MODEL SECOND MID-TERM EXAMINATION-2 - 2024

XI – STD – MATHEMATICS

Time: 1.30 Hrs **Maximum Marks: 45**

PART – I (Marks: 10)

I. Choose the correct answer: 10 ×1= 10

1. If A and B are two matrices such that $A + B$ and AB are both defined, then
   (1)A and B are two matrices not necessarily of same order
   (2)A and B are square matrices of same order
   (3) number of columns of A is equal to the number of rows of B
   (4)$A = B$ **(7-4)**

2. If A and B are symmetric matrices of order n, where $(A \neq B)$, then **(7-9)**
   (1)A + B skew symmetric (2) $A + B$ *symmetric*
   (3) $A + B$ *diagonal matrix* (4) $A + B$ *is a zero matrix*

3. If $A + I = \begin{bmatrix} 3 & -2 \\ 4 & 1 \end{bmatrix}$, then $(A + I)(A - I)$ is equal to **(7-24)**
   (1) $\begin{bmatrix} -5 & -4 \\ 8 & -9 \end{bmatrix}$ (2) $\begin{bmatrix} -5 & 4 \\ -8 & 9 \end{bmatrix}$ (3) $\begin{bmatrix} 5 & 4 \\ 8 & 9 \end{bmatrix}$ (4) $\begin{bmatrix} -5 & -4 \\ -8 & -9 \end{bmatrix}$

4. The unit vector parallel to the resultant of the vectors $\hat{\imath} + \hat{\jmath} - \hat{k}$ *and* $\hat{\imath} - 2\hat{\jmath} + \hat{k}$ is **(8-3)** Mr. K.MURUGANANDHAM. M.Sc., M.Ed, M.Phil +91-98431 51302
   (1)$\frac{\hat{\imath}-\hat{\jmath}+\hat{k}}{\sqrt{5}}$ (2) $\frac{2\hat{\imath}+\hat{\jmath}}{\sqrt{5}}$ (3) $\frac{2\hat{\imath}-\hat{\jmath}+\hat{k}}{\sqrt{5}}$ (4) $\frac{2\hat{\imath}-\hat{\jmath}}{\sqrt{5}}$

5. If $|\vec{a} + \vec{b}| = 60$, $|\vec{a} - \vec{b}| = 40$ and $|\vec{b}| = 46$, then $|\vec{a}|$ *is* **(8-15)**
   (1)42 (2) 12 (3) 22 (4) 32

6. If the points whose position vectors $10\hat{\imath} + 3\hat{\jmath}$, $12\hat{\imath} - 5\hat{\jmath}$ and $a\,\hat{\imath} + 11\hat{\jmath}$ are colinear then a is equal to **(8-23)**
   (1)6 (2) 3 (3) 5 (4) 8

7. $\lim_{\theta \to 0} \frac{\sin\sqrt{\theta}}{\sqrt{\sin\theta}}$ **(9-4)**
   (1)1 (2) -1 (3) 0 (4) 2

8. $\lim_{x \to 0} \frac{x\,e^x - \sin x}{x}$ is **(9-13)**

(1)1 (2) 2 (3)3 (4) 0

9. $\lim_{n\to\infty}\left(\frac{1}{n^2}+\frac{2}{n^2}+\frac{3}{n^2}+\cdots.+\frac{n}{n^2}\right)$ is

(1) $\frac{1}{2}$ (2) 0 (3)1 (4) ∞

10. A root of the equation $\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ 3 & 3 & -6-x \end{vmatrix} = 0$ *is* **(7-16)**

(1)6 (2) 3 (3) 0 (4) -6

PART – II (Marks: 8)

II. Answer any 4 Questions. Question No. 16 is compulsory. 4×2=8

11. If A is a 3×4 matrix and B is a matrix such that both $A^T B$ *and* $B\,A^T$ are defined what is the order of the matrix B? $(\boldsymbol{Ex.7.1-16})$

12. Determine the values of a and b so that the following matrices are singular:

$$B = \begin{bmatrix} b-1 & 2 & 3 \\ 3 & 1 & 2 \\ 1 & -2 & 4 \end{bmatrix} \ (\boldsymbol{Ex.7.4-4(ii)})$$

