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MCP-003-001541

Seat No. _____

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

May / June - 2018

Statistics : S - 501

(Computational Techniques & Statistical 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 Q. No. 2 and Q. No. 3 each carries 25 marks.

(2) Students can use their own scientific calculator.

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

(1) Interpolation and extrapolation approaches are _____ .

(2) Interpolation and extrapolation formulae assume no _____ in the data of the series.

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

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

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

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

(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) Newton's method of divided differences takes care of the _____ spaced arguments.

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

(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* $(x, 1)$ write is correct output ?

(18) If $x = [3\,4\,5 ; 1\,1\,3\,4\,4\,3]$ then using MATLAB function *median (x, 2)* 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) Obtain Newton's formula for obtaining inverse.

(2) Usual notation prove that $\mu\delta = \frac{1}{2}[\Delta + \nabla] = \frac{1}{2}\left[\Delta + \Delta E^{-1}\right]$

(3) Explain MATLAB function poisspdf.

(4) Explain MATLAB function std.

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

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

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

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

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

(3) Explain Talyor's series method.

(4) Explain MATLAB function prod and cumprod.

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

(6) Find by the iteration method, the root near 3.8, of equation $2x - \log_{10} x = 7$. Correct up to four decimal places.

(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) Give 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 up to five decimal places.

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

(1) Define central and mean operator.

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

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

(4) Explain MATLAB function binopdf.

(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 $\frac{1}{10^2}+\frac{1}{11^2}+\frac{1}{12^2}+.....+\frac{1}{20^2}$ correct to 3 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) Use Talyor's series method to compute $y(1.2)$ correct up to five decimal places when $y(x)$ satisfies the equation $\frac{dy}{dx} = xy$ when $y(1.0) = 2$.
