Hall Ticket Number :

R-15

Code: 5GC31

II B.Tech. I Semester Supplementary Examinations Nov/Dec 2022

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) Show that the Eigen values of diagonal matrix are just the diagonal elements of the matrix — 7M

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

OR

2. a) 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

   b) Solve the equations x+2y+3z=0;3x+4y+4z=0;7x+10y+12z=0 — 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 Cubic polynomial which takes the values. $y(0)=1$, $y(1)=0$, $y(2)=1$ and $y(3)=10$ — 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. 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) Form the partial differential equations (by eliminating the arbitrary constants and arbitrary functions) from $z=ax+by+a^2+b^2$ — 5M

   b) Find the half range cosine series for the function $f(x)=x$, when $0<x<$® hence show that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\ldots=\frac{®^2}{8}$ — 9M

OR

8. a) Form a partial differential equation by eliminating the arbitrary functions from $z = f\left(x + at\right) + g\left(x - at\right)$ 7M

b) Obtain the Fourier series for $f\left(x\right) = x$ in the interval $-\text{®} < x < \text{®}$ 7M

UNIT–V

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

b) Using Cauchy's Integral Formula $\int_c \frac{\sin^2 z}{\left(z - \frac{\text{®}}{6}\right)^3} dz$ Evaluate where C is Unit Circle. 7M

OR

10. If $f\left(z\right)$ regular function of z, prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)\left|f\left(z\right)\right|^2 = 4\left|f'\left(z\right)\right|^2$ 14M

***