43

Version No.				
3	0	0	8	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 اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دیے کر ناظم 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.	What are the multiplicative factors of z^2+4z+5?	$(z+2-i)$ $(z+2+i)$	$(z-2-i)$ $(z-2+i)$	$(z+2-2i)$ $(z+2+2i)$	$(z-2-2i)$ $(z-2+2i)$	○	○	○	○
2.	The principal argument (θ) of the complex number $z=-1+i\sqrt{3}$ is:	$-\frac{\pi}{3}$	$\frac{\pi}{3}$	$\frac{2\pi}{3}$	$\frac{5\pi}{3}$	○	○	○	○
3.	A system of linear equations is said to be inconsistent if it has:	No solution	At least one solution	Infinitely many solutions	Exactly two solutions	○	○	○	○
4.	If A is a 3 x 3 matrix, then $\lvert 3A \rvert$ results	$3\lvert A \rvert$	$6\lvert A \rvert$	$9\lvert A \rvert$	$27\lvert A \rvert$	○	○	○	○
5.	In an arithmetic sequence, $a_1 = 5$ and $a_{15} = 75$. What is the common difference?	3	4	5	6	○	○	○	○
6.	If $\frac{1}{2}, \frac{1}{x}, \frac{1}{5}$ are in harmonic sequence then what is the value of x?	$\frac{2}{7}$	$\frac{7}{2}$	$\frac{7}{10}$	$\frac{10}{7}$	○	○	○	○
7.	What is the first term of an infinite geometric series whose sum is 10, and common ratio 0.6?	4	5	6	7	○	○	○	○
8.	What is the sum of the series up to 4 terms? $1+3+5+\cdots+(2n-1)=n^2 \quad \forall n \in N$	7	9	15	16	○	○	○	○
9.	What is the middle term in the expansion of $(x+y)^6$?	$\binom{6}{2}x^3y^3$	$\binom{6}{3}x^3y^3$	$\binom{6}{3}x^4y^2$	$\binom{6}{2}x^4y^2$	○	○	○	○
10.	In signal processing, $P(x)$ represents a signal. If $P(-1)=0$, then the signal has:	A zero at $x=-1$	Unstablity	Periodicity	Error	○	○	○	○
11.	If dot product of two vectors is zero then angle between them is:	180°	90°	45°	0°	○	○	○	○

	Question	A	B	C	D	A	B	C	D
12.	If $\vec{a}.\vec{b}\times\vec{c}=12$ then volume of parallelepiped with $\vec{a}$, $\vec{b}$ and $\vec{c}$ as co–terminal edges is:	6	12	24	36	○	○	○	○
13.	A force $\vec{F}=2\hat{i}+\hat{j}+3\hat{k}$ moves an object along a displacement vector $\vec{d}=3\hat{i}+4\hat{j}-2\hat{k}$. What is the work done?	–4	10	4	16	○	○	○	○
14.	If $\tan\theta=2$, what is the value of $\cos\theta$ when θ is in the first quadrant?	$\frac{1}{\sqrt{3}}$	$\frac{2}{\sqrt{5}}$	$\sqrt{5}$	$\frac{1}{\sqrt{5}}$	○	○	○	○
15.	If $sinx=\frac{3}{5}$, what is the value of $sin2x$? $(0°<x<90°)$	$\frac{12}{25}$	$\frac{24}{25}$	$\frac{7}{25}$	$\frac{25}{25}$	○	○	○	○
16.	If graph of a function is symmetric about origin (e.g. $\sin x$), what type of function is it?	Even	Odd	Neither Even nor Odd	Periodic but not Symmetric	○	○	○	○
17.	The range of a trigonometric function $4sin4x$ is:	$[-1, 1]$	$[-4, 4]$	$[-16, 16]$	$(-\infty,+\infty)$	○	○	○	○
18.	The expression $sin75^{\circ}cos15^{\circ}$ is equivalent to:	$\frac{1}{2}(\sin90^{\circ}+\sin60^{\circ})$	$\frac{1}{2}(\cos90^{\circ}+\cos60^{\circ})$	$\frac{1}{2}(\sin60^{\circ}-\sin90^{\circ})$	$\frac{1}{2}(\cos60^{\circ}-\cos90^{\circ})$	○	○	○	○
19.	How many 5-letter words can be formed from the word 'MATHS' without repeating any letter?	20	60	120	240	○	○	○	○
20.	In how many different ways a player can select 6 numbers from a set of 49 numbers, in a lottery?	${}^{49}C_6$	$\frac{49!}{6!}$	${}^{49}P_6$	6!	○	○	○	○

