* P A P - 0 0 3 - 0 0 1 5 4 1 *

PAP-003-001541 Seat No. _____

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

October / November - 2018

Statistics : S - 501

(Compta. Techniques & Stat. Tool Box 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 - 1 carries 20 marks.

(3) Question - 2 and Question - 3 carry 25 marks.

(4) Students can use their own scientific calculators.

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

(1) In Weddle's rule, $f(x)$ is a polynomial of _____.

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

(3) Interpolation helps to estimate the _____ value in series of data.

(4) The $(n+1)^{th}$ 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) Newton's -Gauss forward formula is also known as _____ polynomial formula.

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

(8) The relation between u of Striling 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) Lagrange's formula does not require the construction of _____ table.

(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 answers any **three** : (Each 2 marks) **6**

(1) Explain MATLAB function geomean.

(2) If $y = 1 + x^2$, then find f (1, 5, 7, 11) and prepare the divided difference table.

(3) Usual notation prove that

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

(4) Explain MATLAB function binopdf.

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

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

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

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

(2) Obtain Lagrange's Interpolation formula.

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

(4) Explain Taylor's series method.

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

(6) Explain MATLAB function prod and cumprod.

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

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

(2) Explain MATLAB function diff.

(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) Define Shift operator.

(b) Write the answers 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 $\frac{1}{11^3}+\frac{1}{12^3}+...+\frac{1}{50^3}$ correct to 5 significant figures.

(5) Explain False position method.

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

(c) Write the answers 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.
