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PAP-003-1015041 Seat No. _____

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

October/November - 2018

S-501 : Statistics

(Computational Techniques & R-Langauge) (New Course)

Faculty Code : 003
Subject Code : 1015041

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

Instructions : (1) All question carry equal marks.
(2) Student can use their own scientific calculator.

1 (a) Give the answer of following question : **4**

1. Interpolation and extrapolation approaches are _____.
2. The finite differences $\left(\Delta^2_{y_2} - \Delta^2_{y_1}\right)$ is called _____ order finite difference.
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.

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

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

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

1. Prove that $\sqrt{1 + \mu^2\delta^2} = 1 + \frac{\delta^2}{2}$
2. Prove that $\Delta + \nabla = \frac{\Delta}{\nabla} - \frac{\nabla}{\Delta}$

(d) Write any one **5**

1. Obtain Greagary Newton's Forward 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	0.4
y	1	1.2214	1.4918	1.8221	2.2255

2 (a) Give the answer of following question : **4**

1. Newton's backward polynomial formula utilizes the _____ leading difference of each column.
2. Newton's method of divided differences takes care of the _____ spaced arguments.
3. The relation between u of Stirling formula and v of Bessel's formula is _____.
4. Better formula for interpolating a value which lies in the middle of the central interval is _____ formula.

(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(θ) for θ = 15° by using Stirling 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 Bessel's formula.

3 (a) Give the answer of following question **4**

1. In Trapezoidal rule, $f(x)$ is a _____ of x.
2. In Simpson's $1/3$ rule is applicable when the number of intervals n must be _____; in other words, in the number of ordinates must be_____.
3. In Simpson's $3/8$ 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 :

1. State Newton-cote's quadrature formula for numerical integration. **2**
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 $1^3 + 2^3 + 3^3 + \ldots + n^3$

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 Simpson's $\frac{1}{3}$ rule and $\frac{3}{8}$ rule for numerical integration.

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 question : **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 iteration is particularly useful for finding the real root of an equation given in the form of an _____ series.
4. Newton-Rapshon method is useful in case of _____ of $f'(x)$.

(b) Write any one **2**

1. Obtain Newton's formula for square root.

2. Evaluate $\frac{1}{\sqrt{37}}$ by using Newton's formula.

   Correct up to seven decimal. .

(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 $x^3 - 6x + 4$
2. Find by the iteration method, the root near 3.8 of equation $2x - \log_{10} x$. Correct upto four decimal place.

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

1. Explain False position method.
2. Explain Bisection method.

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

1. If v = c (2,5), t = c (3,4) then print(v % % t). Output is _____.
2. If a = c (5.5,6), b = c (3,5) then print(a%/%b). Output is _____.
3. If v1 = c(3,–4,1), t1 = c(2, 5, 0) then print(v1 & t1). Output is _____ .
4. If a1 = 8, b1 = 1:12 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.