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Version No.				
3	0	0	8	3

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 معروضات اسی صفحہ پر دے کر نگران مرکز کے حوالے کریں۔ کاٹ کر دوبارہ لکھنے کی اجازت نہیں ہے۔ لیڈ پنسل کا استعمال منع 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.	What is the period of $3\text{Sin}\left(\frac{x}{5}\right)$?	10π	30π	$\frac{\pi}{5}$	5π	○	○	○	○
2.	Which of the given options state the solution of $\text{Sin}\,x+\text{Cos}\,x=0$?	$-\frac{\pi}{6}$	$-\frac{2\pi}{3}$	$\frac{\pi}{4}$	$\frac{3\pi}{4}$	○	○	○	○
3.	What is the multiplicative inverse of $-i$?	1	-1	i	$-i$	○	○	○	○
4.	The real part of $\frac{1+7i}{3-4i}$ is:	$\frac{1}{2}$	1	$\frac{-1}{2}$	-1	○	○	○	○
5.	If A is a matrix of order 3×2, then order of the product $A'A$ is:	3×2	3×3	2×2	2×3	○	○	○	○
6.	If $A=\begin{bmatrix} i & 0 & 0 \\ 0 & i & 0 \\ 0 & 0 & i \end{bmatrix}$, then which one in the options is A^3?	$-iA$	iA	$-A$	A	○	○	○	○
7.	What is the projection of $\underline{a}$ along $\underline{b}$ if $\underline{a}=3\underline{i}+\underline{j}-\underline{k}$ and $\underline{b}=\underline{i}$?	$\frac{3}{\sqrt{1}}$	$\frac{3}{\sqrt{1}}\underline{j}$	$\frac{3}{\sqrt{11}}$	$\frac{3}{\sqrt{11}}\underline{i}$	○	○	○	○
8.	For what value of α, vectors $4\underline{i}+16\underline{j}+\alpha\underline{k}$ and $2\underline{i}+8\underline{j}-4\underline{k}$ are parallel to each other?	34	92	-8	2	○	○	○	○
9.	If $x-3$, 6, $y+3$ are in A.P then value of $x+y$ is:	12	18	0	6	○	○	○	○
10.	The n^{th} term of a series $3\times1^2+5\times2^2+7\times3^2+\ldots..$ is:	$(2n-1)n^2$	$(2n+1)(n+1)^2$	$(2n+1)n$	$(2n+1)n^2$	○	○	○	○

	Question	A	B	C	D	A	B	C	D
11.	In how many ways 5 persons can be seated at a round table?	$4!$	$\frac{1}{2}(4!)$	$5!$	$\frac{1}{2}(5!)$	○	○	○	○
12.	What is the probability of drawing a King from a well shuffled pack of 52 playing cards?	$\frac{13}{52}$	$\frac{4}{52}$	$\frac{1}{52}$	$\frac{2}{52}$	○	○	○	○
13.	What is the coefficient of 3rd term in the expansion of $\left(x-\frac{1}{x}\right)^8$?	${}^8C_3$	${}^8C_4$	1	${}^8C_2$	○	○	○	○
14.	Which one in the given options is true if $2^n > 2(n+1) \quad \forall n \in Z^+$?	$n<3$	$n>3$	$n<2$	$n>2$	○	○	○	○
15.	The graph of $y=x^4$ is symmetrical about:	x-axis	y-axis	Origin	$y=x$	○	○	○	○
16.	$(-1,-1)$ is a solution of the inequality:	$2x+y<-1$	$4x+3y>0$	$-x-2y<0$	$2x-y>1$	○	○	○	○
17.	Which of the following options equates $\text{Cos}196°$?	$\text{Sin}16°$	$-\text{Sin}16°$	$\text{Cos}16°$	$-\text{Cos}16°$	○	○	○	○
18.	If $\text{Cos}\beta=\frac{3}{4}$, then value of $\text{Cos}2\beta$ is:	$\frac{3\sqrt{7}}{8}$	$\frac{-3\sqrt{7}}{8}$	$\frac{1}{8}$	$\frac{-1}{8}$	○	○	○	○
19.	Area of a triangle ΔABC (with usual notations) $a=2, b=\sqrt{3}$ and $\gamma=\frac{\pi}{3}$ is:	$\frac{3}{2}$	3	2	$\frac{\sqrt{3}}{2}$	○	○	○	○
20.	What is the shadow length of a $\sqrt{3}m$ high tree if sun's elevation is $45°$?	$\frac{1}{\sqrt{2}}m$	$\sqrt{3}m$	$1m$	$\frac{1}{\sqrt{3}}m$	○	○	○	○

