	Version No.			
	3	**1**	**1**	**1**

ROLL NUMBER

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 ناظم مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

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

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

	Question	A	B	C	D	A	B	C	D
1.	The multiplicative inverse of $-i$ is:	i	1	$-i$	-1	◯	◯	◯	◯
2.	What is the modulus of a complex number $(8-15i)$?	$8+15i$	17	$\sqrt{161}$	-15	◯	◯	◯	◯
3.	The contrapositive of a conditional $p \to q$ is:	$q \to p$	$\sim q \to p$	$\sim q \to \sim p$	$\sim p \to q$	◯	◯	◯	◯
4.	Which structure in the following is true for the set of natural numbers under multiplication?	Groupoid	Semi group	Monoid	Group	◯	◯	◯	◯
5.	Which one of the following matrices is singular?	$\begin{bmatrix} 1 & -4 \\ 2 & 8 \end{bmatrix}$	$\begin{bmatrix} 1 & 4 \\ \sqrt{4} & 8 \end{bmatrix}$	$\begin{bmatrix} 1 & -4 \\ \sqrt{2} & -8 \end{bmatrix}$	$\begin{bmatrix} -1 & 4 \\ 2 & 8 \end{bmatrix}$	◯	◯	◯	◯
6.	Rank of matrix $\begin{bmatrix} -2 \\ 0 \\ -1 \end{bmatrix}$ is:	0	1	2	3	◯	◯	◯	◯
7.	For what value of k, roots of $kx^2 - 12x + 4 = 0$ are equal?	9	-9	9.5	18	◯	◯	◯	◯
8.	One of the multiplicative factors of $(x^4 - 5x^2 + 4)$ is:	$x+2$	$x-3$	$x+3$	$x+4$	◯	◯	◯	◯
9.	Which one of the following represents $\dfrac{x^3 + 2x^2 + 3}{(x^2+1)(x+4)}$?	Proper fraction	Improper fraction	Cubic polynomial	Polynomial	◯	◯	◯	◯
10.	For what value of x, the numbers $\dfrac{1}{2}, \dfrac{1}{5}, \dfrac{1}{x}$ are in hormonic progression?	-10	-8	8	10	◯	◯	◯	◯
11.	If $\binom{n}{8} = \binom{n}{12}$, then value of n is:	4	8	12	20	◯	◯	◯	◯

	Question	A	B	C	D	A	B	C	D
12.	The probability of getting same upper face on throwing two fair dice simultaneously is:	$\dfrac{1}{12}$	$\dfrac{1}{6}$	$\dfrac{1}{4}$	$\dfrac{1}{2}$	○	○	○	○
13.	The coefficient of third term in the expansion of $\left(x-\dfrac{1}{x}\right)^8$ is:	$\binom{8}{0}$	$\binom{8}{1}$	$\binom{8}{2}$	$\binom{8}{3}$	○	○	○	○
14.	In which quadrant, terminal side of the angle $-510°$ lies?	1st	2nd	3rd	4th	○	○	○	○
15.	$(\mathrm{Sin}\,5x+\mathrm{Sin}\,7x)$ is expressed in product form as:	$2\mathrm{Sin}\,6x\mathrm{Cos}\,x$	$2\mathrm{Cos}\,6x\mathrm{Sin}\,x$	$2\mathrm{Sin}\,6x\mathrm{Sin}\,x$	$2\mathrm{Cos}\,6x\mathrm{Cos}\,x$	○	○	○	○
16.	The value of $\mathrm{Cos}(x+60°)+\mathrm{Cos}(x-60°)$ is:	$\mathrm{Cos}\,x$	$\sqrt{3}\,\mathrm{Cos}\,x$	$\mathrm{Cos}\,2x$	0	○	○	○	○
17.	The period of $\dfrac{8}{7}\mathrm{Sec}(x-\pi)$ is:	$-\pi$	π	3π	$\dfrac{8\pi}{7}$	○	○	○	○
18.	What is the area of a triangle $\triangle ABC$, if $a=10, b=20$ and $\gamma=30°$?	$25\sqrt{2}$	$50\sqrt{3}$	50	$\dfrac{100}{\sqrt{3}}$	○	○	○	○
19.	The value of $\mathrm{Cos}\left[\dfrac{\pi}{6}+\mathrm{Cos}^{-1}\left(-\dfrac{1}{2}\right)\right]$ is:	$\dfrac{1}{2}$	$-\dfrac{1}{2}$	$\dfrac{\sqrt{3}}{2}$	$-\dfrac{\sqrt{3}}{2}$	○	○	○	○
20.	The solution of a trigonometric equation $(\mathrm{Sin}\,x+\mathrm{Cos}\,x=0)$ is:	$-30°$	$-120°$	$45°$	$135°$	○	○	○	○

