ACE
Engineering College

(An Autonomous Institution)

Question Paper Code: MA402BS

ACE-R20

Semester End Examination
II B. Tech- II Semester- AUGUST -2022
NUMERICAL METHODS, COMPLEX VARIABLES & STATISTICAL INFERENCE
ELECTRONICS AND COMMUNICATION ENGINEERING

Time: 3 Hours **Max. Marks: 70**

H. T. No										

Answer any 5 Questions out of 8 Questions from the following

Q.No	Question	Marks
1. a)	Using Newton-Raphson Method find the root of the quation $x + log_{10}x = 3.375$, correct to four decimal places.	7
b)	Find a root of the equation $x^3 - 5x + 1 = 0$ using the bisection method in 5 stages.	7
2. a)	The population of a town in the decimal census was given below. Estimate the population for the year 1895 Year x: 1891, 1901, 1911, 1921, 1931 Population y (in thousands): 46, 66, 81, 93, 101	7
b)	Using Lagrange interpolation formula find the value of y corresponding to $x = 2$ from the following table X: 0, 1, 3, 4 y: 5, 6, 50, 105	7
3. a)	Evaluate $\int_0^1 \frac{1}{1+x}\,dx$ by using Trapezoidal Rule.	7
b)	Evaluate $\int_0^1 \frac{1}{1+x^2}\,dx$ by using Simpson's 3/8th Rule.	7
4. a)	Solve $y' = x^2 + y, y(0) = 1$ using Modified Euler's method and compute $y(0.02)$.	7
b)	Using Runge-Kutta method, find $y(0.2)$ for the equation $y' = \frac{y-x}{y+x}$, $y(0) = 1$. Take $h = 0.2$.	7
5. a)	Show that the function $u = 2\log(x^2 + y^2)$ is harmonic and find its harmonic conjugate.	7
b)	Show that $f(x, y) = x^3y - xy^3 + xy + x + y$ can be the imaginary part of an analytic function.	7

6. a)	Evaluate $\int_C \frac{\log z \, dz}{(z-1)^3}$ where C: |z-1|=1/2 using Cauchy's integral formula.	7
b)	Find the Laurent's series expansion of the function $f(z) = \frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$ in the region $3<\|z+2\|<5$.	7
7. a)	A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence (Z_α = 1.96 for 95 %).	7
b)	The mean and standard deviation of a population are 11,795 and 14054 respectively. If n=50, find 95% confidence interval for the mean (Z_α = 1.96 for 95 %).	7
8. a)	A sample of 64 students have a mean weight of 70 kgs. Can this be regarded as a sample from a population with mean weight 56 kgs and standard deviation 25 kgs.	14