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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	0	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
1.	Period of $\tan\frac{5x}{7}$ is:	$\frac{5\pi}{7}$	5π	$\frac{7\pi}{5}$	7π	○	○	○	○
2.	A function is periodic if:	$f(x)=f(-x)$	$f(x)=1$	$f(x)=0$	$f(x+T)=f(x)$	○	○	○	○
3.	Range of $a+b\sin 2\theta$ is:	$a\pm b$	$a+b$	$a-b$	$2(a\pm b)$	○	○	○	○
4.	Number of ways of arrangements of the letters in the word "SUNDAY" are:	120	480	600	720	○	○	○	○
5.	Number of ways to select 8 players from 12 are:	495	720	11885	19958	○	○	○	○
6.	Factorize z^2+289:	$(z+17)(z-17)$	$(z+17i)$ $(z+17i)$	$(z+17i)$ $(z-17i)$	$(z-17i)$ $(z-17i)$	○	○	○	○
7.	Argument of $z=\sqrt{3}+i$ is:	$\frac{\pi}{3}$	$\frac{\pi}{4}$	$\frac{\pi}{9}$	$\frac{\pi}{6}$	○	○	○	○
8.	Rank of matrix $A=\begin{bmatrix}1&2&-1\\0&1&7\\0&0&0\end{bmatrix}$ is:	1	2	3	4	○	○	○	○
9.	A consistent system **MUST** have at least:	At least one solution	Infinite solutions	No solution	Maximum two solutions	○	○	○	○
10.	Formula of n^{th} term of an A.P is:	$a+nd$	$a+(n-1)d$	$a+(n+1)d$	$a(n-1)d$	○	○	○	○
11.	H.P decreases when A.P:	Decreases	Increases	Constant	Zero	○	○	○	○

	Question	A	B	C	D	A	B	C	
12.	Binomial expansion uses:	Factorization	Roots	Division	Pascal triangle	○	○	○	○
13.	In mathematical induction assume true for $n=k$ is:	Base case	Proof	Hypothesis	Result	○	○	○	○
14.	In polynomial division Degree of remainder is:	Greater	Equal	Less than divisor	Infinite	○	○	○	○
15.	If $(x-2)$ is factor of $f(x)$, then $f(2)=$	–2	0	1	2	○	○	○	○
16.	Scalar product of two non-zero vector is maximum when both vectors are:	Parallel	In opposite direction	Mutually perpendicular	At 45° to each other	○	○	○	○
17.	If vector $\bar{u}=2\hat{i}+3\hat{j}-4\hat{k}$ and $\bar{v}=-2\hat{i}-\hat{k}$ then the dot product of $\bar{u}$ and $\bar{v}$ will be:	6	5	0	–2	○	○	○	○
18.	Three vectors $\bar{P},\bar{Q}$ and $\bar{R}$ are coplanar if:	$\bar{P}\times(\bar{Q}\times\bar{R})=0$	$(\bar{P}.\bar{Q})\times\bar{R}=0$	$(\bar{P}.\bar{Q}).R=0$	$\bar{P}.(\bar{Q}\times\bar{R})=0$	○	○	○	○
19.	$\cos(A-B)=$	$\cos A\cos B-\sin A\sin B$	$\cos A\cos B+\sin A\sin B$	$\cos A\sin B+\sin A\cos B$	$\cos A\sin B-\sin A\cos B$	○	○	○	○
20.	Using product to sum or difference formula $\sin 60°\sin 30°=$	$\frac{\sqrt{3}}{4}$	$\frac{\sqrt{3}}{2}$	1	-1	○	○	○	○

