Jr Inter MATHS-1A

Model Paper-2

8).

9

If

Max. Marks :75

Section-A

Very Short Answer Questions. Answer all Questions.

Each Question carries' Two' marks

10x2=20M

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
$$f(x) = \sqrt{4x - x^2}$$

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

$$\begin{bmatrix} 0 & 1 & 4 \\ -1 & 0 & 7 \\ & 7 & 0 \end{bmatrix}$$

4. If $\begin{bmatrix} -x & -7 & 0 \end{bmatrix}$ is a skew symmetric matrix, then find x.

5. Find the angle between the vectors $\overline{i} + 2\overline{j} + 3\overline{k}$ and $3\overline{i} - \overline{j} + 2\overline{k}$

6. If
$$|\overline{p}| = 2, |\overline{q}| = 3$$
 and $(\overline{p}, \overline{q}) = \frac{\pi}{6}$, then find $|p \times q|^2$

7. If $\overline{a} = \overline{i} + 2\overline{j} - 3\overline{k}$ and $\overline{b} = 3\overline{i} - \overline{j} + 2\overline{k}$, then show that $\overline{a} + \overline{b}$ and $\overline{a} - \overline{b}$ are perpendicular to each other

$$\tan \theta = \frac{\cos 9^0 + \sin 9^0}{\cos 9^0 - \sin 9^0} \text{ and } '\theta' \text{ is in } Q_3 \text{ find } '\theta'.$$

Find the period of the function
$$f(x) = \sin(x+8x+2x+....+n^3x)$$
.

10). If
$$\sinh x = 5$$
, show that $x = \log_e \left(5 + \sqrt{26}\right)$

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Section-B

Short Answer Questions. Answer any 'Five' Questions.

Each Question carries 'Four' marks.

$$A = \begin{bmatrix} 2 & -1 & 2 \\ 1 & 3 & -4 \end{bmatrix} and B = \begin{bmatrix} 1 & -2 \\ -3 & 0 \\ 5 & 4 \end{bmatrix}$$
 then verify that $(AB)^{T} = A^{T} B^{T}$

12. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ then show that for all the positive integers n, $A^{n} = \begin{bmatrix} \cos n\theta & \sin n\theta \\ -\sin n\theta & \cos n\theta \end{bmatrix}$

13. Let A B C D E F be a regular hexagon with center 'O'. Show that

AB + AC + AD + AE + AF=3 AD=6 AO

- 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. $\overline{a}, \overline{b}, \overline{c}$ are non-zero vectors and a is perpendicular to both b and c. If $|\overline{a}| = 2, |\overline{b}| = 3, |\overline{c}| = 4$ and $(\overline{b}, \overline{c}) = \frac{2\pi}{3}$, then find $|[\overline{a} \ \overline{b} \ \overline{c}]|$

16. Prove that
$$\sin^4 \frac{\pi}{8} + \sin^4 \frac{3\pi}{8} + \sin^4 \frac{5\pi}{8} + \sin^4 \frac{7\pi}{8} = \frac{3\pi}{2}$$

17. If A is not an integral multiple of π , prove that

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

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

18 Prove that
$$\frac{\tanh x}{\sec hx - 1} + \frac{\tanh x}{\sec hx + 1} = -2\cos echx$$
 for $x \neq 0$

$$\frac{a^2 + b^2 + c^2}{4\Delta}$$

19. Prove that cot A + cot B + cot C =

$$\cos A + \cos B + \cos C = 1 + \frac{7}{R}$$
20. Prove that

Section-C

Long Answer Questions. Answer any 'Five' Questions.

Each Question carries 'Seven' marks. 5 x7 =35 M

21. i) If f: Q-Q is defined by f(x) = 5x + 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 fg

22. If
$$A = \begin{bmatrix} 1 & 2 & 1 \\ 0 & 1 & -1 \\ 3 & -1 & 1 \end{bmatrix}$$
, then P.T
$$A^{3} - 3A^{2} - A + 9I_{3} = O$$

23. If
$$3A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -2 \\ -2 & 2 & -1 \end{bmatrix}$$
 then show that $A^{-1} = A^{T}$

$$5x - 6y + 4z = 15$$

$$7x + 4y - 3z = 19$$

$$2x + y + 6z = 46$$

Solve by matrix inverse method

25. If
$$\overline{a} = \overline{i} - 2\overline{j} - 3\overline{k}$$
, $\overline{v} = 2\overline{i} + \overline{j} - \overline{k}$ and $\overline{c} = \overline{i} + 3\overline{j} - 2\overline{k}$, verify that $a \times (b \times c) \neq (a \times b) \times c$

26. If
$$a = 2i + j - 3k$$
, $b = i - 2j + k$, $c = -i + j - 4k$ and $d = i + j + k$, then compute $|(a \times b) \times (c \times d)|$

27. If $\overline{a}, \overline{b}, \overline{c}$ are non-coplanar vectors, then S.T the four points

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

28. If A + B +C =180 Prove that $\cos 2A + \cos 2B + \cos 2C + 1 = -4\cos A \cos B \cos C$

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29. Prove that
$$a^{3} \cos(B-C) + b^{3} \cos(C-A) + c^{3} \cos(A-B) = 3abc$$

$$\cos A + \cos B + \cos C = 1 + \frac{r}{R}$$
30. Show that