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

October - 2017

S - 501 : Statistics

(Computational Techniques & Stat. Tool box with Matlab)

(New Course)

Faculty Code : 003

Subject Code : 001541

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1)   Q. No. 1 carries 20 marks,

(2)   Q.No. 2 and 3 each carries 25 marks.

(3)   Students can use their own scientific calculator.

1   Filling the blanks and short questions : (Each 1 mark)   **20**

(1)   The independent variate values in the interpolation are termed as _____

(2)   In Newton's backward formula, the origin is the _____ value of the argument in the series.

(3)   Define Central difference operator.

(4)   Usual notations prove that $E\Delta = \nabla E$.

(5)   Interpolation and extrapolation approaches are _____

(6)   Newton's formula for advancing differences utilizes _____ finite difference of each column of the difference table.

(7)   The relation between u of Striling formula and v of Bessel's formula is _____

(8)   Usual notations prove that $(1 + \Delta)(1 - \nabla) = 1$.

(9)   Usual notations prove that $\dfrac{\nabla^{m+n}}{E^n} = \Delta^m \nabla^n$

(10) If $x = \begin{bmatrix} 3 & 7 & 5; & 0 & 4 & 2 \end{bmatrix}$ then using MATLAB function sort $(x, 2)$ write its correct output.

(11) If $x = \begin{bmatrix} 3 & 4 & 5; & 11 & 34 & 43 \end{bmatrix}$ then using MATLAB function median $(x, 1)$ write its correct output?

(12) If $x = \begin{bmatrix} 0 & 1 & 2; & 3 & 4 & 5 \end{bmatrix}$ then using MATLAB function cumsum $(x, 2)$ write its correct output?

(13) The origin x_0 in difference table in the Newton's-Gauss backward formula is the _____ value of x to the given value of x.

(14) For interpolation or extrapolation, the two variables should have _____ relationship.

(15) If $x = \begin{bmatrix} 1 & 2 & 3; & 4 & 5 & 6 \end{bmatrix}$ then using MATLAB function mean $(x, 2)$ write its correct output?

(16) Define Mean or Average operator.

(17) In Weddle's rule is applicable when the number of intervals n must be a _____

(18) If the interpolating values lies near the beginning or the end of the central interval, _____ formula yields better results.

(19) In diagonal difference table, the _____ argument of the series is taken as origin.

(20) Explain Relation Operators in MATLAB.

2   (A)   Write the answer any **THREE** : (Each 2 mark)   6
(1)   Explain MATLAB function poisspdf.

(2)   Evaluate $\dfrac{1}{18}$ by using Newton's formula, correct upto seven decimal.

(3)   Prove that $f(x) = \dfrac{\Delta^n f(x)}{h^n n!}$

(4)   Obtain Newton's formula for obtaining inverse square root.

(5)   With usual notations prove that $\Delta + \nabla = \dfrac{\Delta}{\nabla} - \dfrac{\nabla}{\Delta}$

(6)   Evaluate $\sqrt{50}$ using Newton's formula correct upto seven decimals.

(B) Write the answers of any **three** : (Each 3 marks)   9

    (1) Explain Talyor's series method.

    (2) With usual notations prove that $\sqrt{1+\mu^2\delta^2} = 1 + \dfrac{\delta^2}{2}$

    (3) Obtain Simpson's $\dfrac{1}{3}$ rule for numerical integration.

    (4) Apply Euler's Maclaurin sum formula to find the sum $1^3 + 2^3 + 3^3 + ... + n^3$

    (5) Obtain Lagrange's Interpolation formula.

    (6) Obtain Trapezoidal rule for numerical integration.

(C) Write the answers of any **two** : (Each 5 marks)   10

    (1) Explain For-Loop and While-Loop structure of MATLAB with example.

    (2) Use Talyor's series method to compute $y(0.1)$ and $y(0.3)$ correct to five decimal places, if $y(x)$ satisfies $\dfrac{dy}{dx} = xy - 2x$ with $y(0) = 3$.

    (3) Obtain Gauss backward interpolation formula.

    (4) Obtain Stirling formula for central difference interpolation.

    (5) Use Taylor's series method to solve $\dfrac{dy}{dx} = xy + y^2$ with $y(0) = 1$ at $x = 0.1, 0.2, 0.3$

3 (A) Write the answers any **three** : (Each 2 marks)   6

    (1) With usual notation prove that $\mu\delta = \dfrac{1}{2}\Delta E^{-1} + \dfrac{1}{2}\Delta$

    (2) Find by the interaction method, the root near 3.8 of the equation $2x - \log_{10} x = 7$ correct upto four decimals.

    (3) Explain MATLAB function binopdf.

    (4) If $y = x^3$ then find $f(1,3,5,7)$ and prepare the divided difference table. If $y = x^3$ then find $f(1,3,5,7)$ and prepare the divided difference table.

(5) Evaluate $\sqrt{37}$ using Newton's formula correct upto seven decimals.

(6) If $y = \dfrac{1}{x}$ then find $f(a, b, c, d)$ and prepare the divided difference table.

(B) Write the answers any **three** : (Each 3 marks)   9

(1) With usual notation prove that $\Delta = \dfrac{1}{2}\delta^2 + \delta\sqrt{1 + \dfrac{\delta^2}{4}}$

(2) Obtain Simpson's $\dfrac{3}{8}$ rule for numerical integration.

(3) Apply Euler's Maclurin sum formula to find the sum $\dfrac{1}{11^3} + \dfrac{1}{12^3} + \ldots + \dfrac{1}{50^3}$ correct to 5 significant figures.

(4) Explain False position method.

(5) Explain MATLAB function sum and cumsum.

(6) Explain Newton Raphson method.

(C) Write the answers of any **two** : (Each 5 marks)   10

(1) Obtain Bessel's formula for central difference interpolation.

(2) Given the differential equation $\dfrac{dy}{dx} = x - y$, 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.

(3) Explain If-Else-End structure of MATLAB with example.

(4) Explain number display format of MATLAB.

(5) Obtain Gauss forward interpolation formula.

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