ROLL NUMBER					

MATHEMATICS HSSC–I

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

SECTION – B (Marks 48)

Q. 2 Solve the following Questions. **(12 x 4 = 48)**

(i)	Simplify $z=\frac{(3+i)^3}{3-i}$ in the form $a+ib$ where $i=\sqrt{-1}$ and find the value of $\lvert z\rvert$.	04	OR	Find row rank of $\begin{bmatrix}1&2&3&2\\4&2&1&3\\5&2&-1&2\end{bmatrix}$	04
(ii)	Solve the system of linear equations. $(3-2i)x+(1+2i)y-1=0$ $(3+2i)x-(1-2i)y-1=0$	04	OR	If 4th and 10th terms of a HP are $\frac{2}{15}$ and $\frac{2}{33}$ respectively, then find its 23rd term.	04
(iii)	If $A=\begin{bmatrix}5&9&2\\4&8&1\\3&7&0\end{bmatrix}$, then show that $(A+A')$ is symmetric.	04	OR	For what value of p, vectors $3p\underline{i}+11\underline{j}-5\underline{k}$ and $2p\underline{i}+p\underline{j}+2\underline{k}$ are mutually perpendicular?	04
(iv)	Find the volume of a tetrahedron with vertices $A(1,2,2)$, $B(2,1,1)$, $C(3,3,4)$ and $D(0,1,5)$	04	OR	Insert four A.Ms between 5 and 25.	04
(v)	If 2nd and 6th terms of a GP are 3 and $\frac{3}{4}$ respectively, find its 16th term.	04	OR	Sum to n-terms the series $1.5+2.6+3.7+4.8+\ldots$	04
(vi)	How many 7-digit different numbers can be formed from the digits 5,5,6,6,9,9,9 using all and how many of them are greater than 9,950,000 ?	04	OR	Prove that $1+4+7+\ldots+(3n-2)=\frac{n(3n-1)}{2}$ by using the mathematical induction.	04
(vii)	For a real valued function $f(x)=\frac{5x-2}{x+2}, x\neq -2$ find $f^{-1}(x)$ and determine its domain and range.	04	OR	If $\text{Cos}\alpha=\frac{3}{5}$, $\text{Sin}\beta=\frac{5}{13}$ with $\frac{\pi}{2}<\beta<\pi$ and $\frac{3\pi}{2}<\alpha<2\pi$, then find the value of $\text{Sin}(\alpha+\beta)$	04
(viii)	State number of diagonals of an n-sided polygon and find number of diagonals of a nine sided polygon.	04	OR	Prove that $\text{Sin}2\theta+\text{Sin}4\theta+\text{Sin}6\theta+\text{Sin}8\theta=4\text{Sin}5\theta\,\text{Cos}2\theta\,\text{Cos}\theta$	04
(ix)	Find the equation of a parabola $y=ax^2+bx+c$ that cuts x-axis at points $(-4,0)$, $(4,0)$ and passes through a point $(0,8)$.	04	OR	A pair of fair dice is thrown. The number of dots on the top are added. What is the probability of getting a sum greater than 9 or a sum divisible by 5.	04
(x)	Verify that $\text{Cos}^4\theta=\frac{1}{8}(3+2\text{Cos}2\theta+\text{Cos}4\theta)$	04	OR	Solve triangle ABC with $\alpha=31°5'$, $\beta=50°55'$ and $C=13cm$ using usual notations.	04
(xi)	Find radii of the escribed circles of triangle ABC opposite to the largest and smallest sides given that $a=13, b=10$ and $c=7$ (using usual notations)	04	OR	Without drawing, guess the graph of $y=\text{Sin}\frac{\theta}{6}$ and find its period, frequency and amplitude.	04
(xii)	Verify that $2S=8R\text{Cos}\frac{\alpha}{2}\text{Sin}\frac{\beta}{2}\text{Cos}\frac{\gamma}{2}$	04	OR	Verify that $\text{Tan}^{-1}\frac{3}{4}-\text{Tan}^{-1}\frac{4}{3}+2\text{Tan}^{-1}\frac{1}{7}=0$	04

