PRN:		Course Code :	AER2401

Second Year **B. Tech** End Semester Examination Summer 2024

Applied Numerical Methods

Day and Date: 31 MAY 2024 Friday Max Marks: **100**

Time : 10:30AM To 01:30PM Duration: **03** hrs

Instructions: 1. All questions are compulsory.

2. Use of non-programmable calculator is allowed.

3. Use of Normal table is allowed.

Q.1	**Attempt the following**	Marks	Bloom's Level	CO
a)	Find the real positive root of the equation $x^3-4x-9=0$ using bisection method up to 8^{th} approximation, given that root lies in the interval $[2,3]$.	08	L3	CO1
b)	Find the real positive root of the equation $x\log_{10}x-1.9=0$ using secant method correct to four decimal places, given that root lies in the interval $[3,4]$.	08	L3	CO1
	OR			
b)	Find the real positive root of the equation $3x=\cos x+1$ using Newton Raphson method correct to four decimal places, given that root lies in the interval $[0,1]$.	08	L3	CO1

Q.2	**Attempt the following**			
a)	Solve the following system of equations using Gauss Jordon method: $x+y+z=2,\ \ 2x+2y-z=1,\ \ 3x+4y+z=9$.	08	L4	CO2
b)	Solve the system of simultaneous equations $20x+y-2z=17,\ 3x+20y-z=-18,\ 2x-3y+20z=25$ using Jacobi's iterative method correct to four decimal places.	08	L3	CO2
	OR			
b)	Apply factorization method to solve the following system of equations: $3x+2y+7z=4;\ \ 2x+3y+z=5;\ \ 3x+4y+z=$	08	L4	CO2

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Q.3 **Attempt any two from the following**

a) Find the cubic polynomial which takes the following values: 08 L3 CO3

x	:	0	1	2	3
$f(x)$	:	1	2	1	10

Hence evaluate $f(4)$.

b) Apply sterling's formula to compute $y_{12.2}$ from the following data 08 L3 CO3

x:	10	11	12	13	14
y:	0.23967	0.2806	0.31788	0.35209	0.38368

c) Obtain $f(x)$ as polynomial and hence find the values of 08 L3 CO3

$f(3), f(4)$ and $f(6)$ for the following table.

x	0	1	2	5
$f(x)$	2	3	12	147

Q.4 **Attempt any two from the following**

a) From the following table find the first, second and third derivatives at $x = 2.8$. 08 L2 CO4

x	2.0	2.2	2.4	2.6	2.8
y	2.000	5.567	9.968	15.272	21.584

b) Find $f'(6)$ for the following data 08 L2 CO4

x	0	1	3	6
$f(x)$	18	10	−18	40

c) Evaluate $\int_{-3}^{3} x^4 dx$ by using Simpson's 1/3rd, Simpson's 3/8th rule and Trapeziodal method by taking h=1.. 08 L2 CO4

Q.5 **Attempt any Two of the following**

a) In a box containing 100 transistors, 20 of which are defective. 10 are selected at random. Find the probability that: 09 L3 CO5

i) all are defective, ii) all are non-defective,

iii) at least one is defective.

b) Fit a Poisson distribution for the following table 09 L3 CO5

x	0	1	2	3	4	5	6	7
frequncy	7	6	19	35	30	23	7	1

c) In a sample of 1000 students the mean and standard deviation of marks obtained by the students in a certain test are 14 and 2.5. Assuming that 09 L3 CO5

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the distribution to be normal find the number of students getting marks i) between 12 and 15 ii) above 18 iii) below 8.

Q.6 **Attempt any Two of the following**

a)	Solve $\frac{dy}{dx} = x + y$ with $y(0) = 1$ by using Picard's method up to 4^{th} approximation and hence find y(0.1) and y(0.2).	09	L3	CO6
b)	Use Euler's modified method to find the value of y satisfying the equation $\frac{dy}{dx} = y + e^x$, $y(0) = 0$ for $x = 0.4$ within two steps correct to four decimals.	09	L3	CO6
c)	Use Runge-Kutta method to find the value of y satisfying the equation $\frac{dy}{dx} = x + y^2$, $y(0) = 1$ for $x = 0.2$ within two steps correct to four decimals.	09	L3	CO6

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