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SARDAR PATEL UNIVERSITY
M.Sc.IT (Integrated) 4th Semester
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Morning Time: 10:30 A.M to 01:30 P.M

Subject Code: PS04FIIT01/ Paper No: 01

Subject: Computer Based Numerical and Statistical Methods

Total Weight age/Marks: 70

Q.1 Multiple Choice Questions.

10

1. For real root of an equation $x^3 - 2x - 5 = 0$, the root lies between.
A. 0 and 1
B. 2 and 3
C. 1 and 2
D. none of them
2. The number 0.01850×10^3 has _____ significant digits.
A. 3
B. 4
C. 5
D. 6
3. All the formulae of interpolation are based on the fundamental assumption that the given data can be expressed as a _____.
A. Polynomial
B. Equation
C. Algorithm
D. None of the above
4. _____ is called the forward difference operator.
A. Δ
B. ∇
C. \emptyset
D. U
5. _____ is not a type of interpolation method.
A. Forward difference
B. backward difference
C. Newton's divided difference
D. moving average method
6. The system of linear equation $AX = B$ is said to be homogeneous if...
A. $A \neq 0$
B. $B = 0$
C. $A = 0$
D. A is symmetric
7. Rate of change of distance with respect to time represents....
A. Acceleration
B. Speed
C. Pressure
D. None of these
8. Irregular variations in a time series are caused by:
A. lockouts and strikes
B. epidemics
C. floods
D. all the above
9. Seasonal variation means the variation occurring within:
A. a number of years
B. parts of a month
C. parts of a year
D. none of the above
10. The time series analysis helps:
A. to compare the two or more series
B. to make predictions
C. to know the behavior of business
D. all the above

Q.2 Answer the following questions in short. (Any 10)

- 1) Define Relative error and absolute error.
- 2) If x lies in the upper half of the table and if $x_k < x < x_{k+1}$, then what is $\frac{dy(x)}{dx}$ and $\frac{d^2y(x)}{dx^2}$?
- 3) Use the False Position method to obtain approximate solution of the equation $X^3 - 9x + 1 = 0$.
- 4) Write algorithm for backward difference table.
- 5) Define Interpolation, Extrapolation.
- 6) What do you mean by Cyclic Variation?
- 7) If x lies in the lower half of the table and if $x = x_k$, then what is $\frac{dy(x)}{dx}$ and $\frac{d^2y(x)}{dx^2}$?
- 8) Write merits and demerits of 'Ratio to Moving Average' method
- 9) List only various direct and iterative methods.
- 10) Describe the stopping rules to obtain approximate solution for given non-linear equations.
- 11) Draw backward difference table.
- 12) List the component of Time series.

Q.3(A) Solve the following using False position method. 06

$x^3 - 2x - 5 = 0$ lies in the interval (1.75, 2.5). Find the root correct to four significant digits.

(B) Write algorithm for Iterative (successive approximation) method. 04

OR

Q.3(A) Solve the following using Bisection method. 06

$x^3 - 4x - 9 = 0$ lies in the interval (2.625, 2.75). Find the root correct to four significant digits.

(B) Write algorithm for False position method. 04

Q.4(A) The following table gives the census population of a town for the years 1931 to 1971. Estimate the population for the year 1965 by using an appropriate interpolation formula. 06

Year	1931	1941	1951	1961	1971
Population	46	66	81	93	101

(B) Write an algorithm for forward difference table and draw the forward difference table. 04

OR

Q.4(A) Given the table of values as (use Lagrangian method) 06

x	0	1	2	3
$y(x)$	0	2	8	27

Find $y(2.5)$.

(B) If $y = 2x^3 - x^2 + 3x + 1$, calculate the value of y corresponding to $x = 0, 1, 2, 3, 4, 5$ and form the table of backward differences. 04

Q.5(A) Solve the following system of equations using matrix inversion method. **06**

$$2x_1 - 2x_2 + 5x_3 = 13$$

$$2x_1 + 3x_2 + 4x_3 = 20$$

$$3x_1 - x_2 + 3x_3 = 10$$

(B) The distance (s) covered by a car in given time (t) is given in the following table **04**

Time(Minutes)	10	12	14	16	18
Distance(km)	12	15	20	27	37

Determine the $\frac{dy}{dx}$ of the car at t = 13 minutes.

OR

Q.5(A) Solve the following system of equations using Gauss-Seidel method. **06**

$$10x_1 + x_2 + 2x_3 = 44$$

$$2x_1 + 10x_2 + x_3 = 51$$

$$x_1 + 2x_2 + 10x_3 = 61$$

(B) The distance (s) covered as a function of time (t) by an athlete during his/her run for the 50 meter race is given in the following table **04**

Time(Secs.)	0	1	2	3	4	5	6
Distance(Mts.)	0	2.5	8.5	15.5	24.5	36.5	50

Determine the $\frac{d^2y}{dx^2}$ of the athlete at t = 5 seconds.

Q.6(A) Write merits and demerits of Moving Average Method and Calculate the trend values by the method of moving average, assuming a four-yearly cycle from the following data relating to sugar production in India **10**

YEAR	SUGAR PRODUCTION (lakh tones)	YEAR	SUGAR PRODUCTION (lakh tones)
1971	37.4	1977	48.4
1972	31.1	1978	64.4
1973	38.7	1979	58.4
1974	39.5	1980	38.6
1975	47.9	1981	51.4
1976	42.6	1982	84.4

OR

Q.6(A) Obtain seasonal indices using ratio to moving average. **10**

Year	Q-I	Q-II	Q-III	Q-IV
1970	25	30	21	32
1971	27	28	25	34
1972	22	27	21	30
1973	24	25	20	33
