Jr.Intermediate MATHS-1A

Model paper-1 **Max. Marks :75**

Section-A

Very Short Answer Questions. Answer all Questions.
Each Question carries' Two' marks **10x2=20M**

1. ***Find the Domain of function*** $\frac{x}{2-3x}$

2. $f: R \to R$ ***and*** $f(x)=\frac{1-x^2}{1+x^2}$ ***then prove that*** $f(\tan\theta)=\cos 2\theta$

3. ***If A =*** $\begin{bmatrix} -1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & x & 7 \end{bmatrix}$ ***is a symmetric matrix, then find x.***

4. ***If*** $a_{ij}=\frac{1}{2}(3i-2j)$ ***and*** $A=[a_{ij}]_{2\times 2}$ ***, then A is equal to***

5. ***Find the angle between the planes*** $2x-3y-6z=5$ *and* $6x+2y-9z=4$

6. ***If*** $4\bar{i}+\frac{2p}{3}\bar{j}+p\bar{k}$ ***is parallel to the vector*** $\bar{i}+2\bar{j}+3\bar{k}$ ***, find*** p ***.***

7. ***Find the area of the triangle having*** $3\bar{i}+4\bar{j}$ *and* $-5\bar{i}+7\bar{j}$ ***as two of its sides.***

8. ***Find the value of*** $\cos^2 52\frac{1}{2}-\sin^2 22\frac{1}{2}$

9. ***Find the period of f(x)=cos*** $\left[\frac{4x+9}{5}\right]$

10. ***If*** $\sinh x=\frac{3}{4}$ ***, find*** $\cosh(2x)$ ***and*** $\sinh(2x)$

Section-B

Short Answer Questions. Answer any 'Five' Questions.

Each Question carries 'Four' marks. **5 x4 =20**

11 **If** $A=\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix}$ **then show that** $A^{-1}=A^3$

12. If $I\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$ and $E=\begin{bmatrix}0 & 1\\ 0 & 0\end{bmatrix}$ then show that $(aI+bE)^3=a^3I+3a^2bE.$

13. If the points whose position vectors are $3\bar{i}-2\bar{j}-\bar{k},\ 2\bar{i}+3\bar{j}-4\bar{k},\ -\bar{i}+\bar{j}+2\bar{k}$ and $4\bar{i}+5\bar{j}+\lambda\bar{k}$ are coplanar, then show that $\lambda=\frac{-146}{7}$

14. If the vectors a = 2i –j +k , b =I +2j -3k and c =3i +pj +5k are coplanar finf p

15 .If O is the circumcentre, H is the orthocentre of triangleABC

S.T. i) $\overline{OA}+\overline{OB}+\overline{OC}=\overline{OH}$

ii) $\overline{HA}+\overline{HB}+\overline{HC}=2\overline{HO}$

16. Prove that $3(\sin\theta-\cos\theta)^4+6(\sin\theta+\cos\theta)^2+4(\sin^6\theta+\cos^6\theta)=13$

17. If $A+B=225^\circ$, then prove that $\frac{\cot A}{1+\cot A}.\frac{\cot B}{1+\cot B}=\frac{1}{2}$

18. Prove that $\sinh(x+y)=\sinh x\ \cosh y+\cosh x\ \sinh y$

19.Prove that $r_1+r_2+r_3-r=4R$

20. In ΔABC, *prove that* $\tan\left(\frac{B-C}{2}\right)=\frac{b-c}{b+c}\cot\frac{A}{2}$

Section-C

Long Answer Questions. Answer any 'Five' Questions.

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

21. If $f=\{(1,2),(2,-3),(3,-1)\}$ then find

i. $2f$ ii. $2+f$ iii. f^2 iv. $\sqrt{f}$

22 Solve the following simultaneous linear equations by using 'Cramer's rule.

$3x+4y+5z=18$

$2x-y+8z=13$

$5x-2y+7z=20$

23. If $A=\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ is a non-singular matrix then A is invertible and $A^{-1}=\frac{AdjA}{\det A}$

24.Find inverse off 3x3 matrices

$$\begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 0 \\ 3 & 2 & 1 \end{bmatrix}$$

25. A line makes angles $\theta_1,\theta_2,\theta_3$ and θ_4 with the diagonals of a cube. Show that $\cos^2\theta_1+\cos^2\theta_2+\cos^2\theta_3+\cos^2\theta_4=\frac{4}{3}$

26. Find the equation of the plane passing through the point and parallel to the vectors $\bar{b}=\bar{i}-2\bar{j}+4\bar{k}$ and $\bar{c}=3\bar{i}+2\bar{j}-5\bar{k}$

27. Let a,b,c be three vectors. Then prove that $(\bar{a}\times\bar{b})\times\bar{c}=(\bar{a}.\bar{c})\bar{b}-(\bar{b}.\bar{c})\bar{a}$

28. If A + B +C =180 Prove that $\cos\frac{A}{2}+\cos\frac{B}{2}+\cos\frac{C}{2}=4\cos\left(\frac{\pi-4}{4}\right)\cos\left(\frac{\pi-B}{4}\right)\cos\left(\frac{\pi-C}{4}\right)$

29. Show that $\frac{r_1}{bc}+\frac{r_2}{ca}+\frac{r_3}{ab}=\frac{1}{r}-\frac{1}{2R}$

30. Prove that $\left(\frac{1}{r}-\frac{1}{r_1}\right)\left(\frac{1}{r}-\frac{1}{r_2}\right)\left(\frac{1}{r}-\frac{1}{r_3}\right)=\frac{abc}{\Delta^3}=\frac{4R}{r^2s^2}$

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