JV-003-001541 Seat No. _____

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

October - 2019

Statistics : S-501

(Computational Techniques & MATLAB)

(Old Course)

Faculty Code : 003

Subject Code : 001541

Time : **2:30** Hours] [Total Marks : **70**

Instructions : (1) Q. 1 carry 20 marks.
(2) Q. 2 and Q. 3 carry 25 marks each.
(3) Student can use their own scientific calculator.

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

(1) Interpolation and extrapolation approaches are _____.

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

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

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

(5) The finite differences $\left(\Delta^2_{y_2} - \Delta^2_{y_1}\right)$ is called _____ order finite difference.

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

(7) 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.

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

(9) Lagrange's formula does not require the construction of _____ table.

(10) Each term of a Lagrange's formula involving n arguments is a polynomial of degree _____.

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

(12) Better formula for interpolating a value which lies in the middle of the central interval is _____ formula.

(13) In Simpson's $3/8$ rule is applicable when the number of intervals n must be a _____.

(14) For Bessel's and Striling's formula, x_0 must be chosen in such a way that u and v lie in the interval _____.

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

(16) In Trapezoidal rule, $f(x)$ is a _____ of x.

(17) If x = [1 2 3; 4 5 6] then using MATLAB function mean(x, 2) write is correct output?

(18) If x = [3 4 5; 11 34 43] then using MATLAB function median(x, 1) write is correct output?

(19) If x = [0 1 2; 3 4 5] then using MATLAB function cumsum(x, 2) write is correct output?

(20) If x = [3 7 5; 0 4 2] then using MATLAB function sort(x, 1) write is correct output ?

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

(1) Usual notation prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$

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

(3) Obtain Newton's formula for obtaining inverse.

(4) Explain MATLAB function binopdf.

(5) Explain MATLAB function std.

(6) Evaluate $\sqrt{51}$ using Newton's formula correct upto seven decimal.

(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) Obtain Gregory-Newton's Forward Interpolation formula.

(3) Explain Taylor's series method.

(4) Explain MATLAB function prod and cumprod.

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

(6) Evaluate $\int_0^{10} \frac{1}{1+x^2}\,dx$ by using Trapezoidal rule.

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

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

(2) Obtain Gauss backward interpolation formula.

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

(4) Explain if - Else-End structure of MATLAB with example.

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

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

(1) Define central and mean operator.

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

(3) Usual notation prove that $\mu\delta = \frac{1}{2}\Delta E^{-1} + \frac{1}{2}\Delta$.

(4) Explain MATLAB function poisspdf.

(5) Explain MATLAB function diff.

(6) Evaluate $\frac{1}{\sqrt{28}}$ by using Newton's formula. Correct upto six decimal.

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

(1) Usual notation prove that $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{\delta^2}{4}}$.

(2) Obtain Gregory-Newton's Backward Interpolation formula.

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

(4) Explain False position method.

(5) Explain MATLAB function sum and cumsum.

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

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

(1) Obtain Stirling formula for central difference interpolation.

(2) Obtain Gauss forward interpolation formula.

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

(4) Explain number display format of MATLAB.

(5) Given the differential equation $\frac{dy}{dx} = 3x + y^2$, with the initial condition $y = 1$ when $x = 0$, use Picard's method to obtain y for $x = 0.1$ correct to three decimal places.
