Hall Ticket Number :										

R-15

Code: 5GC31

II B.Tech. I Semester Supplementary Examinations November 2023

Engineering Mathematics-III

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

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

****

UNIT–I

1. 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

OR

2. a) Verify Cayley-Hamilton theorem for the matrix $A=\begin{bmatrix}1 & 1 & 2\\ 3 & 1 & 1\\ 3 & 3 & 1\end{bmatrix}$ and hence find A^4. 7M

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

UNIT–II

3. a) Find a root of the equation $x^2-4x-9=0$ using bisection method correct to three decimal places 8M

   b) Find the missing term in the table

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

6M

OR

4. From the following table of values of ‘x’ and ‘y’, obtain $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x=1.5

X	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

14M

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. Use Runge-Kutta method to evaluate $y(0.1)$ and $y(0.2)$ given that $y'=x+y$, $y(0)=1$ 14M

UNIT–IV

7. a) Find the Fourier series expansion for $f(x)=e^x$ in $0<x<2$® 10M

   b) Form the partial differential equations (by eliminating the arbitrary constants and arbitrary functions) from $z=ax+by+a^2+b^2$ 4M

OR

8. Form the partial differential equation by eliminating arbitrary function from $F\left(x+y+z, x^2+y^2+z^2\right)=0$ 14M

UNIT–V

9. a) Apply C-R conditions to $f(z)=z^2$ and show that the function is analytic everywhere. 7M

b) Evaluate $\int_c \frac{1}{(z-1)(z-3)}dz$ with C: $|z|=2$ using Cauchy's Integral Formula 7M

OR

10. a) Show that $u=\frac{1}{2}\log\left(x^2+y^2\right)$ is harmonic and find its harmonic conjugate function 7M

b) Evaluate $\int_c \frac{\sin® z^2+\cos® z^2}{(z-1)(z-2)}dz$ with C: $|z|=3$ using Cauchy's Integral Formula 7M

***