Q.P. Code 126BCA01XXXDSC03T

Reg No | | | | | | | | | | | |

BCA I Semester Examination, Feb/March, 2024

Paper: DSC 03

Subject: Mathematical Foundation

Duration of paper : 02 hours | Maximum marks: 60

INSTRUCTIONS TO CANDIDATE:

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

1 Answer any six questions **6X2=12**

a. Define disjunction.

b. If $p \rightarrow q$ is false then find the truth value of $(\sim p \rightarrow \sim q)$

c. If A={a,b,c} B={c,d} find $A \Delta B$

d. If A={1,2,3} B={a,b} find A x B

e. If $A=\begin{bmatrix}1 & 1\\ 2 & 3\\ 1 & 0\end{bmatrix}$, $B=\begin{bmatrix}1 & 1\\ 2 & 3\end{bmatrix}$ find AB

f. Determine transpose of matrix $A=\begin{bmatrix}1 & 2\\ 1 & 1\\ 0 & 0\end{bmatrix}$

g. Evaluate $\lim_{x\to 2} \frac{x^2+4}{x+2}$

h. If $y = \frac{1}{x^2+1}$ find $\frac{dy}{dx}$

2. Answer any three questions **3X4=12**

a. Prove that $[p \rightarrow (q \wedge r)] \leftrightarrow [(p \rightarrow q) \wedge (p \rightarrow r)]$ is tautology.

b. Prove the logical equivalence by using truth table.

$\sim(p \rightarrow q) \leftrightarrow p \wedge (\sim q)$

c. Define converse, inverse and contrapositive of conditional with truth table.

d. Define Quantifiers, write its types with example.

3. Answer any three questions **3x4=12**

a. If U = {1,2,3,4,5,6,7,8,9}, A = {1,3,5,7} and B = {2,4,6,7,8} Find $\overline{A \cup B}$ and $\overline{A \cap B}$

b. i) Define power set and write power set of A = {1,2,3}

ii) Find A-B & B-A if A = {a,b,c} B ={b,d,e}

c. Define one – one function. If A = {1,2,3,4}, B = {v,w,x,y,z} and f = {(1,v), (2,x), (3,z), (4,y)} then show that f is one –one but not onto.

d. If R be the set of real numbers and f:R→R and g:R→R defined as $f(x) = x^3 + 2$, $g(x) = 3x^2 + 3x + 1$ find i) gof , ii) fog.

4. Answer any three questions **3X4=12**

a. If A= $\begin{bmatrix} 4 & 8 \\ 1 & 3 \end{bmatrix}$ find AdjA and A^{-1}

b. Solve by Cramer's rule 5x+2y =21, 3x+y =13

c. Verify Cayley - Hamilton theorem for $\begin{bmatrix} 1 & 3 \\ -2 & -4 \end{bmatrix}$

d. Find rank of a matrix using elementary row transformation if A = $\begin{bmatrix} 1 & 4 & 3 & 2 \\ 2 & -1 & 3 & 4 \\ 4 & 1 & 1 & 5 \\ 0 & 0 & 1 & 3 \end{bmatrix}$

5. Answer any three questions **3X4=12**

a. Evaluate $\lim_{x \to 1} \frac{x^3 - 3x^2 + 3x - 1}{x^2 - 1}$

b. If y = $\sqrt{x}\,(x^2 + 1)^4$ Find $\frac{dy}{dx}$

c. If y = $\frac{x^2}{x^3 + 1}$ Find $\frac{dy}{dx}$

d. If y = $x^6 + 4x^2 + 3x + \frac{2}{x} + \frac{1}{x^2}$ find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$