

Registration Number:

Date & session:

**ST JOSEPH’S UNIVERSITY, BENGALURU -27**

**B.C.A – I SEMESTER**

**SEMESTER EXAMINATION: OCTOBER 2023**

**(Examination conducted in November /December 2023)**

 **CA 1321: MATHEMATICAL FOUNDATIONS**

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| **Time- 2 HOURS**  |  **Max Marks - 60** |

**This paper contains TWO printed pages and THREE parts**

**INSTRUCTION: USE OF SIMPLE CALCULATOR IS ALLOWED**

**PART A**

**I Answer ALL of the Following (2\*5 = 10)**

1. Find (A v B) ^ (∼A^∼B)
2. Let A = {a, b, c}, B = {x, y, z}. Find B x A
3. A = $\left[\begin{matrix}-3&5\\-9&11\end{matrix}\right]$ B = $\left[\begin{matrix}2&-3\\6&-7\end{matrix}\right]$ Find A +10B
4. If A = $\left[\begin{matrix}8&0&0\\0&0&1\\0&1&0\end{matrix}\right]$ Find A3 – 2A2 – A + 2I = 0
5. Find $\frac{d}{dx}\left[\sqrt{x}\right]$

**Part B**

**Answer any FIVE of the following (4\*5=20)**

1. Find PCNF for the following statements (∼p → r) ^ (q ↔ p)
2. Let A and B be two finite sets such that n(A) = 20, n(B) = 28 and n(A∪B) = 36. Find n(A∩B).
3. Find the Rank of the Matrix using Normal Form A = $\left[\begin{matrix}2&4&6\\1&0&2\\2&3&-1\end{matrix}\right]$
4. Illustrate with an example the Canonical form for 3\*3 Matrix.
5. $\lim\_{x\to 3}\left(\frac{x^{3}-27}{x-3}\right)$
6. Find the Eigen Values of A = $\left[\begin{matrix}8&-6&2\\-2&7&-4\\2&-4&-3\end{matrix}\right]$
7. $\frac{d}{dx}5\sqrt{x^{4}}$. Find $\frac{dy}{dx}$

**Part C**

**Answer any THREE of the following (10 x 3= 30)**

1. a) Prove Associate law (p v q) v r ≡ p v (q ^ r)

b) Let A = {1,2,3} and f, g is function from A to A by f {(1,2) (2,3) (3,1)} and g {(1,2) (2,1) (3,3)} Find fog(x) and gof(x)

1. a) Solve using Cramer’s rule

x1 -2x2 -x3 = 2

3x1 +6x2 -x3 = 1

3x1 +3x2 -2x3 = 3

b) Find the Rank of the matrix $\left[\begin{matrix}1&2&3&1\\2&4&6&2\\1&2&3&2\end{matrix}\right]$

1. Find first and second derivate using maxima and minima value from y = 5x3 +2x2 -3x
2. a) Let X, Y, Z be any 3 sets and find out X= {1, 2, 3}, Y = {2, 3, 4}, Z= {3, 4, 5}

 X- (X U Z) = (X – Y) ∩ (X – Z)

 X- (Y ∩ Z) = (X – Y) U (X – Z)

 b) Define function and its types

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