ROLL NUMBER					

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 $Z_1 = 2 + 3i$ and $Z_2 = 4 + 2i$, then show that $\left(Z_1\overline{Z_2} + \overline{Z_1}Z_2\right)$ is a real number.

(ii)   Construct a truth table of a logical statement $(p \leftrightarrow q) \wedge (p \to q)$

(iii)   Solve for x : $\begin{vmatrix} x & -1 \\ 5 & 1-x \end{vmatrix} = \begin{vmatrix} 1 & 0 & -3 \\ 2 & x & -6 \\ 1 & 3 & x-5 \end{vmatrix}$

(iv)   If α, β are the roots of $x^2 + px + q = 0$, find the quadratic equation whose roots are $\dfrac{\alpha}{\beta}$ and $\dfrac{\beta}{\alpha}$.

(v)   Using properties of the cube roots of unity, verify that $(1+\omega) + (1+\omega)^2 + (1+\omega)^3 = 2\omega$

(vi)   Express $\dfrac{125 + 4x - 9x^2}{(x-1)(x+3)(x+4)}$ in partial fractions.

(vii)   Second term of a geometric sequence is 9 and its fourth term is 1. Find sum to infinity.

(viii) Insert six arithmetic means between 15 and -13.

(ix)   Prove that $\text{Sin}\,\theta$ is a periodic function and its period is 2π

(x)   A die is thrown twice. Find the probability that sum of the upper face numbers is a prime number or an odd number.

(xi)   Find the value of k, if the constant term in the expansion of $\left(2x^2 + \dfrac{k}{x}\right)^6$ is 960.

(xii)   If $\text{Cos}\,\theta = \dfrac{\sqrt{10}}{10}$ with $2\pi < \theta < \dfrac{5\pi}{2}$, then find values of the remaining five trigonometric ratios.

(xiii) Verify that: $\text{Cos}\,4x\,\text{Cos}\,x - \text{Sin}\,6x\,\text{Sin}\,3x = \text{Cos}\,7x\,\text{Cos}\,2x$

(xiv)   In an oblique triangle $\triangle ABC$ (with usual notations) $a = 6$, $c = 12$ and $\beta = 124°$. Apply law of cosines and law of sines to find the values of $'b'$, α .and γ

(xv)   Verify that: $2\tan^{-1}\dfrac{1}{2} + \tan^{-1}\dfrac{1}{7} = \tan^{-1}\dfrac{31}{17}$

(xvi)   Solve the trigonometric equation $\text{Cos}\,5\theta + \text{Cos}\,\theta = \text{Cos}\,3\theta$ where $\theta \in [0, \pi]$

SECTION – C (Marks 32)

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

Q. 3   Use Cramer's rule to solve the system of linear equations. $x + y - z = 3$; $2x - y - z = 1$; $3x + y + 2z = 0$

Q. 4   If three consecutive numbers in an arithmetic progression are increased by $1, 2$ and 3 respectively, the resulting numbers are in geometric progression. Find the original numbers if their sum is 12.

Q. 5   If $y = \dfrac{1}{4} + \dfrac{1.3}{4.8} + \dfrac{1.3.5}{4.8.12} + \dots$ then prove that $y^2 + 2y - 1 = 0$

Q. 6   Without using calculator, prove that $\text{Cos}\,10°.\text{Cos}\,30°.\text{Cos}\,50°.\text{Cos}\,70° = \dfrac{3}{16}$

Q. 7   Solve the following system of equations: $5x^2 - 14xy + 9y^2 = 0$: $4x^2 - 3xy - 16 = 0$

Q. 8   Solve triangles $\triangle ABC$ (with usual notations) if,

(a) $\alpha = 60°$, $\beta = 15°$ and $b = 33$

(b) $b = 23$, $c = 24$ and $\alpha = 75°$

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MATHEMATICS HSSC–I
SECTION – A (Marks 20)
Time allowed: 25 Minutes