$$S_{\infty}=\frac{a_1}{1-r}$$

ROLL NUMBER							

MATHEMATICS HSSC–I

44

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

SECTION – B (Marks 48)

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

(i)	Solve the quadratic equation $3z^2+2z+2=0,\ z\in C$ by completing the square method.	04	OR	A triangular park has its three corners located at points **A (2, 3, 1)**, **B (5, 7, 2)**, and **C (1, 4, 3)**. Find area of the park using cross product of vectors.	04
(ii)	Verify that:. $sin\theta\cdot sin\left(\frac{\pi}{3}-\theta\right)\cdot sin\left(\frac{\pi}{3}+\theta\right)=\frac{1}{4}sin3\theta$	04	OR	Verify that: $\binom{n}{r}+\binom{n}{r-1}=\binom{n+1}{r}$	04
(iii)	Find the value of p such that vectors $\hat{i}+2\hat{j}+p\hat{k}$, $3\hat{i}+p\hat{j}+4\hat{k}$ and $2\hat{i}+3\hat{j}+4\hat{k}$ are coplanar.	04	OR	Find the maximum and minimum values of the function $f(\theta)=\frac{1}{3+5\cos(2\theta+\pi)}$	04
(iv)	If $P(x)=x^4-6x^3+11x^2-6x$, then (a) Divide $P(x)$ by $(x-1)$ using synthetic division (b) Solve the resulting depressed equation.	04	OR	A harmonic sequence has 2nd term $\frac{1}{6}$ and 4th term $\frac{1}{12}$ Find general term of the sequence.	04
(v)	Without drawing graph find range, amplitude, period and frequency of the function $y=-4cos(7x-\pi)$	04	OR	Find the term containing x^3 in the expansion of $(x+2)^6$.	04
(vi)	In an arithmetic sequence, the 5th term is 15, and the 12th term is 50. Find a) Common difference and b) First term of the sequence.	04	OR	Verify that: $\frac{1+sin2\theta+cos2\theta}{1+sin2\theta-cos2\theta}=cot\theta$	04
(vii)	Verify that $\begin{vmatrix}1 & a & a^2\\ 1 & b & b^2\\ 1 & c & c^2\end{vmatrix}=(b-a)(c-a)(c-b)$	04	OR	If $tan\theta=\frac{3}{4}$ with $\pi<\theta<\frac{3\pi}{2}$, find the exact values of (a) $sin\left(\frac{\theta}{2}\right)$ and (b) $cos\left(\frac{\theta}{2}\right)$ without using calculator.	04
(viii)	A bouncing ball rebounds 80% of its previous height. If the ball is dropped from a height of 50 meters. Find the total distance traveled by the ball before coming to rest.	04	OR	How many words can be formed by using the letters from the word "EDUCATION" such that all the vowels are never together?	04
(ix)	Use the principle of mathematical induction to prove that $1^3+2^3+3^3+\ldots+n^3=\left(\frac{n(n+1)}{2}\right)^2\ \forall n\in N,\ n\geq 1$.	04	OR	Find rank of the matrix $\begin{bmatrix}1 & 1 & 0 & -2\\ 2 & 0 & 2 & 2\\ 4 & 1 & 3 & 1\end{bmatrix}$	04
(x)	If $z_1=10\left(\cos100^\circ+i\sin100^\circ\right)$ and $z_2=5\left(\cos40^\circ+i\sin40^\circ\right)$, then find the following in polar form: (a) $z_1\cdot z_2$, (b) $\frac{z_1}{z_2}$.	04	OR	A solar panel's sunlight reception is modeled as $P(\theta)=100\ cos\left(3\theta-90^\circ\right)$, with $0^\circ\leq\theta\leq180^\circ$ (a) Find angle for the maximum sunlight and the max sunlight received. (b) Find angle for the minimum sunlight and the min sunlight received.	04
(xi)	A force $\vec{F}=6\hat{i}+8\hat{j}+4\hat{k}$ acts on an object. The object moves from A (1,2,3) to point B(4,6,5). (a) Find the displacement vector $\vec{d}$. (b) Calculate work done by the force $\vec{F}$.	04	OR	If $P(x)=ax^3+bx^2+2x-1$, leaves remainder 5 when divided by $(x-1)$ and leaves remainder 3 when divided by $(x+1)$. Find values of a and b using remainder theorem.	04
(xii)	Solve $x+y+z=3;\ y+z=2;\ z=2$ using Cramer's rule:	04	OR	Use binomial theorem to approximate the value of $\sqrt{101}\times\sqrt{99}$ up to three places of decimal.	04

