Hall Ticket Number :

R-15

Code: 5GC31

II B.Tech. I Semester Supplementary Examinations June 2024

Engineering Mathematics-III

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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UNIT–I

1. a) Determine the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 1 & 4 & 2 \\ 2 & 6 & 5 \end{bmatrix}$ 7M

b) Investigate the values of λ and μ so that the equations
$2x+3y+5z=9$; $7x+3y-2z=8$; $2x+3y+\lambda z=\mu$ have
(i) no solution (ii) a unique solution and (iii) an infinite number of solutions 7M

OR

2. a) Find the Eigen values and eigenvectors of $A=\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 7M

b) Test for consistency and solve $5x+3y+7z=4$; $3x+26y+2z=9$; $7x+2y+10z=5$ 7M

UNIT–II

3. a) Find the missing term in the table 7M

x	2	3	4	5	6
y	45	49.2	54.1	-	67.4

b) Find the real root of the equation $x\log_{10} x = 1.2$ by Regula-falsi method correct to four decimal places. 7M

OR

4. Estimate the value of $f(22)$ and $f(42)$ from the following table by Newton's forward and backward interpolation formula. 14M

x	20	25	30	35	40	45
y	354	332	291	260	231	204

UNIT–III

5. Using Euler's Method, find an approximate value of y corresponding to $x=1$, given $\frac{dy}{dx} = x+y$ and $y=1$ when x=0. 14M

OR

6. Apply Fourth order Runge-Kutta Method to find an approximate value of y when $x=1.2$ in step of 0.1, given that $y' = x^2 + y^2$, $y(1)=1.5$. 14M

UNIT–IV

7. a) Form the partial differential equations (by eliminating the arbitrary constants and arbitrary functions) from $z = ax+by+a^2+b^2$ 7M

b) Obtain the Fourier series for $f(x)=x$ in the interval –® $< x <$ ® 7M

OR

8. Find the Fourier series expansion for $f(x)=e^x$ in $0 < x < 2$® 14M

UNIT–V

9. Apply C-R conditions to $f(z)=z^2$ and show that the function is analytic everywhere. 14M

OR

10. a) If $u = x^2 + y^2$, find harmonic conjugate $v(x, y)$ and write the corresponding complex potential $f(z)=u+iv$ 7M

b) Show that the polar form of Cauchy's Riemann equations are $\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \_}, \frac{\partial v}{\partial r} = \frac{1}{r}\frac{\partial u}{\partial \_}$ 7M

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