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

Candidate Sign. _____

Invigilator Sign. _____

Answer Sheet No. _____

Signature should not cross this line

Version No.				
3	2	0	8	1

ROLL NUMBER						

Deleting/overwriting is not allowed.
Do not use lead pencil.

Fill the relevant bubble against each question according to curriculum:

	Question	A	B	C	D	A	B	C	D
	Factorize z^2+169:	$(z+13)(z-13)$	$(z+13i)$ $(z-13i)$	$(z-13i)$ $(z-13i)$	$(z+13i)$ $(z+13i)$	○	○	○	○
	Argument of $z=1+i$ is:	$\frac{\pi}{6}$	$\frac{\pi}{4}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	○	○	○	○
	Rank of identity matrix is:	Less than its order	Equal to its order	Greater than its order	Undefined	○	○	○	○
4.	A system is inconsistent if it has:	No solution	Unique solution	Infinite solutions	Repeated solutions	○	○	○	○
5.	5th term of A.P for which $(a_1=2\ d=3)$ is:	14	11	13	15	○	○	○	○
6.	If an $A.P.=a_1,a_2,a_3,.....$ then H.P.=	$a_1.a_2.a_3.....$	$a_1+a_2+a_3+.....$	$\frac{1}{a_1+a_2+a_3+.....}$	$\frac{1}{a_1},\frac{1}{a_2},\frac{1}{a_3},....$	○	○	○	○
7.	Coefficient of middle term:	is always 1	is independent of n	Depends on n	is always zero	○	○	○	○
8.	In mathematical induction first step is:	Hypothesis	Result	Conclusion	Base case	○	○	○	○
	If a cubic polynomial is divided by a linear polynomial (containing same variable), the degree of remainder will be:	0	1	2	3	○	○	○	○
	Using factor theorem If $f(a)=0$ then:	$f(a)$ is a factor	a is factor	$(x-a)$ is factor	$(x+a)$ is factor	○	○	○	○
	If dot product of two non-zero vectors is zero, then both vectors are:	parallel	equal	mutually perpendicular	in opposite direction	○	○	○	○
	If $\bar{a}=a_1\hat{i}+b_1\hat{j}$ and $\bar{b}=a_2\hat{i}+b_2\hat{j}$ then $\bar{a}.\bar{b}$ is equal to:	$a_1a_2+b_1b_2$	$a_1a_2-b_1b_2$	$a_1b_1+a_2b_2$	$a_2b_1-a_1b_2$	○	○	○	○

	Question	A	B	C	D	A	B	C	D
13.	Two vectors $\bar{a}$ and $\bar{b}$ will be orthogonal, if the angle θ between them is:	π	$\frac{\pi}{2}$	2π	$\frac{2\pi}{3}$	○	○	○	○
14.	$\cos(\pi+\beta)$ is equal to:	$\cos\beta$	$-\cos\beta$	$\sin\beta$	$-\sin\beta$	○	○	○	○
15.	$\cos A\cos B$ is equal to:	$\frac{1}{2}[\cos(A+B)+\cos(A-B)]$	$\cos(A+B)$	$\cos(A-B)$	$\frac{1}{2}[\sin(A+B)+\sin(A-B)]$	○	○	○	○
16.	Period of $\cos\frac{2x}{5}$ is:	$\frac{5}{2}\pi$	2π	$\frac{2}{5}\pi$	5π	○	○	○	○
17.	Which of the given functions is even?	$f(x)=x^3$	$f(x)=\sin x$	$f(x)=x$	$f(x)=\cos x$	○	○	○	○
18.	Maximum value of $y=3+2\sin\theta$ is:	5	4	3	2	○	○	○	○
19.	Number of ways of arrangement of the letters in the word "GARDEN" are:	480	600	720	840	○	○	○	○
20.	Number of ways to choose 10 members from 15 are:	360,360	$\frac{15!}{10!}$	$\frac{15!}{5!}$	3003	○	○	○	○

