BAS - 24

Roll No. | | | | | | | | | | |

Name of the Course: B. Tech
Year: 2nd Semester: III
Major Examination: 2016-17
Subject Name: Applied Computational Methods

Time: 3 hrs. **Max. Marks: 40**

Note: Attempt all questions. Each question carries equal marks.

Q.1 Attempt any three of the following. Q. 1(a) is compulsory Marks

(a) (i) Find the positive root of $2x = Cos\,x + 3$ by Bisection method. 4

(ii) Evaluate $\left(\frac{\Delta^2}{E}\right)x^4$

(b) Determine the root of $x^4 + x^3 - 7x^2 - x + 5 = 0$ by method of False Position which lies between 2 and 3 correct to three decimal places. 3

(c) Solve the system of equations 3

$$2x - 6y + 8z = 24$$
$$5x + 4y - 3z = 2$$
$$3x + y + 2z = 16$$

by Crout's method.

(d) Solve the system of equations by Gauss – Seidel iteration method upto the fifth iterations. 3

$$54x + y + z = 110$$
$$2x + 15y + 6z = 72$$
$$-x + 6y + 27z = 85$$

Q.2 Attempt any three of the following. Q. 2(a) is compulsory.

(a) Find the interpolating polynomial for the following data. 4

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

Also evaluate $\int_{0.1}^{1.1} x^{1/2} e^{-x}\,dx$ by Simpson's one third rule by taking h = 0.1.

(b) Using Simpson's 3/8 rule with h = 0.1 evaluate $\int_0^{0.8} (1 - \frac{1}{4} Sin^2\,x)^{1/2}\,dx$ by tabulating the integrand to five places after decimal. 3

(c) Compute the value of definite integral $\int_2^{1.4} (Sin\,x - \log_e x + e^x)\,dx$ by Trapezoidal rule 3

(d) Find the value of y_1, y_2 from the following data, where,

x	5	10	15	20	25	30
y	7	y_1	13	15	y_2	25

3

Q. 3 Attempt any three of the following. Q. 3(a) is compulsory.

(a) Solve the difference equation

$$u_{n+2} - 2u_{n+1} + 4u_n = -2^n\{6\,Cos\frac{n\pi}{3} + 2\sqrt{3}\,Sin\frac{n\pi}{3}\}$$

4

(b) Solve $\frac{dy}{dx} = x + y^2$ given $y(0)=0$, by Picard's method up to third approximation.

3

(c) Using Euler's method, find an approximate value of y corresponding to $x = 1.6$ given $\frac{dy}{dx} = y^2 - \frac{y}{x}$ and $y(1)=1$. 3

(d) Solve the following by Euler's modified method the equation 3

$\frac{dy}{dx} = \log_{10}(x+y) + x^2$, $y(0)=2$ at $x = 1.0$ with $h = 0.2$.

Q.4 Attempt any three of the following. Q. 4(a) is compulsory.

(a) Suppose the number of telephone calls on an operator received from 9.00 AM to 9.05 AM follow a Poisson distribution with mean 3. Find the probability that

(i) The operator will receive no calls in that time interval tomorrow.

(ii) In the next three days the operator will receive a total of 1 call in that time interval.

4

(b) Find the coefficient of correlation and obtain the equation of lines of regression for the data

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

3

(c) Calculate the Karl Pearson's coefficient of skewness from the given data

Life time in months	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120
No. of mobiles	4	6	8	26	28	12	8	5	3

3

(d) Calculate the first four moments of the following data about the mean.

Values	10-20	20-30	30-40	40-50	50-60	60-70	70-80
Frequency	1	20	69	108	78	22	2

3

Also calculate the coefficient of skewness.