SECTION – C (Marks 32)

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

Q.3	If $P(x)=2x^3+x^2-13x+6$, then **a)** Verify that $(x+3)$ is a factor of $P(x)$. **b)** Factorize $P(x)$ using synthetic division. **c)** Find all the roots of $P(x)$. **d)** Write complete factorized form of $P(x)$ and confirm by expanding.	08	OR	If $\vec{a}=3\hat{i}-2\hat{j}+4\hat{k}$ and $\vec{b}=\hat{i}+2\hat{j}-\hat{k}$, then (a) Find $\vec{a}\times\vec{b}$. (b) Find $\left(\vec{a}\times\vec{b}\right)\cdot\vec{a}$ and verify that $\vec{a}\times\vec{b}\perp\vec{a}$. (c) Find $\left(\vec{a}\times\vec{b}\right)\cdot\vec{b}$ and verify that $\vec{a}\times\vec{b}\perp\vec{b}$	08
Q.4	If x is very small such that its square and higher powers can be neglected, then show that : $\frac{(16+4x)^{\frac{3}{4}}}{(4+x)\sqrt{9-6x}}\approx\frac{2}{3}+\frac{13x}{72}$	08	OR	Verify the fundamental law of trigonometry: $\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$ Where α,β are real angles in standard position and $\alpha>\beta$.	08
Q.5	Solve $x+2y-3z=4$, $2x-3y+4z=5$, $3x+4y-5z=6$ using the Gaussian elimination method.	08	OR	$y=3cos2x\ ;-\frac{\pi}{2}\leq x\leq\frac{\pi}{2}$ **a)** Make table of values for given interval **b)** Draw the graph of the function for given interval	08
Q.6	For an arithmetic-geometric series: $1+5\left(\frac{1}{2}\right)^1+9\left(\frac{1}{2}\right)^2+13\left(\frac{1}{2}\right)^3+\ldots$ (a) Find general term of the series. (b) Sum the series upto n terms, (c) Sum the series upto infinite terms.	08	OR	A company has 7 engineers and 5 managers. In how many ways can a project team of 5 be selected if it includes: (a) 3 engineers and 2 managers? (b) 4 engineers and 1 manager? (c) At least 4 engineers? (d) At the most 1 manager?	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 اوّل لازمی ہے۔ اس کے جوابات اسی صفحہ پر دیے کرنا ظم 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 پر 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 are the multiplicative factors of z^2+9 ?	$(z+3i)(z-3i)$	$(z-3)(z+3)$	$(z+3)^2$	$(z-3i)^2$	○	○	○	○
2.	The rectangular form of $4\left(\cos\frac{2\pi}{3}+i\sin\frac{2\pi}{3}\right)$ is:	$-2+2i\sqrt{3}$	$-2-2i\sqrt{3}$	$2+2i\sqrt{3}$	$2-2i\sqrt{3}$	○	○	○	○
3.	A system of linear equations is said to be inconsistent if it has:	No solution	At least one solution	Exactly one solution	Exactly two solution	○	○	○	○
4.	If $\begin{vmatrix} a & b & c \\ d & e & f \\ g & h & i \end{vmatrix}=5$, then $\begin{vmatrix} 2a & 2b & 2c \\ 3d & 3e & 3f \\ g & h & i \end{vmatrix}=$	6	10	15	30	○	○	○	○
5.	In an arithmetic series, if $a=2$, $d=4$ then $S_{15}=$	240	450	480	510	○	○	○	○
6.	What is the sum of first two terms of an arithmetic-geometric sequence $T_n=(2n+1)\cdot 3^{n-1}$? $(n\in N)$	5	11	18	23	○	○	○	○
7.	For what value of x geometric series $1+2x+4x^2+8x^3+\ldots$ converges? $(r<1)$	$\frac{1}{2}$	$\frac{1}{4}$	1	$\frac{2}{1}$	○	○	○	○
8.	The number of ways to climb a 10-step staircase (taking either 1 or 2 steps at a time) is 89. Which method justifies the best conclusion?	Empirical counting	Pascal's Triangle	Mathematical Induction	Binomial Theorem	○	○	○	○
9.	What is the middle term in the expansion of $(x+y)^6$?	$\binom{6}{2}x^3y^3$	$\binom{6}{3}x^3y^3$	$\binom{6}{3}x^4y^2$	$\binom{6}{2}x^4y^2$	○	○	○	○
10.	The division of $2x^3-5x^2+3x-1$ by $(x-2)$ gives remainder:	–3	0	5	1	○	○	○	○
11.	If dot product of two vectors is zero then angle between them is:	180°	90°	45°	0°	○	○	○	○
12.	If $\vec{a}\perp\vec{b}$, then projection of $\vec{a}$ on $\vec{b}$ is:	–1	0	1	Undefined	○	○	○	○

