



JV-003-1015041

Seat No. _____

B. Sc. (Sem. V) Examination

October - 2019

Statistics : S-501

**(Computational Tech. & R. Language-2018)
(New Course)**

Faculty Code : 003

Subject Code : 1015041

Time : **2:30** 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 answer of following question : 4

- (1) The dependent variate value in interpolation and extrapolation is called _____.
- (2) The differences between two consecutive dependent variate values are called _____ difference.
- (3) The independent variate values in the interpolation are termed as _____.
- (4) Interpolation and extrapolation approaches are _____ Interpolation and extrapolation are the parts of _____ analysis.

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

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

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

(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 Gregory 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	0.4
y	1	1.2214	1.4918	1.8221	2.2255

2 (a) Give answer of following question 4

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

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

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

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

(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 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 Sterling's formula.

(2) Obtain Gauss Forward Interpolation formula.

3 (a) Give answer of following questions : 4

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

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

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

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

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

(1) Apply Euler's Maclaurin sum formula to find the

sums $\frac{1}{10^2} + \frac{1}{11^2} + \frac{1}{12^2} + \dots + \frac{1}{20^2}$

(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 Quadrature 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) Newton-Raphson method has _____ convergence.
 - (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 _____ signs.
 - (3) The method of iteration is particularly useful for finding the real root of an equation given in the form of an _____ series.
 - (4) If $f(a)$ be negative and $f(b)$ be positive then first approximation to the root in Bisection method is $x_1 = \underline{\hspace{2cm}}$.
- (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.
- (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 place.

- (d) Write any **one** : 5
- (1) Explain successive approximation method.
 - (2) Explain Bisection method.
- 5 (a) Give answer of following questions : 4
- (1) If $a1 = 8$, $b1 = 1:12$ `print(a1%in%b1)`.
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 $v = c(5, 9)$, $t = c(3, 4)$ then `print(v%%t)`.
Output is _____.
- (b) Write any **one** : 2
- (1) Explain logical operators with example in R-language.
 - (2) Explain relation 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** :

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- (1) Explain the Student's T-test in R language.
 - (2) Explain making Matrix object and convert it in Data frame with example.
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