

3003

B.C.A. (SEM. - I) EXAMINATION, 2025-26

NEP - 2020

COMPUTER APPLICATION

COURSE / PAPER NAME - FOUNDATION OF MATHEMATICS FOR

COMPUTER APPLICATION

PAPER-III

COURSE CODE - S020103T

[Time : 2 Hours]

[Maximum Marks : 75]

Instructions: Attempt all sections as per instructions.

Section - A

Note: Attempt all questions. Give answer of each question in 50 words.

10x3=30

Q1.

- ~~(a)~~ What is Cartesian product of two sets?
- ~~(b)~~ What do you mean by Power set?
- ~~(c)~~ What do you mean by tautology?
- ~~(d)~~ What are Quantifiers?
- ~~(e)~~ Define Rank of a matrix.
- ~~(f)~~ What is a Scalar matrix?
- ~~(g)~~ What do you mean by Maxima and maximum value?

(MPU)

(h) Evaluate the following:

$$\lim_{x \rightarrow 0} \frac{x}{3 - \sqrt{x+9}}$$

(i) Define Gamma function.

(j) Evaluate the following integral: $\int_2^1 \frac{2y^3 - 6y^2}{y^2} dy$

Section - B

Note: Attempt any four questions. Give answer of each question in about 150 words.

$$4 \times 6 = 24$$

Q2. If $A = \{1, 2, 3, 4\}$ and $B = \{3, 4, 5, 6\}$, find

a. $A \cup B$

b. $A - B$

c. $B - A$

Q3. Determine whether the function $f(x)$ is one-one and onto when

a. domain = \mathbb{R} , codomain = \mathbb{R}

b. domain = \mathbb{R} , codomain = $[0, \infty)$

Q4. What do you mean by bi-conditional statements. Explain in detail with the help of truth table.

Q5. State and explain Cayley Hamilton theorem. Find inverse of the following matrix using Cayley Hamilton theorem. $\begin{bmatrix} 1 & 0 & 2 \\ 1 & 5 & 2 \end{bmatrix}$

Q6. Solve the following system of equations using Cramer's rule-

$$x + y + z = 6$$

$$x - y + z = 2$$

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

(MPU)

Q7. Differentiate the following w.r.t. x :

$$y = \sin (x^3 + 2x)$$

Q8. Integrate the following: $\int \frac{3x+5}{(x-1)(x+2)} dx$

Section - C

Note: Attempt any two questions. Give answer of each question in about 450 words.

$$2 \times 10.5 = 21$$

Q9. A right circular cone has height 12 cm and base radius 6 cm. A cylinder is inscribed in the cone coaxially. Find the dimensions of cylinder of maximum possible volume.

Q10. Integrate the following $\int_0^a \frac{x}{\sqrt{a^2 - x^2}} dx$

Q11. Integrate the following $\int \frac{1}{1+x^4} dx$

Q12. Check for continuity of the following function at $x = 0$

$$f(x) = \begin{cases} \frac{|x|}{x} & \text{for } x \neq 0 \\ 0 & \text{for } x = 0 \end{cases}$$

-----x-----