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RN-003-1015041 Seat No. _____

B. Sc. (Sem. V) (CBCS) (W.I.F. - 2016) Examination

February - 2019

S - 501 : Statistics

(Computational Techniques & R-Language)

(New Course)

Faculty Code : 003

Subject Code : 1015041

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

Instructions : (1) All questions are compulsory.
(2) All questions carry equal marks.
(3) Students can use their own scientific calculator.

1 (A) Give the answer of following questions : **4**

(1) Interpolation and extrapolation approaches are _____ interpolation and extrapolation are the parts of _____ analysis.

(2) The differences between two consecutive dependent variate values are called _____ difference.

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

(4) The dependent variate value in interpolation and extrapolation is called _____

(B) Write any **one** : **2**

(1) Prove that $\mu^2 = 1 + \frac{1}{4}\delta^2$

(2) Prove that $(1+\Delta)(1-\nabla) = 1$

(C) Write any **one** : **3**

(1) Prove that $\sqrt{1+\mu^2\delta^2} = 1 + \frac{\delta^2}{2}$

(2) Prove that $\frac{\Delta^{m+n}}{E^n} = \Delta^m \nabla^n$

(D) Write any **one** : **5**

(1) Obtain Greagary Newton's backward Interpolation formula.

(2) Compute $f(0.005)$ and $f(0.37)$ from the following data by using appropriate method.

x	0	0.10	0.20	0.30	0.40
y	1	1.2214	1.4918	1.8221	2.2255

2 (A) Give the answer of following questions : **4**

(1) Newton's formula for advancing differences is also known as _____ forward.

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

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

(4) The $(n+1)^{th}$ order finite difference of a n^{th} order polynomial is _____.

(B) Write any **one** : **2**

(1) Prove that relation between forward difference and divided deference.

(2) If $f(x) = x^3 - 9x^2 + 17x + 6$, compute $f(-1,1,2,3)$.

(C) Write any **one** : **3**

(1) Using Lagrange's interpolation formula, find a polynomial which passes from points (0,648), (2,704), (3,729), (6,792).

(2) Compute $f(\theta)$ for $\theta = 15^\circ$ by using Stiriling formula from the following data

θ	10°	12°	14°	16°	18°	20°
y	0.176327	0.212556	0.249328	0.286745	0.324920	0.363970

(D) Write any **one** : **5**

(1) Obtain Gauss Forward Interpolation formula.

(2) Obtain Sterling's formula.

3 (A) Give the answer of following questions : 4

(1) In Simson's $\frac{1}{3}$ rule, $f(x)$ is a polynomial of _____.

(2) In Simpson's $\frac{1}{3}$ rule is applicable when the number of intervals n must be _____; in other words, the number of ordinates must be _____.

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

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

(B) Write any **one** : 2

(1) State Newton-cote's quadrature formula for numerical integration.

(2) Evaluate $\int_0^1 x^3\,dx$ by Trapezoidal rule with $n = 5$.

(C) Write any **one** : 3

(1) Apply Euler's Maclaurin sum formula to find the sums $\frac{1}{10^2}+\frac{1}{11^2}+\frac{1}{12^2}+\ldots..+\frac{1}{20^2}$

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

(D) Write any **one** : 5

(1) Obtain general Quadreture formula.

(2) 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.

4 (A) Give the answer of following questions : 4

(1) If $f(a)$ be negative and $f(b)$ be positive then first approximation to the root in Bisection method is $x_1 =$ _____.

(2) In method of Regula-Falsi method we choose two points x_0 and x_1 such that $f(x_0)$ and $f(x_1)$ are of _____ sings.

(3) The method of interation is particularly useful for finding the real root of an equation given in the form of an _____ series.

(4) Newton-Rapshon method has _____ convergence.

(B) Write any **one** : **2**

(1) Obtain Newton's formula for Inverse.

(2) Evaluate $\frac{1}{\sqrt{23}}$ by using Newton's formula. Correct upto seven decimal places.

(C) Write any **one** : **3**

(1) Using Newton-Raphson method, find correct upto four decimal places. The root lies between 0 and 1 of equation $x^3 - 6x + 4 = 0$

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

(D) Write any **one** : **5**

(1) Explain successive approximation method.

(2) Explain Bisection method.

5 (A) Give the answer of following question : **4**

(1) If $v = c(5,9), t = c(3,4)$, then print $(v\%\%t)$. Output is _____.

(2) If $v1 = c(3,-4,1), t1 = c(2,5,0)$, then print$(v1 \& t1)$. Output is _____.

(3) If $a = c(5.5,6), b = c(3,5)$, then print $(a\%/\%\, b)$. Output is _____

(4) If $a1 = 8, b1 = 1:12$, then print $(a1\%in\%b1)$. Output is _____.

(B) Write any **one** : **2**

(1) Explain relation operators with example in R-language.

(2) Explain logical operators with example in R-language.

(C) Write any **one** : **3**

(1) Explain making Data Frame objects and convert it in Matrix object with example in R-language.

(2) Explain create Histogram with example in R-language.

(D) Write any **one** : **5**

(1) Explain making Matrix object and convert it in Data frame with example.

(2) Explain the Student's T-test in R language.