Course Code: 5BSC5
Course: Mathematics-V
Credit: 4
Last Submission Date: April 30 (for January Session)
October 31, (for July session)

Max. Marks:-30
Min. Marks:-10

Note:-attempt all questions.

Que1. Show that the function

$$f(x,y) = \begin{cases} \frac{x^2 y}{x^2+y^2} & ; \text{when } x^2 + y^2 \neq 0 \\ 0 ; when\ x^2 + y^2 = 0 \end{cases}$$

is continuous but not differentiable at (0,0).

Que2. If f is a monotonic on $[a, b]$, then it is integrable on $[a, b]$.

Que3. Show that $\int_0^\infty \frac{sinx}{x}$ dx is convergent.

Que4. Expand f(x) = |x| in a fourier series on [$-l, l$].

Que5. Define L.I and L.D vectors and show that the set $\{1, x, x\ (1-x)\}$is a L.I. set of vectors in the vector space of all polynomial in R.

Que6. Define vector space and show that the set V= R^n (R) = $\{(a_{1\,,}a_{2---}a_n)|\ ai\ ER\ for\ i = 1,2 --- r\}n$

Forms a vector space with respect to the component wise addition and scaler multiplication.

Que7. Show that T: I$R_n[x] \rightarrow R_n[x]$ s.t

T $(p_{(x)}) = \int_0^x p(x)_{dx}$

Is a linear transformation. Where $R_n[x]$ is the set of all polynomials of degree less than equal to n.

Que8. Define diagonalizability of a matrix and show that the matrix

A= $\begin{pmatrix} 4 & 2 & -2 \\ -5 & 3 & 2 \\ -2 & 4 & 1 \end{pmatrix}$ is diagonalizable.

Que9. Define eqnivalence relation on a set and show that the relation on the set of integer z defined by

xRy⟺x ≡ y (modn)

where n is any fixed integer, form an eqnivalence relation on Z

Que10. A tree with n vertices has n-1 edges.