ST. JOSEPH'S UNIVERSITY, BENGALURU -27
BCA (DATA ANALYTICS) – II SEMESTER
SEMESTER EXAMINATION: APRIL 2024
(Examination conducted in MAY/JUNE 2024)
BCADA 2321: Discrete Mathematics II
(For current batch students only)

Time: 2 Hours **Max Marks: 60**

This paper contains <u>TWO</u> printed pages and <u>THREE</u> parts

<u>PART A</u>
ANSWER ALL THE QUESTIONS **5 X 2 = 10**

1. Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & 4 \\ 1 & 3 & 5 & 7 \\ 1 & 4 & 7 & 10 \end{bmatrix}$ using Row reduced echelon form.

2. When do we say a set of vectors is linearly dependent?
3. Find the solution of $\int 5x(x^2+3)dx$
4. Why do we need to use Integration?
5. Mention any two states of finite automata machine.

<u>PART B</u>
ANSWER ANY FIVE QUESTIONS **5 X 4 = 20**

6. Find the non-trivial solution of the given simultaneous equations.
   x + y =0
   x − y =0
   3x +y - z =0
7. Examine the consistency of the following system of equations
   x +2y −z =3
   3x −y +2z=1
   2x − 2y +3z=2
8. Show that the vector (2,2,3) is in the span of the vectors (2,1,4), (1,-1,3), (3,2,5)
9. Find the linear transformation $f:R^2 \rightarrow R^2$ such that $f(1,0) = (1,1)$ and
   $f(0,1) =(-1,2)$
10. Find the value of $\int (5x^4+3x^3-5x-2e^x)\,dx$
11. Find the value of $\int 2x\sin x\,dx$
12. Describe finite state machine.

ANSWER ANY THREE QUESTIONS   **3 X 10 = 30**

13. Find the eigen values and corresponding eigen vectors of the matrix A = $\begin{bmatrix} 1 & 2 \\ 3 & 2 \end{bmatrix}$

14. Find the dimension and basis of the subspace of V spanned by subset S given by S= (2,4,2), (1,-1,0)), (1,2,1) and (0,3,1)

15. Find the value of ∫e^x sin x dx

16. Draw with a neat state diagram of the simplified Ticketing machine.