BTS–V(R/S)–01–23–1365 Reg. No. | | | | | | | | |

B

B.Tech. Degree V Semester Regular/Supplementary Examination January 2023

CS/EC/IT/CE/EE/ME/SE 19-200-0501 NUMERICAL AND STATISTICAL METHODS

(2019 Scheme)

Time: 3 Hours Maximum Marks: 60

Course Outcome
On successful completion of the course, the students will be able to:

CO1: Solve algebraic and transcendental equations by numerical methods.
CO2: Solve numerical differentiation and integration problems.
CO3: Compute the mean and variance of a probability distribution including the binomial Distribution.
CO4: Test hypothesis on data.
Bloom's Taxonomy Levels (BL): L1 – Remember, L2 – Understand, L3 – Apply, L4 –Analyze, L5 – Evaluate, L6 – Create
PO – Programme Outcome

PART A

(Answer *ALL* questions)

(8 × 3 = 24) | Marks | BL | CO | PO

I. (a) Find the missing term in the following table. — 3 | L2 | 1 | 1.1

x	0	1	2	3	4
f(x)	1	3	9	-	81

(b) A devotee of Newton-Raphson method used the method to solve the equation $x^{100} = 0$ using the initial estimate $x_0 = 0.1$. Calculate the next three estimate using Newton method. — 3 | L3 | 1 | 1.1

(c) The f(x) is given by — 3 | L3 | 2 | 1.1

x	0	0.5	1
f(x)	1	0.8	0.5

Then using Trapezoidal rule what is the value of $\int_0^1 f(x)dx$?

(d) Using Runge-kutta method of order 4 what is the value of $y(0.1)$ for $y' = x - 2y$, $y(0) = 1$ taking h = 0.1. — 3 | L2 | 2 | 1.1

(e) Given. — 3 | L2 | 3 | 1.1

x	0	1	2
y	0	1.1	2.1

Then which is the best fit straight line?

(f) If P(1) = P(2) then what is the mean of the Poisson distribution. — 3 | L2 | 3 | 1.1

(g) A random sample of 400 items gives the mean 4.45 and the variance as 4. Can the samples be regarded as drawn from the normal population with mean 4? (At 5% level of significance). — 3 | L3 | 4 | 1.1

(h) Derive the formula for sampling distribution of means. — 3 | L1 | 4 | 1.1

PART B

(4 × 12 = 48)

II. (a) Using regular-falsi method compute the real root of the following equations correct to three decimal places. — 6 | L3 | 1 | 1.1

$2x - \log x = 7$

(b) Using Newton's divided difference interpolation find the polynomial of the given data — 6 | L3 | 1 | 1.1

x	-1	0	1	3
f(x)	2	1	0	-1

OR

			Marks	BL	CO	PO
III.	(a)	If $y(1)=-3, y(3)=9, y(4)=30, y(6)=132$ find the Lagrange's interpolation polynomial that takes the same values as y at the given points.	6	L3	1	1.1
	(b)	Solve the following equation by Gauss-Seidel method $2x+y+6z=9, 8x+3y+2z=13, x+5y+z=7$.	6	L3	1	1.1
IV.	(a)	Find the $y'(0)$ and $y''(0)$ from the following table	6	L5	2	1.1

x	0	1	2	3	4	5.
y	4	8	15	7	6	2

	(b)	Apply Euler's method to solve $y'=x+y$, $y(0)=0$ choosing the step length = 0.2 (carry out 6 steps).	6	L5	2	1.1
		OR				
V.	(a)	Solve $y'=3x+y^2$, $y(0)=1$. Using Taylor's series method and compute $y(0.1)$.	6	L4	2	1.1
	(b)	Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using:	6	L4	2	1.1
		(i) trapezoidal rule				
		(ii) Simpson's 1/3 rd rule				
		(iii) Simpson's 3/8 th rule.				
VI.	(a)	From an urn containing 3 red and 2 white balls a man is to draw 2 balls at random without replacement, being promised ₹20 for each red ball he draws and ₹10 for each white one. Find his expectation.	6	L4	3	1.1
	(b)	Fit a binomial distribution for the following data.	6	L4	3	1.1

X	0	1	3	4
y	28	62	10	4

		OR					
VII.	(a)	In a normal distribution 31% of the items are under 45 and 81% are over 64. Find the mean and standard deviation of the distribution.	6	L5	3	1.1
	(b)	By the method of least squares find the straight line that best fits the following data.	6	L5	3	1.1

x	1	2	3	4	5
y	14	27	40	55	68

VIII.	(a)	A die was thrown 60 times and the following frequency distribution was observed.	6	L4	4	1.1

Faces	1	2	3	4	5	6
f_0	15	6	4	7	11	17.

Test whether the die is unbiased?

	(b)	Two samples of 9 and 7 individuals have variances 4.8 and 9.6 respectively. Is the variance 9.6 significantly greater than the variance 4.6?	6	L4	4	1.1
		OR				
IX.	(a)	A machine produces 16 imperfect articles in a sample of 500. After machine is overhauled, it produces 3 imperfect articles in a batch of 100. Has the machine been improved.	6	L4	4	1.1
	(b)	In a sample of 500 people from a state 280 take tea and rest take coffee. Can we assume that tea and coffee are equally popular in the state at 5% level of significance?	6	L4	4	1.1

Blooms's Taxonomy Levels

L1 - 5%, L2 - 17%, L3 - 29%, L4 - 33%, L5 - 16%.

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