Hall Ticket Number :

R-15

Code: 5GC31

II B.Tech. I Semester Supplementary Examinations March/April 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)

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Marks

UNIT–I

1. Find the values of k for which the system of equations (3k-8)x+3y+3z=0; 3x+(3k-8)y+3z; 3x+3y+(3k-8)z=0 has a non-trivial solution. 14M

OR

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

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

UNIT–II

3. a) Find the Cubic polynomial which takes the values. $y(0)=1$, $y(1)=0$, $y(2)=1$ and $y(3)=10$ 7M

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. From the following table, estimate the number of students who obtained marks between 40 and 45 using Newton's interpolation formula

Marks	30-40	40-50	50-60	60-70	70-80
No. of Students	31	42	51	35	31

14M

UNIT–III

5. Employ Taylor's method to obtain approximate value of y at $x = 0.2$ for the differential equation $\frac{dy}{dx} = 2x + 3e^x$ $y(0) = 0$. Compare the numerical solution obtained with the exact solution 14M

OR

6. Apply Milne's method to find a solution of the equation $y' = x - y^2$ in the range $0 \le x \le 1$ for the boundary conditions y=0 at x=0. 14M

UNIT–IV

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

b) Form a partial differential equation by eliminating the arbitrary function f from $z = f\left(x^2 + y^2\right)$. 6M

OR

8. Using the method of separation of variables, solve

$$\frac{\partial u}{\partial x}=2\frac{\partial u}{\partial t}+u \text{ where } u(x,0)=6e^{-3x}$$ 14M

UNIT–V

9. 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 $\frac{\partial u}{\partial r}=\frac{1}{r}\frac{\partial v}{\partial \theta},\frac{\partial v}{\partial r}=\frac{1}{r}\frac{\partial u}{\partial \theta}$ 7M

OR

10. Show that the function $f(z)=\sqrt{|xy|}$ is not analytic at the origin even though C-R equations are satisfied. 14M

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