	Question	A	B	C	D	A	B	C	D
13.	What is the volume of a parallelepiped formed by vectors $\hat{i}+\hat{j}$, $\hat{j}+\hat{k}$ and $\hat{k}+\hat{i}$?	0	1	$\sqrt{2}$	2	○	○	○	○
14.	$sin75^{\circ}cos15^{\circ} =$	$\frac{1}{2}(sin90^{\circ}+sin60^{\circ})$	$\frac{1}{2}(\cos 90^{\circ}+\cos 60^{\circ})$	$\frac{1}{2}(\sin 60^{\circ}-\sin 90^{\circ})$	$\frac{1}{2}(\cos 60^{\circ}-\cos 90^{\circ})$	○	○	○	○
15.	What is value of $cos\left(\frac{\theta}{2}\right)$, if $cos\theta=\frac{1}{2}$; $(0<\theta<90°)$	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2\sqrt{2}}$	○	○	○	○
16.	Which of the following is an odd function?	$f(x)=cosx$	$f(x)=sinx+cosx$	$f(x)=tanx$	$f(x)=secx$	○	○	○	○
17.	The range of $f(x)=3cosx+4$ is:	$[-1, 1]$	$[1, 7]$	$[-3, 3]$	$[4, 7]$	○	○	○	○
18.	Which function's graph is symmetric about y-axis?	$y=sinx$	$y=tanx$	$y=cosx$	$y=cscx$	○	○	○	○
19.	A cell phone password consists of 4 distinct digits (0-9). How many possible passwords can be set?	${}^{10}C_4$	${}^{10}P_4$	${}^{9}C_4$	${}^{9}P_4$	○	○	○	○
20.	How many 5-letter words can be formed from the word 'TABLE' without repeating any letter?	20	60	120	240	○	○	○	○

$$S_n=\frac{n}{2}[2a+(n-1)d]$$

ROLL NUMBER						

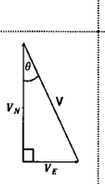
MATHEMATICS HSSC–I

46

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

SECTION – B (Marks 48)

