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Reg. No.

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I Semester (NEP) B.C.A. Degree Examination, April/May - 2022  
MATHEMATICAL FOUNDATION  
(Regular)

Time : 2 Hours

Maximum Marks : 60

**Instructions to Candidates:**

1. Question paper has 5 questions.
2. Answer all 5 questions.

1. Answer any Six Questions. (6×2=12)
  - a. Define Conjunction.
  - b. Define tautology.
  - c. Define power set.
  - d. Consider the function f and g defined by  $f(x) = x^2$  and  $g(x) = x^3 + 1, \forall x \in R$ , find gof.
  - e. Define a unit matrix.
  - f. Define Rank of Matrix.
  - g. Evaluate  $\lim_{x \rightarrow 2} \frac{x^3 - 2^3}{x - 2}$
  - h. If  $y = x^3 + 4x^2 - 5x + 6$  Find  $dy/dx$ .

2. Answer any Three questions. (3×4=12)
  - a) Define (i) Converse & (ii) Inverse. Write the converse and inverse of "If two triangles are Congruent then they are similar".
  - b) Show by means of truth table that i)  $\sim(p \vee q) \Leftrightarrow \sim p \wedge \sim q$ .  
ii)  $\sim(p \wedge q) \Leftrightarrow \sim p \vee \sim q$ .

[P.T.O.]

- c) Find the possible truth values of  $p$ ,  $q$  &  $r$  if  $p \rightarrow (q \vee r)$  is false.
- d) Prove that the following proposition is a tautology.  $[(p \rightarrow q) \wedge (q \rightarrow r)] \rightarrow (p \rightarrow r)$ .

3. Answer any **Three** questions.

(3×4=12)

- a) i. Write the power set of  $A = \{1, 2, 3, 4\}$
- ii. let  $A = \{a, b, c, e, f\}$  &  $B = \{b, e, f, r, s\}$  find  $A \cup B$  and  $A \cap B$ .
- b) Define symmetric difference and determine the set  $A \Delta B$  if  $A = \{a, b, c, d\}$  and  $B = \{c, d, e, f\}$ .
- c) Define i) Onto function & ii) One-to-One function If  $f: R \rightarrow R$  is defined by  $f(x) = x^2$  for every  $x \in R$ , show that  $f$  is not one-to-one function.
- d) Define composition of functions. let  $R$  be the set of real numbers. Define  $f: R \rightarrow R$  and  $g: R \rightarrow R$  by  $f(x) = 3x - 2$  and  $g(x) = x^2 + 4$ . Find i)  $\text{gof}$  & ii)  $\text{fog}$ .

4. Answer any **Three** questions.

(3×4=12)

- a) If  $A = \begin{bmatrix} 3 & 5 \\ 1 & 2 \end{bmatrix}$  find the Adjoint of Matrix  $A$ .
- b) Solve the equation using Cramer's Rule  $2x - 3y = 5$  &  $7x - y = 8$ .
- c) Find the Eigen values of the Matrix  $A = \begin{bmatrix} 4 & 8 \\ 1 & 6 \end{bmatrix}$
- d) Find the rank of the Matrix by Elementary Row Transformation of

$$A = \begin{bmatrix} 1 & 2 & 3 & 2 \\ 2 & 3 & 5 & 1 \\ 1 & 3 & 4 & 5 \end{bmatrix}$$

5. Answer any **Three** questions.

(3×4=12)

a) Evaluate  $\lim_{x \rightarrow 4} \frac{x^3 - 4^3}{x^2 - 4^2}$ .

b) Evaluate  $\lim_{x \rightarrow 0} \frac{x}{x - \sqrt{1-x}}$ .

c) Find  $\frac{dy}{dx}$  if  $y = \frac{a^2 + x^2}{a^2 - x^2}$ .

d) Find  $\frac{dy}{dx}$  if  $y = x^2 \log x$ .

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