## Jr Inter MATHS-1A

## Model Paper-2

## Max. Marks :75

## Section-A

## Very Short Answer Questions. Answer all Questions.

Each Question carries‘ Two’ marks
$10 \times 2=20 \mathrm{M}$
1.If $A=\left\{0, \frac{\pi}{6}, \frac{\pi}{4}, \frac{\pi}{3}, \frac{\pi}{2}\right\}$ and $f: A \rightarrow B$ is a surjection defined by $f(x)=\cos x$ then Find $B$
2) Find the domain of $f(x)=\sqrt{4 x-x^{2}}$
3. A certain book shop has 10 dozen chemistry books, 8 dozen physics books, 10 dozen economics books. Their selling prices are Rs. 80 ,Rs. 60 and Rs. 40 each respectively. Find the total amount that book shop will receive by selling all the books using matrix algebra
4. $\left[\begin{array}{ccc}0 & 1 & 4 \\ -1 & 0 & 7 \\ -x & -7 & 0\end{array}\right]$ is a skew symmetric matrix, then find $x$.
5. Find the angle between the vectors $\bar{i}+2 \bar{j}+3 \bar{k}$ and $3 \bar{i}-\bar{j}+2 \bar{k}$
6. If $|\bar{p}|=2,|\bar{q}|=3$ and $(\bar{p}, \bar{q})=\frac{\pi}{6}$, then find $|p \times q|^{2}$
7. If $\bar{a}=\bar{i}+2 \bar{j}-3 \bar{k}$ and $\bar{b}=3 \bar{i}-\bar{j}+2 \bar{k}$, then show that $\bar{a}+\bar{b}$ and $\bar{a}-\bar{b}$ are perpendicular to each other
8). If $\tan \theta=\frac{\cos 9^{0}+\sin 9^{0}}{\cos 9^{0}-\sin 9^{0}}$ and ' $\theta^{\prime}$ is in $Q_{3}$ find ' $\boldsymbol{\theta}^{\prime}$.
9) Find the period of the function $f(x)=\sin \left(x+8 x+2 x+\ldots .+n^{3} x\right)$.
10). If $\sinh x=5$, show that $x=\log _{e}(5+\sqrt{26})$

## Section-B

Short Answer Questions. Answer any 'Five' Questions.
Each Question carries 'Four' marks.
$5 \times 4=20 \mathrm{M}$

12. If $A=\left[\begin{array}{cc}\cos \theta & \sin \theta \\ -\sin \theta & \cos \theta\end{array}\right]_{\text {then show that for all the positive integers } \mathrm{n},} A^{n}=\left[\begin{array}{cc}\cos n \theta & \sin n \theta \\ -\sin n \theta & \cos n \theta\end{array}\right]$
13. Let A B CDEF be a regular hexagon with center ' $O$ '. Show that

$$
A B+A C+A D+A E+A F=3 A D=6 A O
$$

14. In the two dimensional plane, prove by using vector methods, the equation of the line whose intercepts on the axes are ' $a$ ' and ' $b$ ' is $\frac{x}{a}+\frac{y}{b}=1$.
15. $\bar{a}, \bar{b}, \bar{c}$ are non-zero vectors and a is perpendicular to both b and c . If $|\bar{a}|=2,|\bar{b}|=3,|\bar{c}|=4$ and $(\bar{b}, \bar{c})=\frac{2 \pi}{3}$, then find $\left|\left[\begin{array}{l}\bar{a} \\ \bar{b} \\ \bar{c}\end{array}\right]\right|$
16. Prove that $\sin ^{4} \frac{\pi}{8}+\sin ^{4} \frac{3 \pi}{8}+\sin ^{4} \frac{5 \pi}{8}+\sin ^{4} \frac{7 \pi}{8}=\frac{3}{2}$
17. If $A$ is not an integral multiple of $\pi$, prove that

$$
\cos A \cdot \cos 2 A \cdot \cos 4 A \cdot \cos 8 A=\frac{\sin 16 A}{16 \sin A} \text { and hence deduce that }
$$

$$
\cos \frac{2 \pi}{15} \cdot \cos \frac{4 \pi}{15} \cdot \cos \frac{8 \pi}{15} \cdot \cos \frac{16 \pi}{15}=\frac{1}{16}
$$

18 Prove that $\frac{\tanh x}{\sec h x-1}+\frac{\tanh x}{\sec h x+1}=-2 \cos e c h x$ for $x \neq 0$
19. Prove that $\cot \mathrm{A}+\cot \mathrm{B}+\cot \mathrm{C}=\frac{a^{2}+b^{2}+c^{2}}{4 \Delta}$
20. Prove that $\cos A+\cos B+\cos C=1+\frac{r}{R}$

## Section-C

## Long Answer Questions. Answer any 'Five' Questions.

> Each Question carries 'Seven' marks. $5 \times 7=35 \mathrm{M}$
21. i) If $f: Q-Q$ is defined by $f(x)=5 x+4$ for $x$ is rational then prove that $f$ is bijective
ii) If $f=\{(4,5),(5,6),(6,-4)\}$ and $g=\{(4,-4),(6,5),(8,5)\}$ then finf $f+g$ and $f g$
22. If $A=\left[\begin{array}{ccc}1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1\end{array}\right]$, then P.T $A^{3}-3 A^{2}-A+9 I_{3}=O$
23. If $3 A=\left[\begin{array}{ccc}1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1\end{array}\right]$ then show that $A^{-1}=A^{\top}$
24. $5 x-6 y+4 z=15$

$$
\begin{aligned}
& 7 x+4 y-3 z=19 \\
& 2 x+y+6 z=46
\end{aligned}
$$

Solve by matrix inverse method
25. If $\bar{a}=\bar{i}-2 \bar{j}-3 \bar{k}, \bar{v}=2 \bar{i}+\bar{j}-\bar{k}$ and $\bar{c}=\bar{i}+3 \bar{j}-2 \bar{k}$, verify that $a \times(b \times c) \neq(a \times b) \times c$
26. If $a=2 i+j-3 k, b=i-2 j+k, c=-i+j-4 k$ and $d=i+j+k$, then compute $|(a \times b) \times(c \times d)|$
27. If $\bar{a}, \bar{b}, \bar{c}$ are non-coplanar vectors, then S.T the four points

$$
6 \bar{a}+2 \bar{b}-\bar{c}, 2 \bar{a}-\bar{b}+3 \bar{c},-\bar{a}+2 \bar{b}-4 \bar{c},-12 \bar{a}-\bar{b}-3 \bar{c}, \text { are coplanar. }
$$

28. If $\mathrm{A}+\mathrm{B}+\mathrm{C}=180$ Prove that $\cos 2 A+\cos 2 B+\cos 2 C+1=-4 \cos A \cos B \cos C$
29. Prove that $a^{3} \cos (B-C)+b^{3} \cos (C-A)+c^{3} \cos (A-B)=3 a b c$
30. Show that $\cos A+\cos B+\cos C=1+\frac{r}{R}$
