

V SEM(CBCS) MODEL QUESTION PAPER – B. Sc. MATHEMATICS
PAPER: 5.1: ADVANCED ALGEBRA AND NUMERICAL METHODS

Time : 3 Hours

Max. Marks : 90

PART-A

I. ANSWER ANY SIX QUESTIONS.

6X2=12

1. Add and Multiply the two polynomials over the Ring $(Z_6, +_6, \times_6)$, where $f(x)=2x^0+5x+3x^2$ and $g(x)=1x^0+4x+2x^3$.
2. Define Irreducible element ?
3. Give an example to show that the union of two sub rings is not necessarily a Sub-ring .
4. Express the vector $(3,5,2)$ as the linear combination of the vectors $(1,1,0)$, $(2,3,0)$ and $(0,0,1)$ of $V_3(R)$.
5. Find the Linear transformation of $f: R^2 \rightarrow R^2$ such that $f(1,0)=(1,1)$ and $f(0,1)=(-1,2)$.
6. Explain Newton-Raphson Method to solve $f(x)=0$.
7. Solve $\frac{dy}{dx} = x + y$ by Euler's Method, given that $y=1$ when $x=0$, $h=0.2$.

PART-B

II. ANSWER ANY SIX QUESTIONS.

6X3=18.

1. Show that the set M of all 2×2 matrices of the form $\begin{bmatrix} 0 & a \\ 0 & b \end{bmatrix}$ where a, b are integers, is a left ideal but not a right ideal in the right of 2×2 matrices with elements as Integers.
2. If R is a commutative Ring, then
 - (i) $a|b$ and $b|c \Rightarrow a|b+c$.
 - (ii) $a|b \Rightarrow a|bx$ for all $x \in R$.
3. Let $f: R \rightarrow R^1$ be a homomorphism of rings from R onto R^1 with kernel K, then show that f is one-one iff $K = \{0\}$.
4. In any Vector Space V over a field F. Prove that
 - (i) $c \cdot 0 = 0, \forall c \in F$
 - (ii) $0 \cdot \alpha = 0, \forall \alpha \in F$
 - (iii) $(-c)\alpha = -(c\alpha) = c(-\alpha), \forall c \in F \& \forall \alpha \in F$
5. For the Matrix $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$, find the corresponding Linear Transformation $T: R^2 \rightarrow R^2$ w.r.t the Basis $\{(1,0), (1,1)\}$.
6. Use Gauss-Seidel Method to solve the system $x + 5y = 11; 4x + y = 6$ correct to 2 decimal places.
7. Using Picard's method, solve the differential equation $\frac{dy}{dx} = x^2 + y, y(0) = 1$ to find the value of y at $x = 0.1$.

(Dr. Narasimha)

UCS, Tumkur

(Dr. Yogesh)

GFC Tumkur

M.S.S

M.S. SURESHA

G. F. S. C. TUMKUR

DEAN

Faculty of Science & Techno

Tumkur University

Tumkur-572103