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

(i)	Express the following in rectangular form. **a)** $\left[5\left(cos45^\circ + i\,sin45^\circ\right)\right]\left[4\left(cos15^\circ + i\,sin15^\circ\right)\right]$ **b)** $\dfrac{\left[27\left(cos120^\circ + i\,sin120^\circ\right)\right]}{\left[3\left(cos60^\circ + i\,sin60^\circ\right)\right]}$	**04**	**OR**	A mechanic applies a force $\vec{F} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ at point $A\,(14,-3,\,6)$ to turn a bolt with pivot at $P\,(2,-2,1)$. Find: **(a)** the moment arm $\vec{r}$ and **(b)** the moment vector $\vec{M}$ about the bolt.	**04**
(ii)	Verify that: $cos\theta \,.\, cos\left(\dfrac{\pi}{3}-\theta\right) \,.\, cos\left(\dfrac{\pi}{3}+\theta\right) = \dfrac{1}{4}cos3\theta$	**04**	**OR**	Verify that: ${}^{n}P_r = {}^{n-1}P_r + r\,.\,{}^{n-1}P_{r-1}$	**04**
(iii)	Find the value of λ such that vectors $\hat{i}+4\hat{j}+2\hat{k}$, $2\hat{i}-\hat{j}+3\hat{k}$ and $\lambda\hat{i}+3\hat{j}+5\hat{k}$ are coplanar.	**04**	**OR**	Find the maximum and minimum values of the function: $f(\theta) = \dfrac{1}{3+4sin(5\theta+\pi)}$	**04**
(iv)	If $P(x) = 3x^3 - 5x^2 - 16x + 12$, then **(a)** Use factor theorem to verify that $(x+2)$ is a factor of $P(x)$. **(b)** Apply synthetic division to factorize $P(x)$ completely.	**04**	**OR**	A harmonic sequence has 3rd term $\dfrac{1}{8}$ and 5th term $\dfrac{1}{20}$. Find: **(a)** the general term and **(b)** the 15th term of the sequence.	**04**
(v)	Without drawing graph find range, amplitude, period and frequency of the function $y = -3sin\left(5x + \dfrac{\pi}{3}\right)$	**04**	**OR**	A force $\vec{F} = 5\hat{i} + 3\hat{j} + 4\hat{k}$ is applied to move an object from $A(2,3,1)$ to $B(5,7,4)$. Find work done by the force.	**04**
(vi)	In an arithmetic sequence, first term is 12, and 10th term is 48. Find: **a)** the common difference and **b)** the sum of the first 12 terms of the sequence.	**04**	**OR**	Verify that: $\dfrac{cos\theta + cos4\theta + cos7\theta}{sin\theta + sin4\theta + sin7\theta} = \cot 4\theta$	**04**
(vii)	Verify that $\begin{vmatrix} a+k & a & a \\ a & a+k & a \\ a & a & a+k \end{vmatrix} = k^2(3a+k)$	**04**	**OR**	If $\sin\theta = -\dfrac{3}{5}$ and θ lies in 3rd quadrant, find the exact values of **(a)** $\cos(180^\circ + \theta)$ **(b)** $\tan(270^\circ - \theta)$	**04**
(viii)	A falcon dives from a height of 100 meters to catch its prey and then ascends back to 85% of its previous height after each unsuccessful attempt. Find the total vertical distance travelled by the falcon before stopping its attempts.	**04**	**OR**	A boat is sailing north at 10 km/h but is also being pushed east by ocean currents at 5 km/h. Find: **(a)** actual speed (V) of the boat. **(b)** direction angle (θ) of the boat relative to due north. 	**04**
(ix)	Use principle of mathematical induction to prove that: $1^2 + 2^2 + 3^2 + \cdots + n^2 = \dfrac{n(n+1)(2n+1)}{6}$ $\forall n \in N,\ n \geq 1$	**04**	**OR**	Find rank of the matrix: $\begin{bmatrix} 1 & 1 & 0 & -2 \\ 2 & 0 & 2 & 2 \\ 4 & 1 & 3 & 1 \end{bmatrix}$	**04**
(x)	Solve the simultaneous linear equations $2iz - 3iw = 4$ and $-3iz + 5iw = 9$ carrying complex coefficients $\left(i = \sqrt{-1}\right)$.	**04**	**OR**	A bakery offers 2 types of breads, 7 types of fillings and 5 types of sauces for a custom sandwich: **(a)** How many different sandwich combinations can be made? **(b)** How many weeks can a customer eat a different sandwich each day without repetition?	**04**
(xi)	Find the term containing x^4 in the expansion of $(2x-3)^7$.	**04**	**OR**	A checksum polynomial $C(x) = x^4 + px^2 + qx + 6$ is used to detect errors in transmitted data. **(a)** If $C(1)=10$ and $C(-1)=4$, set equations for p and q. **(b)** Solve the equations to find values of p and q.	**04**
(xii)	Solve the system $x - y + z = 1;\ x - z = 2;\ z = 3$ using Cramer's rule.	**04**	**OR**	Use binomial theorem to approximate the value of $\dfrac{(1.03)^4}{(0.98)^3}$ upto three places of the decimal.	**04**

