



B.Sc. I Semester Degree Examination, March/April - 2023

MATHEMATICS

Business Mathematics OE

(NEP)

Time : 2 Hours

Maximum Marks : 60

Note : Answer *all* sections.

SECTION - A

1. Answer the following questions.

10x1=10

(a) Define Set and give example.

(b) Define diagonal Matrix.

(c) Give example of Null matrix.

(d) If $A = \{4 \ 8 \ 9\}$ $B = \{3 \ 2 \ 1\}$ then find $A \cup B$.

(e) If $\begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 \\ 1 \\ z \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$, then find values of x, y, z .

(f) If $A = \begin{bmatrix} 0 & 2 & 3 \\ 2 & 1 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 7 & 6 & 0 \\ 0 & 4 & 1 \end{bmatrix}$ find $A - B$.

(g) Define continuous function.

(h) If $y = e^{\sin x}$ find $\frac{dy}{dx}$.

(i) Find degree of homogeneous function $x^3 + y^2x + y^3 = 0$

(j) Write order of the Equation $\left(\frac{dy}{dx}\right)^3 + \frac{d^2y}{dx} + y = 0$.



SECTION - B

Answer **any four** of the following questions.

4x5=20

2. Find the value of $(125)^{2/3}$.

3. Find the Adjoint of $\begin{bmatrix} 1 & 4 & -2 \\ -2 & -5 & 4 \\ 1 & -2 & 1 \end{bmatrix}$.

4. Solve
$$\begin{aligned} 3x_1 + 2x_2 + x_3 &= 3 \\ 2x_1 - x_2 - 3x_3 &= -3 \\ x_1 + x_2 + x_3 &= 4 \end{aligned}$$

by using elementary operation.

5. Verify Euler formula for $u = \sin^{-1}\left(\frac{x+y}{\sqrt{x}+\sqrt{y}}\right)$ then prove that

$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \frac{1}{2} \tan u.$$

6. If S is the distance transversed in meters by the particle in time t sec and $S = 4t^4 - 6t^3 + 8t^2 - t$, find the velocity and acceleration.

7. Examine the function $f(x) \begin{cases} \frac{x^3 - 9}{x - 3} & \text{when } x \neq 3 \\ 9 & \text{when } x = 3 \end{cases}$ for continuity at $x=2$.

SECTION - C

Answer **any three** of the following.

3x10=30

8. (a) If $A = \{-1, 1, 0, 2, 5\}$ and $f : A \rightarrow I$ (I is the set of integer) is defined by $f(x) = x - 2$, find the range of f. **6**

(b) Find the value of $\log_{2\sqrt{2}} 64$.

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9. (a) Prove that $\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ a & b & 1+c \end{vmatrix} = 1+a+b+c.$ **6**
- (b) A determinant changes its sign when any two of its row or columns are interchanged. **4**
10. (a) Solve linear equation **6**
 $x+y+z=3, 3x+4y+7z=14, x-y+z=1.$
- (b) Find for what values of λ and μ the system $x+y+z=6, 2x+4y+6z=20,$ **4**
 $x+2y+\lambda z=\mu$ has a unique sum.
11. (a) Examine the differentiability of the function $f(x)=x^2+2$ at $x=2.$ **6**
- (b) If $u = \phi(y+ax) + \psi(y-ax)$ show that $\frac{\partial^2 u}{\partial x^2} = a^2 \frac{\partial^2 u}{\partial y^2}.$ **4**
12. (a) Find the total derivative of u wrt 't' when $u = x \sin y,$ where $x=(1+t^2) y=t^3.$ **6**
- (b) Define implicit function and give examples. **4**

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