

[AISA]

**SARDAR PATEL UNIVERSITY
BCA SEMESTER-IV EXAMINATION**

Saturday, 11th April,
2015

10.30 A.M. to 01.30 P.M.

COMPUTER BASED NUMERICAL AND STATISTICAL METHODS (US04FBCA01)

Note: Scientific calculator is allowed.

Total Marks: 70

Q.1 Select appropriate answer from given choice (all questions carry equal marks). [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. From the following _____ method is the best method to obtain root of equation $f(x) = 0$.
(a) False position (b) Bisection (c) Newton's Raphson (d) none of them
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. The second order difference is denoted by _____.
(a) Δ^2 (b) ∇^3 (c) ϕ^2 (d) y^3
5. _____ method is used if the estimated value lies towards the end of the difference table.
(a) Divided difference (b) Forward difference
(c) Backward difference (d) None of the above
6. We can find solution of system of linear, algebraic equations using.....
(a) Gauss-Seidel method (b) Bisection method
(c) Newton-Raphson method (d) None of these
7. Rate of change of distance with respect to time represents....
(a) Speed (b) Acceleration (c) Pressure (d) None of these
8. Consider the following system of linear equation
 $3x + y - z = 10$, $x + 5y + 2z = 18$, $x + 4y + 9z = 16$
If current approximation is $x = 3.33$, $y = 2.93$, $z = 0.1$, then the Gauss-Seidel method will give next approximation as $x = 2.39$, $y = 3.08$ and $z =$ _____.
(a) 1.2 (b) 0.14 (c) 0.21 (d) 0.19
9. Gradual, long-term movement in time-series data is called _____.
(a) seasonal variation (b) cycles (c) trends (d) exponential variation
10. Which of the following is not present in a time series?
(a) Seasonality (b) cycles (c) operational variations (d) trend

Q.2 Attempt any Ten (All questions carry equal marks). [20]

1. Write the steps for bisection method.
2. Define Relative error and absolute error.
3. Use the False Position method to obtain approximate solution of the equation $x^3 - 9x + 1 = 0$ up to two iteration.
4. Draw the backward difference table for $n = 4$.
5. Write different methods of Interpolation.
6. Write lagrangian formula for $n = 2$ and inverse formula for $n = 2$.
7. List only various direct and iterative methods.
8. Write the following system of equations in matrix form.
 $2x_1 + 8x_2 + 2x_3 = 11, x_1 + 6x_2 - x_3 = 13, 2x_1 - x_2 + 2x_3 = 5$
9. If x lies in the upper half of the table and if $x = x_k$, then what is $\frac{dy(x)}{dx}$ and $\frac{d^2y(x)}{dx^2}$?
10. List the component of Time series.
11. What do you mean by Secular trend?
12. Write a note on Survey Method of Forecasting.

Q.3 Using Secant method, find the approximate root of the equation $x^3 - 2x - 5 = 0$ correct up to 3 decimal places. [10]

OR

Q.3 [A] Explain Newton Raphson method. [03]

[B] Using Bisection method, find the approximate root of the non-linear equation $x^3 - x^2 - 1 = 0$ correct up to three decimal places. [07]

Q.4 [A] From the following table, find $y(2.8)$. [05]

x	2.5	3	3.5	4	4.5
y(x)	9.75	12.45	15.7	19.52	23.75

[B] Apply Newton's divided difference method to find the no. of persons getting Rs. 6 from the following data. [05]

Income per min	3	5	7	8	10
No. of persons	180	154	120	110	90

OR

Q.4 [A] Given a function in the form of a table as [06]

x	2.0	3.0	4.0	5.0
y(x)	6.6	9.2	8.6	10.2

Interpolate the value of $y(x)$ using Lagrangian polynomial at $x = 2.8$.

[B] Explain Interpolation and extrapolation. [04]

Q.5

- [A] Solve the following system of equation by Gauss-Seidel method. [07]
 $10x_1 + x_2 + 2x_3 = 44$, $2x_1 + 10x_2 + x_3 = 51$, $x_1 + 2x_2 + 10x_3 = 61$
- [B] Explain the matrix inversion method for solution of system of linear equations. [03]

OR

Q.5

- [A] 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
Distance (Mts.)	0	2.5	8.5	15.5	24.5

Determine the speed of the athlete at $t = 3$ seconds.

- [B] Given the following table. [06]

x	0.50	0.75	1.00	1.25	1.50
$y = f(x)$	0.13	0.42	1.00	1.95	2.35

Find $f'(0.75)$ and $f'(0.85)$.

Q.6

- [A] What is time series? Explain Irregular variation. [04]
- [B] Obtain the trend from the time series given below by method of moving average of [06]
[i] 3 years [ii] 5 years

Year	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Y	500	540	550	530	520	560	600	640	620	640

OR

Q.6

- [A] Write steps of 'Ratio to moving Average' Method. [04]
- [B] Obtain seasonal indices by simple average method. [06]

Year	Summer	Monsoon	Autumn	Winter
1	30	81	62	119
2	33	104	86	171
3	42	153	99	221
4	56	172	129	235
5	67	201	136	302