SECTION – C (Marks 32)

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

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

Q.3	A polynomial $P(x)=x^4+ax^3-5x^2+bx+c$ **(a)** Leaves remainder 0 when divided by $(x-0)$ **(b)** Leaves remainder –3 when divided by $(x-2)$ **(c)** Leaves remainder –4 when divided by $(x+1)$ Use remainder theorem to find values of a,b and c	**08**	**OR**	If $\vec{a}=5\hat{i}-3\hat{j}+\hat{k}$ and $\vec{b}=-2\hat{i}+6\hat{j}+4\hat{k}$, then **(a)** Find $\vec{a}\times\vec{b}$ **(b)** Find $(\vec{a}\times\vec{b})\cdot\vec{a}$ and verify that $\vec{a}\times\vec{b}\perp\vec{a}$ **(c)** Find $(\vec{a}\times\vec{b})\cdot\vec{b}$ and verify that $\vec{a}\times\vec{b}\perp\vec{b}$	**08**
Q.4	If x is very small such that its square and higher powers can be neglected, then show that $\frac{(8+2x)^{\frac{2}{3}}}{(2+x)(\sqrt{4-2x})}\approx 1-\frac{x}{12}$	**08**	**OR**	Verify the fundamental law of trigonometry: $\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$ Where α,β are real angles in standard position and $\alpha>\beta$.	**08**
Q.5	Solve the system $x+y+z=6,\ 2x+3y+z=11,\ 3x+y+2z=8$ using the Gaussian elimination method.	**08**	**OR**	$y=2\sin(2x)\ ;\ -\frac{\pi}{2}\le x\le\frac{\pi}{2}$ **a)** Make table of values for given interval **b)** Draw the graph of the function for given interval	**08**
Q.6	For an arithmetic-geometric series: $1(1)+3\left(\frac{1}{2}\right)+5\left(\frac{1}{4}\right)+7\left(\frac{1}{8}\right)+9\left(\frac{1}{16}\right)+....$ **(a)** Find n^{th} term of the series , **(b)** Sum the series up to n terms and **(c)** Sum the series up to infinite terms	**08**	**OR**	A basketball club has 7 forwards and 5 guards. In how many ways a team of 5 can be selected if it includes: **(a)** 3 forwards and 2 guards? **(b)** 4 forwards and 1 guard? **(c)** At least 4 forwards? **(d)** At the most 1 guard?	**08**

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Version No.				
9	0	0	8	1

ROLL NUMBER						

MATHEMATICS HSSC-I
(Old Curriculum)
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 اوّل 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. _____

