(1411MFD20)

THREE YEAR B.C.A. (Big Data and Machine Learning)/ B.C.A. (Data Science and Data Analytics)/M.C.A. (Dual Degree)/B.C.A. with Data Science (CBCS) DEGREE EXAMINATION.
MARCH/APRIL 2022.

(Regular/Supplementary)

FIRST SEMESTER

Paper – I – MATHEMATICAL FOUNDATION FOR DATA SCIENCE

Time : 3 Hours *Max. Marks : 75*

SECTION – A

Answer any FIVE questions. Each question carries 5 marks.

(Marks : 5 × 5 marks = 25 marks)

1. If $A=\begin{bmatrix}1 & -2 & 3\\ 2 & 3 & -1\end{bmatrix}$ and $B=\begin{bmatrix}1 & 0 & 2\\ 0 & 1 & 2\end{bmatrix}$, then find $A+B$ and $A-B$.

2. If $A=\begin{bmatrix}8 & 9\\ 5 & -1\end{bmatrix}$ and $B=\begin{bmatrix}-2 & 3\\ 4 & 0\end{bmatrix}$, then find AB and BA. Is $AB=BA$?

3. Examine the following matrix A is orthogonal or not, where $A=\begin{bmatrix}2 & -3 & 1\\ 4 & 3 & 1\\ -3 & 1 & 9\end{bmatrix}$.

4. Find the adjoint of the matrix $A=\begin{bmatrix}2 & 3 & 4\\ 4 & 3 & 1\\ 1 & 2 & 4\end{bmatrix}$.

5. Find the rank of the matrix $A=\begin{bmatrix}-1 & 0 & 6\\ 3 & 6 & 1\\ -5 & 1 & 3\end{bmatrix}$.

6. Solve the following equations by Cramer's rule $x+y+z=6,\ x-y+z=2,\ 2x-y+3z=9$.

7. Evaluate $\int_0^6 \frac{1}{1+x}dx$ by using Trapezoidal rule, here divide the interval [0, 6] into six sub-intervals.

8. Construct a forward difference table from the following table, find $\Delta^4 y(0)$.

x	0	1	2	3	4
y_x	1	1.5	2.2	3.1	4.6

[P.T.O]

9. If $A=\{1,2,3,4,5,6,7,8,9,10\}$ and $B=\{2,3,5,6\}$, then find $A-B$ and $B-A$.

10. If $A=\{1,2,3,4,5,6,7\}$ and $B=\{2,4,6,8\}$, then find $A\cup B$ and $A\cap B$.

SECTION – B

Answer any FIVE questions. Each question carries 10 marks.

(Marks : 5×10 marks = 50 marks)

11. If $A=\begin{bmatrix}1 & 2\\ 3 & -1\end{bmatrix}$, $B=\begin{bmatrix}0 & 1\\ 2 & 3\end{bmatrix}$ and $C=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$, then verify that $A(B+C)=AB+AC$.

12. If $A=\begin{bmatrix}2 & 5\\ 3 & 1\end{bmatrix}$, then find $A^2-3A-13I$, where I is the unit matrix.

13. Examine the following matrix 'A' is singular or Non-singular where $A=\begin{bmatrix}3 & 8 & 1\\ -4 & 4 & 1\\ -4 & 1 & 1\end{bmatrix}$

14. Find the inverse of the matrix A, where $A=\begin{bmatrix}1 & 1 & 3\\ 1 & 3 & -3\\ -2 & -4 & -4\end{bmatrix}$.

15. Find the rank of the matrix $A=\begin{bmatrix}1 & 2 & 3\\ 3 & 4 & 5\\ 4 & 5 & 6\end{bmatrix}$.

16. Solve the equations by using matrix inversion method.

$2x-y+3z=9,\ x+y+z=6,\ x-y+z=2$.

17. Evaluate $\int_0^{\pi} t\sin t\,dt$ using the Trapezoidal rule. Divide the interval $[0,\pi]$ into six parts of width $h=\frac{\pi}{6}$.

18. Find the Newton's forward difference interpolation polynomial for the following data.

x	0	1	2	3
$f(x)$	1	3	7	13

19. If $A=\{a,b,c,d,e\}$, $B=\{1,2,7,9\}$, $C=\{4,5,9\}$ then prove that $A\cup(B\cup C)=(A\cup B)\cup C$.

20. If $U=\{1,2,3,4,5,6,7,8\}$, $A=\{1,2,3,4\}$ $B=\{4,5,6,7,8\}$, then verify

Is (a) $(A\cup B)^T=A^T\cap B^T$?

Is (b) $(A\cap B)^T=A^T\cup B^T$?