BTS–V(S)–11.20–0624 Reg. No. | | | | | | | | |

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B.Tech. Degree V Semester Supplementary Examination November 2020

CE/CS/EC/EE/IT/ME/SE AS 15-1501 NUMERICAL AND STATISTICAL METHODS
(*2015 Scheme*)

Time: 3 Hours Maximum Marks: 60

PART A
(Answer *ALL* questions)

(10 × 2 = 20)

I. (a) Using Newton's method, find the root between 0 and 1 of $x^3 = 6x - 4$.

(b) Derive divided difference interpolation formula.

(c) Obtain second derivative of y at x = 0.96 from the data

x:	0.96	0.98	1.00	1.02	1.04
y:	0.7825	0.7739	0.7651	0.7563	0.7473

(d) The velocity of a train which starts from rest is given by the following table, time being reckoned in minutes from the start and speed in miles per hour.

Minutes:	2	4	6	8	10	12	14	16	18	20
Miles/hour:	10	18	25	29	32	20	11	5	2	0

Find the total distance covered in 20 minutes.

(e) Using Euler's method, solve numerically the equation $y' = x + y$, $y(0) = 1$ for $x = 0.2$

(f) A random variable x has the following probability function

x:	-2	-1	0	1	2	3
p(x):	0.1	k	0.2	2k	0.3	k

Find the value of k and calculate mean and variance.

(g) If X be a binomially distributed random variable with mean 2 and variance $\frac{4}{3}$, find the distribution of X.

(h) Define (i) critical region (ii) level of significance

(i) Determine the probability that the sample mean will be between 75 and 78 if a random sample of size 100 is taken from a population having mean 76 and variance 256.

(j) The S.D of a sample of 20 observations from a normal population was found to be 5. Examine whether the sample was taken from a population with S.D 5.3

PART B

(4 × 10 = 40)

II. (a) Solve by Gauss Seidel method

$$28x + 4y - z = 32,\ x + 3y + 10z = 24,\ 2x + 17y + 4z = 35$$

(b) Find the value of y at x = 21 and x = 28 from the following data

x:	20	23	26	29
y:	0.3420	0.3907	0.4384	0.4848

OR

III. (a) Use Lagrange's formula to fit a polynomial to the data and hence find y(1)

x:	-1	0	2	3
y:	-8	3	1	12

(b) Use Stirling's formula to find log337.5, given that

x:	310	320	330	340	350	360
logx:	2.4914	2.5052	2.5185	2.5315	2.5441	2.5563

IV. (a) A slider in a machine moves along a fixed straight rod. Its distance x cm along the rod is given below for various values of the time t seconds. Find the velocity and acceleration of the slider when t = 0.3 second.

t:	0	0.1	0.2	0.3	0.4	0.5	0.6
x:	30.13	31.62	32.87	33.64	33.95	33.81	33.24

(b) Using Modified Euler method find y(0.1) and y(0.2) given $y' = x^2 + y^2$, $y(0) = 1$

OR

V. (a) Using R.K method of fourth order, find y(0.8) if $y' = y - x^2$, $y(0.6) = 1.7379$

(b) Find by Taylor's series method the value of y at x = 0.1 and 0.2 from $\frac{dy}{dx} = x^2y - 1, y(0) = 1$

VI. (a) A manufacturer of cotton pins knows that 5% of his product is defective. Pins are sold in boxes of 100. He guarantees that not more than 10 pins will be defective. Determine the probability that a box will fail to meet the guarantee.

(b) Find the mean and s.d of an examination in which grades 70 and 88 correspond to standard scores of -0.6 and 1.4 respectively.

OR

VII. (a) Fit a least square geometric curve $y = ax^b$ to the following data

x:	1	2	3	4	5
y:	0.5	2	4.5	8	12.5

(b) The probability of any ship of a company being destroyed on a certain voyage is 0.02. The company owns 6 ships for the voyage. What is the probability of (i) losing one ship (ii) losing at most 2 ships (iii) losing none

VIII. (a) A company producing computers states that the mean lifetime of its computers is 1600. Test the claim at 0.01 L.O.S against the A.H: $\mu<1600$ hours if 100 computers produced by this company has mean lifetime of 1570 hours with s.d of 120 hours.

(b) Two independent random sample of size $n_1 = 10$, $n_2 = 7$ when observed to have sample Variance $s_1^2 = 16$, $s_2^2 = 3$ using $\alpha = 0.01$ test $H_0: \sigma_1^2 = \sigma_2^2$ Vs $H_1: \sigma_1^2 \neq \sigma_2^2$

OR

IX. (a) In a random sample of 100 tube lights produced by company A, the mean lifetime of tube light is 1190 hours with s.d of 90 hours. Also in a random sample of 75 tube lights from company B the mean lifetime is 1230 hours with s.d of 120 hours. Is there a difference between the mean lifetime of the two brands of tube lights.

(b) The yield of wheat in a random sample of 1000 farms in a certain area has a S.D of 192 kg. Another random sample of 1000 farms gives a s.d of 224 kg. Are the S.D.s significantly different?

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