ہر سوال کے سامنے دیے گئے، کریکولم کے مطابق درست دائرہ کو پر 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 $\text{order}(A) = m \times n$, $\text{order}(B) = n \times p$ then order $(AB)' =$	$m \times m$	$p \times m$	$p \times n$	$n \times m$	○	○	○	○
2.	If $Z = 2i^2 - 3i$ then $img(Z) =$	–1	–3	2	3	○	○	○	○
3.	The rank of matrix: $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 1 \\ 0 & 0 & 0 \end{bmatrix}$	0	1	2	3	○	○	○	○
4.	$\begin{vmatrix} 1 & 2 & 3 \\ 0 & 1 & 2 \\ 1 & 2 & 3 \end{vmatrix} =$	0	15	12	7	○	○	○	○
5.	For what value of P, $[2, P, 5]$ is orthogonal to $[3, 1, P]$?	–2	–3	–5	–1	○	○	○	○
6.	The work done in moving an object along a vector $9\hat{i} - \hat{j} + \hat{k}$ if applied force is $3\hat{i} + 2\hat{j} + \hat{k}$ is:	24 unit	26 unit	28 unit	30 unit	○	○	○	○
7.	A sequence $\{a_n\}$ is an arithmetic sequence if $\forall n \in N$ and $n > 1$	$\frac{a_n}{a_{n-1}} = d$	$a_{n+1} - a_{n-1} = d$	$\frac{a_{n-1}}{a_n} = d$	$a_n - a_{n-1} = d$	○	○	○	○
8.	Find: 2+6+18+.....6 terms	827	726	728	627	○	○	○	○
9.	$\sum_{j=1}^{n} j^3 =$	$\frac{n(n+1)}{2}$	$\left(\frac{n(n+1)}{2}\right)^2$	$\frac{n(n+1)(2n+1)}{6}$	$\left(\frac{n(n-1)}{2}\right)^2$	○	○	○	○
10.	The value of $\frac{3!6!}{7!5!}$ is	$\frac{1}{7!}$	$\frac{1}{20!}$	20!	$\frac{1}{140}$	○	○	○	○
11.	If $P(A \cap B) = \frac{3}{9}$, $P(B) = \frac{4}{9}$ then $P(A/B) =$ is:	$\frac{3}{4}$	$\frac{4}{3}$	$\frac{3}{9}$	$\frac{4}{9}$	○	○	○	○

	Question	A	B	C	D	A	B	C	D
12.	If 'n' is even then the middle term in the expansion of $(a+b)^{2n}$ is:	$(2n+2)^{th}$ *term*	$(2n+1)^{th}$ *term*	$(n+1)^{th}$ *term*	$\left(\frac{2n+1}{2}\right)^{th}$ *term*	○	○	○	○
13.	Number of terms in the expansion of $(1+2x)^{\frac{2}{3}}$ is:	$\frac{1}{3}$	$\frac{2}{3}$	$\frac{3}{6}$	Infinite	○	○	○	○
14.	Which of the following is **NOT** a solution of inequality? $3x-2y\leq 15$	$(0,0)$	$(3,1)$	$(-3,-2)$	$(9,0)$	○	○	○	○
15.	$\text{Cos}\,3\alpha =$	$4\,\text{Cos}^3\,\alpha - 3\,\text{Cos}\,\alpha$	$3\,\text{Cos}\,\alpha - 4\,\text{Cos}^3\,\alpha$	$4\,\text{Cos}\,\alpha - 3\,\text{Cos}^3\,\alpha$	$3\,\text{Cos}^3\,\alpha - 4\,\text{Cos}^2\,\alpha$	○	○	○	○
16.	If $\text{Sin}\,\theta = \frac{-1}{2}$ and θ does not lie in 3rd quadrant then value of $\tan\theta$ lies in:	1st quadrant	2nd quadrant	3rd quadrant	4th quadrant	○	○	○	○
17.	If a=3, b=9, c=7 are sides of triangle then smallest angle is:	α	β	γ	Both β *and* γ	○	○	○	○
18.	The period of $5\,\text{Sin}\,3x$ is:	2π	3π	$\frac{2\pi}{3}$	$\frac{3\pi}{2}$	○	○	○	○
19.	The maximum value of $y=1+3\,\text{Sin}(2x-15)$ is:	$\frac{1}{4}$	$\frac{-1}{2}$	4	–2	○	○	○	○
20.	If $\text{Cos}^{-1}\frac{1}{2}=\frac{\pi}{2}-X$ then $X=$	90°	60°	30°	45°	○	○	○	○

ROLL NUMBER						

MATHEMATICS HSSC–I
(Old Curriculum)