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 parts. **(12 x 4 = 48)**

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

(i)	Solve the system: $z+2\omega=4i$, $2z+5\omega=3$	04	OR	A force $\vec{F}=2i+3j+k$ moves an object through displacement $\vec{d}=i+2j+2k$. find the work done.	04
(ii)	Verify that $\sin 4\theta = 8\sin\theta\cos^3\theta - 4\sin\theta\cos\theta$	04	OR	Evaluate $\frac{(n-1)!}{(n-3)!}$	04
(iii)	Find the volume of a tetrahedron formed by vectors: $\vec{a}=2i+j, \vec{b}=i+3j+k, \vec{c}=j+k$	04	OR	Find the maximum and minimum values of: $y=\frac{1}{2+3\sin(2x+1)}$	04
(iv)	Find the value(s) of K if $x-1$ is a factor of: $f(x)=x^3+K^2-2K+1$	04	OR	Find the sum of 6 terms of sequence: $1+\frac{1}{2}+\frac{1}{4}+....$	04
(v)	Without drawing graph determine the amplitude, period and range of: $y=2\sin(3x+1)$	04	OR	Find the angle between vectors: $\vec{a}=4i+j-8k$, $\vec{b}=i+4j+k$	04
(vi)	Find the 10^{th} term of an A.P with $a=3$ and the 7^{th} term of it is 15.	04	OR	Using fundamental law of trigonometry find the value of $\cos 15°$. (do not use calculator)	04
(vii)	Find the rank of matrix: $\begin{bmatrix} 3 & -4 & 2 \\ 2 & 3 & 5 \\ 1 & 0 & 1 \end{bmatrix}$	04	OR	Express $2\sin 12\theta \cos 6\theta$ as a sum or difference.	04
(viii)	The 3^{rd} term of a geometric sequence is 16 and the 5^{th} term is 64. Find the common ratio and 1^{st} term. Also write the sequence for positive vaues.	04	OR	Find the inverse of given matrix if possible: $\begin{bmatrix} 2 & 1 & 0 \\ 0 & 3 & 2 \\ 2 & 1 & 4 \end{bmatrix}$	04
(ix)	Determine the last two digits of $(13)^{10}$.	04	OR	Sketch the graph of $y=3\sin x$ for $-\pi \le x \le \pi$	04
(x)	Convert $z=1+i$ into polar form and then find z^2 using polar representation.	04	OR	Find r if ${}^{54}P_r : {}^{56}P_{r+3} = 1:30800$	04
(xi)	Use Binomial Theorem to find the remainder when 8^{205} is divided by 48.	04	OR	Factorize the polynomial: x^3-4x^2+x+6	04
(xii)	For what value of λ the given matrix is singular? $\begin{bmatrix} 1 & -1 & 2 \\ 2 & 1 & \lambda \\ 3 & 1 & 2 \end{bmatrix}$	04	OR	Use mathematical induction to prove: $1+2+3+...+n=\frac{n(n+1)}{2}$	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. A company's profit over the last few years can be modeled by the polynomial $P(x)=x^3+6x^2-x-6$. If x represents years since 2010, calculate the company's profit in 2012 by dividing $P(x)$ and $x-2$ finding the remainder. b. Verify your answer by long division.	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 $(\vec{a}\times\vec{b}).\vec{a}$ and verify that $\vec{a}\times\vec{b}\perp\vec{a}$ c. Find $(\vec{a}\times\vec{b}).\vec{b}$ and verify that $\vec{a}\times\vec{b}\perp\vec{b}$	08
Q.4	Find the term independent of x in the expansion of $\left(2x-\frac{1}{x}\right)^{12}$. Also find the 10^{th} term.	4+4	OR	Prove fundamental law of trigonometry: $\cos(A-B)=\cos A\cos B+\sin A\sin B$ Diagram is necessary.	08
Q.5	Solve the system: $x+y+z=6$, $2x+3y+z=10$, $x+2y+3z=11$	08	OR	The height of seat on a Ferries wheel is Modeled by the equation $h(t)=10+8\sin\frac{\pi}{6}t$ a. Find the period of motion b. Determine the maximum and minimum height c. At what time is the height maximum?	3+2 +3
Q.6	a. For the sequence 2, 5, 8, 11, ... find the general term. Also find the sum of first 20 terms. b. Find the sum of the n terms of the series $1.2+2.3+3.4+.....$	4+4	OR	A box contains 7 red, 5 blue and 4 green balls. In how many ways can 5 balls be selected if at least 2 are red?	08