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حصہ اول لازمی ہے۔ اس کے جوابات اسی مطبوعہ پرچے کر ناظم مرکز کے حوالے کریں۔ کاٹ کردوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال ممنوع ہے۔

Answer Sheet No. _____

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

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

	Question	A	B	C	D	A	B	C	D
1.	What is the area of a triangle $\triangle ABC$, if $a=1$, $c=2$ and $\beta=60°$?	$\sqrt{3}$	$\dfrac{\sqrt{3}}{2}$	$\dfrac{1}{2}$	1	◯	◯	◯	◯
2.	The value of $\operatorname{Sin}\left(\pi+\operatorname{Sin}^{-1}x\right)$ is:	πx	x	$-x$	$-\pi x$	◯	◯	◯	◯
3.	Which one of the following is a solution of $\operatorname{Sin}2x+\operatorname{Cos}2x=-1$?	$30°$	$45°$	$90°$	$0°$	◯	◯	◯	◯
4.	If $z=-2-3i$ then, what is the value of $z-\bar{z}$?	$6i$	-4	4	$-6i$	◯	◯	◯	◯
5.	The simplified form of i^{18} is:	$-i$	1	-1	i	◯	◯	◯	◯
6.	The converse of the conditional $\sim q \rightarrowtail p$ is:	$\sim q \rightarrow p$	$q \rightarrowtail p$	$\sim p \rightarrowtail q$	$q \rightarrow p$	◯	◯	◯	◯
7.	Which structure in the following is **TRUE** for the set of natural numbers under addition?	Semi group	Monoid	Group	Groupoid	◯	◯	◯	◯
8.	The determinant of a matrix $\begin{bmatrix} i & 0 & \sqrt{3} \\ 0 & i & \sqrt{3} \\ 0 & 0 & i \end{bmatrix}$ is:	i	-1	1	$-i$	◯	◯	◯	◯
9.	Rank of matrix $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ is:	1	2	3	0	◯	◯	◯	◯
10.	If (-1) is a root of $x^3+px^2-x+2=0$, then value of p is:	-4	0	2	-2	◯	◯	◯	◯

	Question	A	B	C	D	A	B	C	D
11.	For what value of m, $\left(x^2 - 2mx - 3\right)$ has zero remainder, when divided by $(x-3)$?	1	-2	2	-1	○	○	○	○
12.	For what value of B, $\dfrac{1}{x^2-1} = \dfrac{A}{x-1} + \dfrac{B}{x+1}$?	2	-1	$-\dfrac{1}{2}$	$\dfrac{1}{2}$	○	○	○	○
13.	If $a-3$, 6, $b+3$ are in arithmatic progression, then value of $(a+b)$ is:	6	12	18	0	○	○	○	○
14.	If $^nP_2 = 30$ then, value(s) of n is/are:	$6, -5$	8	12	$6, 5$	○	○	○	○
15.	The probability of getting two tails when two coins are tossed is:	$\dfrac{1}{6}$	$\dfrac{1}{4}$	$\dfrac{1}{3}$	$\dfrac{1}{2}$	○	○	○	○
16.	The middle term in the expansion of $\left(x - \dfrac{1}{2x}\right)^{12}$ is:	6th	7th	8th	5th	○	○	○	○
17.	If $\mathrm{Sin}^2\theta = \dfrac{1}{7}$ the value of $\mathrm{Sec}^2\theta$ is:	$\dfrac{6}{7}$	$\dfrac{7}{6}$	$\dfrac{8}{7}$	7	○	○	○	○
18.	$2\mathrm{Sin}\,7x\,\mathrm{Cos}\,3x$ is expressed in sum or difference form as:	$\mathrm{Sin}\,10x - \mathrm{Sin}\,4x$	$\mathrm{Sin}\,5x - \mathrm{Sin}\,2x$	$\mathrm{Cos}\,5x + \mathrm{Cos}\,2x$	$\mathrm{Sin}\,10x + \mathrm{Sin}\,4x$	○	○	○	○
19.	The value of $\mathrm{Sin}(90° + x) + \mathrm{Sin}(90° - x)$ is:	0	$-2\mathrm{Sin}\,x$	$-2\mathrm{Cos}\,x$	$2\mathrm{Cos}\,x$	○	○	○	○
20.	The period of $3\mathrm{Cos}\dfrac{x}{5}$ is:	10π	30π	$\dfrac{\pi}{5}$	5π	○	○	○	○

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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 $Z_1 = 3 + 4i$ and $Z_2 = 4 + 3i$, then show that $\left| Z_1 + \dfrac{1}{Z_2} \right| \cong 5$.