SECTION – C (Marks 32)

Note: Solve the following Questions. **(4 x 8 = 32)**

(Use of graph paper is not necessary. Candidates can make their own grid on answer book)

Q.3	Find inverse of the matrix $\begin{bmatrix}1&1&2\\3&-1&1\\-1&3&4\end{bmatrix}$	08	OR	If $\underline{a}=-10\underline{i}+2\underline{j}+4\underline{k}$ and $\underline{b}=\underline{i}-\underline{j}+2\underline{k}$ then find a unit vector orthogonal to $\underline{a}\times\underline{b}$. Also find angle between the vectors $\underline{a}$ and $\underline{b}$.	08
Q.4	Use Gauss Jordan method to solve the system of linear equations: $x-2y+z=3$; $3x+5y=11$; $4y+3z=13$	08	OR	If $y=\frac{1}{2(1!)}\left(\frac{1}{6}\right)+\frac{1.3}{4(2!)}\left(\frac{1}{6}\right)^2+\frac{1.3.5}{8(3!)}\left(\frac{1}{6}\right)^3+\ldots$ then verify that $5y^2+10y-1=0$	08
Q.5	Find point of intersection of the functions $f(x)=-x+6$ and $g(x)=x^2-4x+6$ graphically.	08	OR	Find general solution of a trigonometric equation $3\text{Cos}x+3=2\text{Sin}^2x$	08
Q.6	Find maximum and minimum values of a function $f(x,y)=2x+3y$ subject to the constraints $x+2y\leq 10$, $3x+y\leq 9$, $9x+8y\leq 72$, $x\geq 0, y\geq 0$	08	OR	Sketch the graph of $y=2\text{Cos}\frac{\theta}{2}$; $-\pi\leq\theta\leq\pi$	08

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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 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 $z=-3-5i$ then value of $\bar{z}-z$ is:	$3+10i$	6	$6+10i$	$10i$	○	○	○	○
2.	What is the modulus of complex number $\frac{4+2i}{1-2i}$?	$\frac{10}{3}$	$\frac{10}{\sqrt{5}}$	2	4	○	○	○	○
3.	For what value of x, $\begin{bmatrix}2&2&2\\0&x&6\\0&0&6\end{bmatrix}$ is a singular matrix?	0	1	$\frac{1}{12}$	12	○	○	○	○
4.	If $\begin{bmatrix}1&2\\3&4\\4&6\end{bmatrix}A=\begin{bmatrix}1&0&2\\2&0&1\\3&1&2\end{bmatrix}$, then order of matrix A is:	2×2	2×3	3×2	3×3	○	○	○	○
5.	For what value of α, vectors $3\underline{i}+4\underline{j}-\underline{k}$ and $\underline{i}-\alpha\underline{j}$ have the same magnitude?	25	±5	$\sqrt{23}$	$\frac{3}{4}$	○	○	○	○
6.	If $\lvert\underline{a}\cdot\underline{b}\rvert=\lvert\underline{a}\times\underline{b}\rvert$ then angle between vectors $\underline{a}$ and $\underline{b}$ is:	$30°$	$45°$	$90°$	$180°$	○	○	○	○
7.	For what value of q, numbers $\frac{1}{3},\frac{1}{5},\frac{1}{q}$ are in H.P?	$\frac{1}{7}$	$\frac{1}{15}$	7	15	○	○	○	○
8.	n^{th} term of a series $2\times1^2+4\times2^2+6\times3^2+\ldots$ is:	$(2n)n^2$	$(2n+1)n^2$	$(2n+2)n^2$	$2n^2$	○	○	○	○
9.	In how many ways 5 keys can be arranged on a circular key ring?	$5!$	$\frac{1}{2}(5!)$	$4!$	$\frac{1}{2}(4!)$	○	○	○	○
10.	What is the probability of getting one head on tossing two fair coins?	$\frac{1}{4}$	$\frac{2}{4}$	$\frac{3}{4}$	$\frac{4}{4}$	○	○	○	○