ROLL NUMBER						

MATHEMATICS HSSC–I

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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)	Find the sum of the geometric series $\frac{2}{3},-1,\frac{3}{2},\ldots$ up to 5 terms.	04	OR	Sketch the graph of $y=2\cos x$ for $-\pi \le x \le \pi$	04
(ii)	Find the last two digits of $(12)^{11}$.	04	OR	Find the rank of matrix: $\begin{bmatrix}1&2&3\\2&4&6\\1&1&1\end{bmatrix}$	04
(iii)	Given $z_1=2(\cos 30°+i\sin 30°)$ and $z_2=3(\cos 60°+i\sin 60°)$, find z_1z_2 in polar form.	04	OR	Find the value of 'n' if ${}^{n}P_4 : {}^{n-1}p_3 = 9:1$	04
(iv)	Find the remainder when 9^{205} is divided by 31 using Binomial expansion.	04	OR	Find all roots of: $x^3-3x^2-4x+12$ by Factor theorem.	04
(v)	If $A=\begin{bmatrix}1&2&3\\2&4&6\\3&6&9\end{bmatrix}$ then find A_{13}, A_{23}, A_{31} and A_{33}.	04	OR	Prove by mathematical induction that: $2^n \ge n+1$ for all $n \ge 1$	04
(vi)	Solve the following equations: $(2+i)\omega = 1$ $(3-i)z+5\omega = 2-i$	04	OR	A force $\bar{F}=3i-2j+k$ acts at point $(1,2,3)$. Find the moment about the origin.	04
(vii)	Verify the identity: $\cos 3\alpha = 4\cos^3\alpha - 3\cos\alpha$	04	OR	A class has 5 boys and 4 girls. In how many ways can a group of 3 students be formed?	04
(viii)	Find the volume of the parallelepiped: $\bar{a}=i+j+2k, \bar{b}=2i+j-k, \bar{c}=i+k$	04	OR	Find the maximum and minimum values of: $y=\frac{1}{4+5\cos 3x}$	2+2
(ix)	Determine whether $(x+2)$ is a factor of: $f(x)=x^3+2x^2-4x-8$	04	OR	Find the sum to n terms of the sequence: 3, 9, 27, 81...	04
(x)	Determine the properties of the graph of: $y=\cos x$ i.e Domain, Range, Period and Amplitude.	04	OR	Find the value of "λ" so that vectors $\bar{v}=\hat{i}-\hat{j}+\hat{k}$, $\bar{u}=2\hat{i}+\hat{j}+\hat{k}$ and $\bar{w}=-\hat{i}+\lambda\hat{j}+2\hat{k}$ are coplanar.	04
(xi)	Find the Sum of first 20 terms of A.P with $a=1, d=3$.	04	OR	Verify: $\tan(\alpha+\beta)=\frac{\tan\alpha+\tan\beta}{1-\tan\alpha\tan\beta}$	04
(xii)	Find the inverse of matrix if possible: $\begin{bmatrix}0&3&4\\-4&2&6\\2&0&5\end{bmatrix}$	04	OR	Convert $\cos\frac{2\theta+2\phi}{2}\sin\frac{2\theta-2\phi}{2}$ into sum or difference form:	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. Recognize the sequence (as A.P or G.P) and find the general term of the sequence $4,2,1,\frac{1}{2},\ldots$ b. Find the sum up to n terms. c. Find the sum up to infinity.	4+2 +2	OR	A committee of 5 members is to be selected from a group of 8 men and 6 women. In how many ways can the committee be formed if it must include at least 2 women?	08
Q.4	Solve: $2x+y-z=1$ $x+2y+z=4$ $3x+y+2z=7$	08	OR	In a robotics project, a mechanical arm moves in such a way that its vertical position h (in meters) is modeled by $h(t)=15\cos\left(\frac{t}{2}\right)$, where t is time in seconds. Determine the first time t when the vertical position of the arm reaches 7.5 meters. Also determine the value of t for maximum height.	08
Q.5	Find the middle term(s) in the expansion of $\left(3x^2-\frac{1}{2x}\right)^{10}$. Also find the 9th term.	08	OR	If $\sin\alpha=\frac{3}{5}, \sin\beta=\frac{1}{\sqrt{5}}$, where terminal ray of α and β are in 2nd quadrant, then find the value of $\cos(\alpha-\beta)$ and $\sin(\alpha+\beta)$.	08
Q.6	a. For what value of k the remainder of $2x^3-kx^2+16x+12$ will be zero if the polynomial, is divided by $x-2$ b. Factorize the polynomial completely.	3+5	OR	a. Prove that scalar triple product is invariant under cyclic permutation. b. Verify using vectors $\bar{i},\bar{j},\bar{k}$	5+3