48

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)**

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

(i)	Find Echelon from of the given matrix: $A=\begin{bmatrix}4&5&6\\1&2&3\\7&8&9\end{bmatrix}$	04	OR	Solve the equation for the solution set $2\sin^2\theta-3\sin\theta+1=0$	04
(ii)	Find the rank of the matrix: $\begin{bmatrix}1&3&-1\\2&1&4\\3&4&-5\end{bmatrix}$	04	OR	Find corner points by shading of linear inequalities $x-2y\le 6, 2x+y\le 6, x\le 0$	04
(iii)	Find projection of vector $\vec{a}=9\hat{i}-\hat{j}+\hat{k}$ along the vector $\vec{b}=3\hat{i}+2\hat{j}+\hat{k}$.	04	OR	Find $f^{-1}(x)$ if $f(x)=\frac{x+4}{x+3}$	04
(iv)	If A and B are two events such that $P(A)=\frac{2}{4}$, $P(B')=\frac{10}{16}$, $P(A\cup B)=\frac{6}{8}$ Find $P(A\cap B)$.	04	OR	Without using calculator find exact value of $\text{Sec}(\text{Sin}^{-1}\frac{1}{2})$	04
(v)	Sum the series up to "n" terms: 1.3.5+2.4.6+3.5.7+..... to "n" terms.	04	OR	Solve for 't' if: $\begin{vmatrix}t+2&3&4\\2&t+3&4\\2&3&t+4\end{vmatrix}=0$	04
(vi)	Find the Domain and Range of the function: $f(x)=\sqrt{x^2-16}$	04	OR	Reduce $\sin^4 x$ in terms of Cosine function raised to the first power multiple of angle.	04
(vii)	Maximize $f(x,y)=2x-y$ subject to constraints $x+y\le 6$, $x+y\ge 1$, $x,y\ge 0$	04	OR	Verify that: $\begin{vmatrix}1&x&x^2\\1&y&y^2\\1&z&z^2\end{vmatrix}=(x-y)(y-z)(z-x)$	04
(viii)	Verify that: $\sin 4x=8\sin x\cos^3 x-4\sin x\cos x$	04	OR	Find $\cos\theta$ if: $\vec{a}=\hat{i}-2\hat{j}+\hat{k}$ $\vec{b}=4\hat{i}-4\hat{j}+7\hat{k}$	04
(ix)	Verify that: $\cos\frac{\pi}{9}\cos\frac{2\pi}{9}\cos\frac{\pi}{3}\cos\frac{4\pi}{9}=\frac{1}{16}$	04	OR	Solve the triangle by using half Sin law if: $a=9, b=1.2, c=10$	04
(x)	Find area of triangle if $b=40, \beta=50°, \gamma=60°$	04	OR	Verify that: $abc(\sin\alpha+\sin\beta+\sin\gamma)=4\Delta S$	04
(xi)	Find the range of trigonometric function $7-3\sin 2x$ by using inequality $-1\le\sin 2x\le 1$	04	OR	By applying mathematical induction prove that $a+b$ is a factor of a^n-b^n for all positive integer n.	04
(xii)	Verify that: $\text{Tan}^{-1}\frac{3}{4}-\text{Tan}^{-1}\frac{8}{19}+\text{Tan}^{-1}\frac{3}{5}=\frac{\pi}{4}$	04	OR	Check whether $1+2i$ is the factor of polynomial $f(x)=x^2-2x+5$	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	Verify the fundamental law of trigonometry: $\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$	08	OR	Use Cramer's rule to solve the system of equations: $x-2y=-4$, $3x+y=-5$, $2x+z=-1$	08
Q.4	Find the volume of parallelepiped whose vertices are the following points by fixing point "A". $A(2,3,1), B(-1,-2,0), C(0,2,-5), D(0,1,-2)$	08	OR	A ball is dropped from a height of 30 meter and it rebounds every time $\frac{1}{3}$ of previous height. How far it travels up to eight bounce?	08
Q.5	If x^4 and higher powers are neglected such that $(1+x)^{\frac{1}{4}}+(1-x)^{\frac{1}{4}}=a-bx^2$ find a and b.	08	OR	Without using calculator by applying combination formula prove that: ${}^6C_4+{}^6C_5={}^7C_5$	08
Q.6	Find the point of intersection graphically of the following functions: $A(x)=4-x^2, B(x)=2+x$	08	OR	Show that: $\text{Sin}^{-1}x+\text{Cos}^{-1}x=\frac{\pi}{2}$	08