	Question	A	B	C	D	A	B	C	D
11.	In the expansion of $\left(x-\frac{1}{x}\right)^{11}$ 6^{th} term from end is:	5^{th}	6^{th}	7^{th}	8^{th}	○	○	○	○
12.	For which given least value of n, the expression $n!>\left(2^n-1\right)$ remains true?	1	2	3	4	○	○	○	○
13.	The graph of $y=2x^2-6x$ cuts x-axis at point(s):	$(0,0)$ only	$(3,0)$ only	$(0,0),(3,0)$	$(0,0),(-3,0)$	○	○	○	○
14.	$(0,0)$ is **NOT** a solution of the inequality:	$x+y+1>0$	$x-y<1$	$2x+y<1$	$-2x+y+1<0$	○	○	○	○
15.	Which one of the given options, equates $\mathrm{Sin}(254°)$?	$\mathrm{Cos}16°$	$-\mathrm{Cos}16°$	$\mathrm{Sin}16°$	$-\mathrm{Sin}16°$	○	○	○	○
16.	Which one of the given options, equates $2\mathrm{Sin}7x\mathrm{Sin}3x$?	$\mathrm{Cos}10x-\mathrm{Cos}4x$	$\mathrm{Cos}10x+\mathrm{Cos}4x$	$\mathrm{Cos}4x-\mathrm{Cos}10x$	$-\mathrm{Cos}4x-\mathrm{Cos}10x$	○	○	○	○
17.	What is the area of triangle ΔABC with $a=2, c=4, \beta=\frac{\pi}{6}$ (usual notations)	2	$2\sqrt{3}$	4	$4\sqrt{3}$	○	○	○	○
18.	If shadow length of a building is $\frac{1}{\sqrt{3}}$ times its height, the elevation angle of sun is:	30°	45°	60°	90°	○	○	○	○
19.	What is the period of $5\mathrm{Sec}\left(\frac{x}{3}\right)$?	$\frac{2\pi}{3}$	3π	6π	30π	○	○	○	○
20.	One solution of the equation $\mathrm{Cos}x+\mathrm{Sin}x=\sqrt{2}$ is:	$\frac{-\pi}{4}$	$\frac{\pi}{4}$	$\frac{2\pi}{4}$	$\frac{3\pi}{4}$	○	○	○	○

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ROLL NUMBER					

MATHEMATICS HSSC–I

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

SECTION – B (Marks 48)