13. find the angle between the vectors $5\hat{\imath}+3\hat{\jmath}+4\hat{k}$ and $6\hat{\imath}-8\hat{\jmath}-\hat{k}$. $(\boldsymbol{Eg.8.16})$

14. If G is the centroid of a triangle ABC, prove that $\overrightarrow{GA}+\overrightarrow{GB}+\overrightarrow{GC}=\vec{0}$ $(\boldsymbol{Ex.8.1-10})$ Mr. K.MURUGANANDHAM. M.Sc., M.Ed, M.Phil +91-98431 51302

15. If f *and* g are continuous function with $f(3)=5$ *and* $\lim_{x\to3}[2f(x)-g(x)]=4$, find $g(3)$. $(\boldsymbol{Ex.9.5-8})$

16. Evaluate: $\lim_{x\to0}\frac{\sqrt{1-x}-1}{x^2}$ $(\boldsymbol{Ex.9.2-13})$

PART – III (Marks: 12)

III. Answer any 4 Questions. Question No. 22 is compulsory. 4×3=12

17. Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$ $(\boldsymbol{Ex.7.2-4})$

18. Identify the singular and non-singular matrices $\begin{bmatrix} 0 & a-b & k \\ b-a & 0 & 5 \\ -k & -5 & 0 \end{bmatrix}$ $(\boldsymbol{Ex.7.4-3(iii)})$

19. If $\vec{a}$ *and* $\vec{b}$ are two vectors such that $|\vec{a}| = 10$, $|\vec{b}| = 15$ and $\vec{a}.\vec{b} = 75\sqrt{2}$ find the angle between $\vec{a}$ and $\vec{b}$. $(\boldsymbol{Ex.8.3-3})$ Mr. K.MURUGANANDHAM. M.Sc., M.Ed, M.Phil +91-98431 51302

20. For any vector $\vec{a}$ prove that $|\vec{a}\times\hat{\imath}|^2 + |\vec{a}\times\hat{\jmath}|^2 + |\vec{a}\times\hat{k}|^2 = 2|\vec{a}|^2$ $(\boldsymbol{Ex.8.4-8})$

21. Evaluate: $\lim_{x\to\infty}\left(\frac{2x^2+3}{2x^2+5}\right)^{8x^2+3}$ $(\boldsymbol{Ex.9.4-4})$

22. Evaluate: $\lim_{x\to 0}\frac{\sqrt{1+\sin}-\sqrt{1-\sin}}{\tan x}$ $(\boldsymbol{Ex.9.4-23})$

PART – IV (Marks: 15)

IV. Answer all the questions. **3×5=15**

23. prove that $\begin{vmatrix}1 & x^2 & x^3\\ 1 & y^2 & y^3\\ 1 & z^2 & z^3\end{vmatrix} = (x-y)(y-z)(z-x)(xy+yz+zx)$. **(Eg. 7.24)**

(OR) If $\cos 2\theta = 0, determine \begin{vmatrix}0 & \cos\theta & \sin\theta\\ \cos\theta & \sin\theta & 0\\ \sin\theta & 0 & \cos\theta\end{vmatrix}^2$ $(\boldsymbol{Ex.7.4-5})$

24. The medians of a triangle are concurrent. **(Th.8.3)**

(OR) Show that the following vectors are coplanar $(\boldsymbol{Ex.8.2-9})$

a. $\hat{\imath}-2\hat{\jmath}+3\hat{k}$, $-2\hat{\imath}+3\hat{\jmath}-4\hat{k}$, $-\hat{\jmath}+2\hat{k}$

25. $Evaluate$: $\lim_{x\to 2}\frac{2-\sqrt{x+2}}{\sqrt[3]{2}-\sqrt[3]{4-x}}$ **(Ex. 9.2 – 11)**

(OR) Find the points of discontinuity of the function f, where $(\boldsymbol{Ex.9.5-3})$

$$(iii)\ f(x) = \begin{cases} x^3-3, & if\ x\le 2\\ x^2+1, & if\ x>2\end{cases}$$

Mr. K. MURUGANANDHAM. MSc. MEd. MPhil.

P.G – ASST IN MATHS

SEARCH IN YOU TUBE MUMURUGANANDHAM MATHS

LINK : https://youtube.com/user/TheMuruganandham