



RN-003-001541

Seat No. _____

B. Sc. (Sem. V) (CBCS) Examination

February - 2019

Statistics : Paper - S - 501

(Compu. Tech. & Stat. Toolbox with Matlab.)

(Old Course)

Faculty Code : 003

Subject Code : 001541

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions are **compulsory**.
(2) Question no. 1 carries **20** marks and Question No. 2 and 3 carry **25** marks.
(3) Student can use their (own) scientific calculator.

- 1** Filling the blanks and short questions : (each 1 mark) **20**
1. Lagrange's formula does not require not require the construction of _____ table.
 2. For interpolation or extrapolation, the two variables should have _____ relationship.
 3. Newton's - Gauss forward formula is also known as _____ polynomial formula.
 4. The $(n + 1)^{\text{th}}$ order finite difference of a n^{th} order polynomial is _____.
 5. Newton's formula for advancing differences utilizes _____ finite difference of each column of the difference table.
 6. Interpolation helps to estimate the _____ value in series of data.
 7. The independent variate values in the interpolation are termed as _____.
 8. The relation between u of Stirling formula and v of Bessel's formula is _____.

9. If the interpolating values lies near the beginning or the end of the central interval, _____ formula yields better results.
10. In Weddle's rule, $f(x)$ is a polynomial of _____.
11. Define Forward difference operator.
12. Define Mean or Average operator.
13. Define Interpolation.
14. Usual notations prove that $(1 + \Delta)(1 - \nabla) = 1$.
15. Usual notations prove that $E\nabla = \Delta$.
16. Usual notations prove that $\Delta^m \Delta^n = \Delta^{m+n}$.
17. If $x = [3 \ 7 \ 5; 0 \ 4 \ 2]$ then using MATLAB function `sort(x, 1, 2)` write is correct output ?
18. If $x = [3 \ 3 \ 5; 3 \ 6 \ 3]$ then using MATLAB function `mode(x, 2)` write is correct output?
19. If $x = [0 \ 1 \ 2; 3 \ 4 \ 5]$ then using MATLAB function `sum(x, 1)` write is correct output?
20. If $x = [1 \ 3 \ 9; 4 \ 6 \ 8]$ then using MATLAB function `std(x, 0, 2)` write is correct output?

2 (a) Write the answer any **three** : (Each 2 marks) **6**

1. Obtain Newton's formula for obtaining inverse.
2. If $y = 1 + x^2$ then find $f(1, 5, 7, 11)$ and prepare the divided difference table.
3. Usual notation prove that

$$\mu\delta = \frac{1}{2} [\Delta + \nabla] = \frac{1}{2} [\Delta + \Delta E^{-1}].$$

4. Explain MATLAB function `binopdf`.

5. Prove that $f(x) = \frac{\Delta^n f(x)}{h^n n!}$.

6. Explain MATLAB function `geomean`.

(b) Write the answer any **three** : (Each 3 marks) **9**

1. Usual notation prove that $\sqrt{1 + \mu^2 \delta^2} = 1 + \frac{\delta^2}{2}$.
2. Explain MATLAB function prod and cumprod.
3. Evaluate $\int_0^{10} \frac{1}{1+x^2} dx$ by using Trapezoidal rule.
4. Explain Talyor's series method.
5. Apply Euler's Maclurin sum formula to find the sum $1^3 + 2^3 + 3^3 + \dots + n^3$.
6. Obtain Lagrange's Interpolation formula.

(c) Write the answer any **two** : (Each 5 marks) **10**

1. Explain For-Loop and While-Loop structure of MATLAB with example.
2. Obtain Gauss backward interpolation formula.
3. Obtain Trapezoidal rule for numerical integration.
4. Use Talyor's series method to compute $y(0.1)$ and $y(0.3)$ correct to five decimal places, if $y(x)$ satisfies $\frac{dy}{dx} = xy - 2x$ with $y(0) = 3$.
5. Obtain Bessel's formula for central difference interpolation.

3 (a) Write the answer any **three** : (Each 2 marks) **6**

1. Evaluate $\sqrt{37}$ using Newton's formula correct upto seven decimal.
2. Define Shift operator.
3. What are the assumptions on which the interpolation and extrapolation are based ?
4. Find by the interaction method, the root near 3.8 of the equation $2x - \log_{10}x = 7$ correct upto four decimal.
5. Write Logical Operators of MATLAB.
6. Explain MATLAB function diff.

(b) Write the answer any **three** : (Each 3 marks) **9**

1. Explain Newton Raphson method.
2. Explain MATLAB function mean and median.
3. Obtain Simpson's $\frac{1}{3}$ rule for numerical integration.
4. Apply Euler's Maclurin sum formula to find the sums $\frac{1}{11^3} + \frac{1}{12^3} + \dots + \frac{1}{50^3}$ correct to 5 significant figures.
5. Explain False position method.
6. Obtain Gregory-Newton's Forward Interpolation formula.

(c) Write the answer any **two** : (Each 5 marks) **10**

1. Explain number display format of MATLAB.
2. Explain If-Else-End structure of MATLAB with example.
3. Given the differential equation $\frac{dy}{dx} = x - y$, with the initial condition $y = 1$ when $x = 0$, use Picard's method to obtain y for $x = 0.2$ correct to five decimal places.
4. Obtain Gauss forward interpolation formula.
5. Obtain Stirling formula for central difference interpolation.