

BACHELOR OF SCIENCE (COMPUTER SCIENCE) (CBCS - 2018 COURSE)
S.Y.B.Sc.(Computer Science) Sem-III :SUMMER- 2022
SUBJECT : COMPUTER ORIENTED NUMERICAL METHODS

Day : Saturday
Date : 9/7/2022

S-20094-2022

Time : 03:00 PM-06:00 PM
Max. Marks : 60

N.B:

- 1) All questions are **COMPULSORY**.
- 2) Figures to the right indicate **FULL** marks.
- 3) Use of logarithmic table and non-programmable scientific calculator is **ALLOWED**.

Q.1 Attempt **ANY TWO** of the following: **[12]**

- a) Explain Regula – Falsi method to find a root of the equation $f(x) = 0$.
- b) Find the root of the equation $x^3 - 9x + 1 = 0$ between $x = 2$ and $x = 4$, using bisection method.
- c) Fit a straight line by least square method of the form $y = a + bx$ to the following data:

x	1	2	3	4	5	6
y	1200	900	600	200	110	50

Q.2 Attempt **ANY TWO** of the following: **[12]**

- a) State and derive Simpson's $\frac{1}{3}$ rule.
- b) Evaluate $\int_0^{10} \frac{1}{1+x} dx$ by dividing the range into 8 equal parts by using Trapezoidal rule.
- c) In developing a decoration system at printing industry 13 activities were involved. Their interdependence is given below:
N is the first activity which is succeeded by A, C and B which are concurrent activities. A controls D and L; but L is also controlled by B and C. On B depends commencement of activities J, F and H. J controls K, F controls G and activity E cannot commence unless activities K, G and H are completed. Ground is set for commencement of activity P only when D, L and E are completed. P is the last activity. Draw neat network and number the events.

Q.3 Attempt **ANY TWO** of the following: **[12]**

- a) Find $y(0.1)$, $y(0.2)$ and $y(0.3)$ where $\frac{dy}{dx} = xy + y^2$ and $y(0) = 1$ using Taylor's series.
- b) State method of successive approximation and determine $y(0.1)$ by Euler's modified method, where $\frac{dy}{dx} = x^2 + y$ and $y(0) = 1$.
- c) Find the percentage of criminals under 35 years of age by using Lagrange's interpolation formula from the following data:

Age less than	25	30	40	50
Percentage of Criminals	52	67	84	94

P.T.O.

Q.4 Attempt **ANY THREE** of the following: [12]

- a) Construct a backward difference table for the function $f(x) = x^3 + 5x - 7$ for $x = 0, 1, 2, 3, 4, 5$ and find $f(-1)$.
- b) Show that : $\nabla \equiv 1 - E^{-1}$ or $E \equiv (1 - \nabla)^{-1}$.
- c) Determine the constants a and b so that polynomial $y = a + bx$ is the best fit to the data:

x	0	1	2	3
y	1	6	17	34

- d) Find $y(0.2)$ by using Runge-Kutta's second order formula where, $y(0) = 0$ and $\frac{dy}{dx} = 1 + y^2$.

Q.5 Attempt **ANY FOUR** of the following: [12]

- a) Obtain Newton – Raphson formula to find inverse of a given number.
- b) Locate the error in the following values and correct it:
-1, 0, 7, 26, 65, 124, 215, 342, 511.
- c) Define: i) Shift operator (E)
ii) Averaging operator (μ).
- d) Evaluate $\int_0^1 \frac{1}{1+x} dx$ with $h = \frac{1}{6}$ by Simpson's $\frac{3^{th}}$ rule.
- e) What do you mean by dummy activity? Why it is used in network?
- f) Write the interval in which root of $x^3 - 4x - 9 = 0$ lies.

* * * *