

Code: 7GC32

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)

UNIT-I

1. a) Apply fourth order Runge-Kutta method to $\frac{dy}{dx} = 3x + \frac{1}{2}y$, $y(0) = 1$ determine $y(0.1)$ correct to four decimal places. 7M
- b) Find a real root of the equation $3x = \cos x + 1$ by Newton-Raphson's method correct to four decimal places. 7M

OR

2. Use Milne's method to find $y(0.3)$ from $y' = x^2 + y^2$, $y(0) = 1$. Find the initial values $y(-0.1)$, $y(0.1)$, $y(0.2)$ from the Taylor's series method. 14M

UNIT-II

3. a) Evaluate $\int_0^1 \frac{1}{1+x} dx$ by Simpson's 1/3 rule. 7M
- b) Using Lagrange formula find $f(4)$. Given

x	0	2	3	6
y	-4	2	14	158

7M

OR

4. Using Lagrange's interpolation formula find the value of $f(10)$ from the following table

x	5	6	9	11
y	12	13	14	16

14M

UNIT-III

5. Form the partial differential equation by eliminating the arbitrary constants $x^2 + y^2 + (z-c)^2 = a^2$ 14M

OR

6. Form a partial differential equation by eliminating the arbitrary functions $f(x)$ and $g(y)$ from $z = yf(x) + xg(y)$. 14M

UNIT-IV

7. Find the Fourier series expansion of $f(x) = 2x - x^2$ in $(0,3)$ and hence deduce that $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2} - \frac{1}{6^2} + \dots = \frac{f^2}{12}$ 14M

OR

8. a) Find the Fourier series expansion for $f(x) = f - x$ in $0 < x < f$ 7M
- b) Expand $f(x) = \cos x$, $0 < x < f$ in half range sine series. 7M

UNIT-V

9. a) Find the Fourier sin and cosine transform of $f(x) = \frac{e^{-ax}}{x}$, $a > 0$ 7M
- b) Find the Fourier sin and cosine transform of $f(x) = 2e^{-5x} + 5e^{-2x}$ 7M

OR

10. Find the Fourier cosine transform of $f(x) = \frac{1}{1+x^2}$, hence, derive the Fourier sine transform of $w(x) = \frac{x}{1+x^2}$ 14M
