



**B.A./B.Sc./B.Com. I Semester (NEP) Degree Examination,
March/April - 2022
MATHEMATICS [OEC]
Business Mathematics**

Time : 3 Hours

Maximum Marks : 60

Instruction : Answer **all** Sections.

SECTION - A

1. Answer the following sub-questions, each sub-question carries **one** mark. **10x1=10**

(a) Define finite set with an example.

(b) Define power set.

(c) Define diagonal matrix.

(d) Define symmetric matrix.

(e) If $A = \begin{bmatrix} \sqrt{3} & 1 & -1 \\ 2 & 3 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & \sqrt{5} & 1 \\ -2 & 3 & 7 \end{bmatrix}$, find $A+B$.

(f) If $A = [1 \ 3 \ -6]$ then find A' .

(g) Define limit of a function.

(h) Find $\frac{dy}{dx}$ if $x-y = \pi$.

(i) Define implicit function.

(j) Find the maximum of the function $f(x) = x^3 + 1$.



SECTION - B

Answer **any four** of the following questions, each question carries **five** marks. **4x5=20**

2. Find the value of 'n' such that ${}^n P_5 = 42 {}^n P_3$, $n > 4$.

3. If $A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$ then show that $A^3 - 23A - 40I = 0$.

4. Solve

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

by using elementary operations.

5. Find the values of 'K' so that the function $f(x)$ is continuous at $x=2$.

$$\text{Where } f(x) = \begin{cases} Kx^2, & \text{if } x \leq 2 \\ 3, & \text{if } x > 2 \end{cases}$$

6. Find two numbers whose sum is 24 and whose product is as large as possible.

7. State and prove Euler's Theorem.

SECTION - C

Answer **any three** of the following questions, each question carries **ten** marks. **3x10=30**

8. (a) Prove that the function $f(x) = \log x$ does not have maxima or minima.

(b) If $y = \frac{x \log x}{1-x}$ find $\frac{dy}{dx}$.

9. (a) If 'S' is the distance travelled in meter by a particle in a time 't' sec and $S = 4t^3 - 6t^2 + t - 7$ find velocity and acceleration when $t=2$ seconds.

(b) Find limit of function $f(x) = \begin{cases} x^3 + 3; & x \leq 1 \\ x + 1; & x > 1 \end{cases}$ at $x=1$.



10. (a) Define Relation on a set. Give an example of relation which is reflexive and transitive but not symmetric.

(b) Show that the function $f(x)=|x|$ is neither one-one nor onto.

11. (a) If $A = \begin{bmatrix} 1 & 2 \\ 4 & 2 \end{bmatrix}$ then show that $|2A|=4|A|$.

(b) Find the adjoint of the matrix $\begin{bmatrix} 1 & -1 & 2 \\ 2 & 3 & 5 \\ -2 & 0 & 1 \end{bmatrix}$

12. (a) Solve : $x + y - z = -4$
 $x - 2y + 3z = 5$
 $4x + 3y + 4z = 7$

(b) Find for what values of λ and μ the system.

$$x + y + z = 6$$

$$2x + 4y + 6z = 20$$

$$x + 2y + \lambda z = \mu$$

has a unique solution.

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