Q. 2 Solve the following Questions. **(12 x 4 = 48)**

(i)	Simplify $z=\frac{(4-6i)(2+i)}{(3+i)(1+i)}$ in the form $a+ib$ where $i=\sqrt{-1}$ and find the value of $\lvert z\rvert$.	04	OR	Find the value of x, if $\begin{bmatrix} x+1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & x+9 \end{bmatrix}$ is a singular matrix.	04
(ii)	Solve the system of linear equations. $(2+3i)x+(1-i)y-11=0$ $(1+i)x+(2-3i)y-11=0$	04	OR	A particle acted by constant force $2\underline{i}+\underline{j}, \underline{i}+2\underline{j}, \underline{i}+\underline{j}+\underline{k}$ and $3\underline{i}-2\underline{j}+4\underline{k}$ is displaced from point $P(0,-2,-3)$ to point $Q(2,0,6)$. Find the work done.	04
(iii)	If $A=\begin{bmatrix} 7 & 8 & 6 \\ 6 & 7 & 5 \\ 5 & 6 & 4 \end{bmatrix}$, then show that $(A-A')$ is skew-symmetric.	04	OR	Find number of different arrangements that can be made from the letters of word PARALELLOGRAM (using all) and how many of these begin with PE and end with OM?	04
(iv)	Insert four G.Ms between 7 and 1701	04	OR	Find the volume of a parallelepiped with adjacent edges defined by vertices. $A(0,1,2), B(1,2,1), C(5,5,6)$ and $D(3,3,1)$	04
(v)	The 11th and 19th terms of an AP are 42 and 74 respectively. Find the sum of first 20 terms of AP.	04	OR	Sum to n-terms the series $1.2+2.3+3.4+\ldots$	04
(vi)	Verify that $3+7+11+\ldots+(4n-1)=n(2n+1)$ by using the mathematical induction.	04	OR	Find the values of 'n' and 'r' if ${}^{n}P_{r}=15120$ and ${}^{n}C_{r}=126$	04
(vii)	In an HP, 8th term is $\frac{2}{5}$ and 17th term is $\frac{2}{11}$. Find 35th term of the HP.	04	OR	For a real valued function $f(x)=\frac{3x-2}{x+4}$, find $f^{-1}(x)$ and determine its domain and range.	04
(viii)	In a single throw of two fair dice, the number of dots on the top are added. Find the probability of getting a sum of 7 or 9.	04	OR	Without drawing, guess the graph of $y=\text{Cos}\frac{1}{6}\theta$. Also find its period, frequency and amplitude.	04
(ix)	If $\text{Sec}\alpha=\frac{5}{4}, \text{Sec}\beta=\frac{13}{5}$ with $\frac{3\pi}{2}<\alpha<2\pi$ and $\frac{3\pi}{2}<\beta<2\pi$, then find the value of $\tan(\alpha+\beta)$.	04	OR	Solve triangle ABC with $a=15, c=20$ and $\beta=60°$ using usual notations.	04
(x)	Verify that $\text{Cos}3\theta+\text{Cos}5\theta+\text{Cos}7\theta+\text{Cos}9\theta=4\text{Cos}\theta\,\text{Cos}2\theta\,\text{Cos}6\theta$	04	OR	Find radii ('R' and 'r') of circumscribed and inscribed circles of triangle ABC with side measures $a=4cm, b=7cm$ and $c=9cm$ (use usual notations).	04
(xi)	Verify that $2r=8R\text{Sin}\frac{\alpha}{2}\text{Sin}\frac{\beta}{2}\text{Sin}\frac{\gamma}{2}$ (use usual notations).	04	OR	Verify $\text{Sin}^4\theta=\frac{1}{8}(3+\text{Cos}4\theta-4\text{Cos}2\theta)$	04
(xii)	Verify that $\left(\text{Sin}^{-1}\frac{1}{\sqrt{5}}+\text{Sin}^{-1}\frac{1}{\sqrt{10}}\right)+\left(\text{Cos}^{-1}\frac{2}{\sqrt{5}}+\text{Cos}^{-1}\frac{3}{\sqrt{10}}\right)=\frac{\pi}{2}$	04	OR	Find equation of a parabola $y=ax^2+bx+c$ $(\forall a,b,c\in R)$ that cuts x-axis at points $(-5,0),(4,0)$ and passes through a point $(1,18)$	04

SECTION – C (Marks 32)

Note: Solve the following Questions. **(4 x 8 = 32)**
(Use of graph paper is not necessary. Candidates can make their own grid on answer book)

Q.3	Find inverse of the matrix $\begin{bmatrix} 1 & 1 & 2 \\ 3 & -1 & 1 \\ -1 & 3 & 4 \end{bmatrix}$	08	OR	Find a vector of magnitude 14 units orthogonal to vectors $\underline{a}=-\underline{i}+3\underline{j}$ and $\underline{b}=\underline{i}+2\underline{k}$ both. Also find angle between the vectors $\underline{a}$ and $\underline{b}$.	08
Q.4	Use Gauss Jordan method to solve the system of linear equations. $-x+y+2z=2;\quad 3x-y+z=6;\quad -x+3y+4z=4$	08	OR	Find the point of intersection graphically from the following functions. $f(x)=-x+4;\quad g(x)=x^2-3x+1$	08
Q.5	If $y=\frac{1}{(1!)2}\left(\frac{1}{4}\right)+\frac{1.3}{(2!)4}\cdot\left(\frac{1}{4}\right)^2+\frac{1.3.5}{(3!)8}\left(\frac{1}{4}\right)^3+\ldots$, then prove that $3y^2+6y-1=0$	08	OR	Find general solution of a trigonometric equation $\text{Cos}2x=\text{Sin}x$	08
Q.6	Find maximum and minimum values of a function $f(x,y)=3x+2y$ subject to the constraints $x+2y\le 8,\quad 5x-2y\le 10,\quad 7x-5y\ge -35,\quad x\ge 0,\quad y\ge 0$	08	OR	Sketch the graph of $y=\text{Sin}\frac{\theta}{2};\quad -\pi\le\theta\le\pi$	08