(ii)   Construct truth table of a logical statement $(\sim p \to \sim q) \wedge p$

(iii)   Show that $\begin{vmatrix} y+z & x & y \\ z+x & z & x \\ x+y & y & z \end{vmatrix} = (x+y+z)(z-x)^2$

(iv)   If (-5) is a root of the equation $2x^2 + px - 15 = 0$ and the equation $p(x^2 + x) + k = 0$ has equal roots, find values of $'p'$ and $'k'$.

(v)   Using properties of the cube roots of unity, Show that $(x+y)^2 + (x\omega + y\omega^2)^2 + (x\omega^2 + y\omega)^2 = 6xy$

(vi)   Express $\dfrac{x^2 + 2x - 1}{(x)(x+2)(2x-1)}$ in partial fractions.

(vii)   Which term of the arithmetic sequence $4, -4, -12, -20, -28, \dots$ is (-172)?

(viii)   Show that $S_n = \sum_{K=1}^{n}(6k^2 + 4k - 1) = n(n+2)(2n+1)$

(ix)   Prove that $\mathrm{Tan}\,gent$ is a periodic function and its period is π

(x)   A fair cubical die is rolled three times.
   (a)   Find the probability of getting a six all three times.
   (b)   Find the probability of getting no sixes.

(xi)   Find the value of k, if the constant term in the expansion of $\left(4x^2 + \dfrac{k}{2x}\right)^9$ is 84.

(xii)   If $\mathrm{Sin}\,\theta = \dfrac{-\sqrt{15}}{15}$ and $\pi < \theta < \dfrac{3\pi}{2}$, then find values of the remaining trigonometric ratios.

(xiii)   If $\mathrm{Cosec}\,\alpha = \dfrac{5}{3}$, where $0 < \alpha < \dfrac{\pi}{2}$ and $\mathrm{Sec}\,\beta = \dfrac{13}{12}$, where $\dfrac{3\pi}{2} < \beta < 2\pi$, then find the value of $\mathrm{Cos}(\alpha - \beta)$

(xiv)   Two escribed circles of radii r_2 and r_3 are connected with triangle $\triangle ABC$. Using usual notations, prove that
$(r_2 + r_3)\tan\dfrac{\alpha}{2} = a$

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

(xvi)   Solve the trigonometric equation $\mathrm{Sin}\,2x = \sqrt{3}\,\mathrm{Cos}\,x$, where $0 < x < 2\pi$

SECTION – C (Marks 32)

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

Q. 3   Use Cramer's rule to solve the system of linear equations $x + 5y - 3z = -36$; $x + 4y + 2z = -11$; $2x - y = 7$

Q. 4   If $1, 4$ and 3 are added to three consecutive terms of a geometric progression, the resulting numbers are in arithmetic progression. What are the numbers if their sum is 13?

Q. 5   If $y = \dfrac{3}{4} + \dfrac{3.5}{4.8} + \dfrac{3.5.7}{4.8.12} + \dots$ then prove that $y^2 + 2y - 7 = 0$

Q. 6   Without using calculator, prove that $\mathrm{Cos}\,40°.\mathrm{Cos}\,80°.\mathrm{Cos}\,120°.\mathrm{Cos}\,160° = \dfrac{1}{16}$

Q. 7   Solve the following system of equations $6x^2 + 9xy + 3y^2 = 0$; $x^2 - 5xy + 6y^2 = 26$

Q. 8   Solve triangle $\triangle ABC$ (with usual notations) if,
   (a) $a = 7, b = 10$ and $c = 13$
   (b) $a = 25, b = 24$ and $\gamma = 120°$