

BAS-24

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MCA I (Even Semester) 2015-16

Applied Computational Methods

Time =3 hrs.

Max. Marks=40

Note: Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from remaining three parts of each question.

1. (a) Use Newton-Raphson Method to find a root between 1 and 2 of the equation $x^4 - x - 13 = 0$ correct up to 3 decimal places. Also, find the cube root of 25 by same method correct up to 3 decimal places.

- (b) Use Regula Falsi method to find a root between 1 and 2 of the equation $x^3 - 5x + 3 = 0$ correct up to four decimal places.

- (c) Solve by Crout's method:

$$x + 2y + 6z = 22;$$

$$3x + 4y + z = 26;$$

$$6x - y - z = 19.$$

- (d) Solve by Gauss-Seidel method:

$$x + 8y + 2z = 6;$$

$$3x + 2y + 10z = 9;$$

$$6x + y + z = 7.$$

2. (a) From the following table, find value of $f(3.5)$:

x	3	4	5	6	7
$f(x)$	3	6.6	15	22	35

and find the missing term from table given below:

x	0	1	2	3	4
y	1	3	9	-	81

- (b) Use Lagrange's method to find cubic polynomial from table given below:

x	0	2	3	6
$f(x)$	659	705	729	804

- (c) Find $f(x)$ as a polynomial in x using Newton divided difference formula from following table:

x	5	6	9	11
$f(x)$	12	13	14	16

Also, find $f(10)$.

(d) Evaluate $\int_0^2 \frac{dx}{1+x^3}$ by Simpson's one-third rule by taking $n = 12$ and use Simpson's three-eighth rule to evaluate $\int_0^{1.2} \frac{e^{-x}}{1+x^2} dx$ by taking $h = 0.1$.

3. (a) Solve the differential equation: $\frac{dy}{dx} = x + y, y(0) = 1$ by Picard's method to find value of $y(1)$.

Also, solve: $\frac{dy}{dx} = x + y^2, y(0) = 0$ by Taylor's Series method.

- (b) Solve $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$ by Euler's method to find $y(0.1)$ by taking $h = 0.02$.

- (c) Solve $\frac{dy}{dx} = xy + y, y(0) = 1$ to find $y(0.1)$ by using Runge-Kutta method of order four.

- (d) Solve the difference equation:

$$y_{n+2} + 6y_{n+1} + 9y_n = 3, \quad y_0 = 0, y_1 = 1.$$

4. (a) Calculate Bowley's coefficient of skewness for table given below:

C.I.	0-10	10-20	20-30	30-40	40-50	50-60	60-70
f	2	5	10	15	10	4	2

- (b) Calculate the coefficient γ_2 and find the nature of the following frequency distribution:

x	5	15	25	35
f	1	3	4	2

- (c) Find the coefficient of correlation and equations of regression lines from following table:

x	6	2	10	4	8
y	9	11	5	8	7

- (d) 10 coins are tossed simultaneously. Find the probability of getting at least 7 heads.

A sample of 50 bulbs were tested to get $\bar{x} = 12$ months and $\sigma = 3$ months. If the data is normally distributed then find the probability that the bulb has life

- (i) more than 15 months;
- (ii) less than 6 months;
- (iii) in between 9 and 15 months.

Given Area for $z = 1$ is 0.3413 and for $z = 2$ area is 0.4772.