

University of Engineering & Management, Kolkata

Even Semester Term- II Examination, May, 2021

Course: B.Tech (CS) Semester: IV

Paper Name: Mathematics & Statistics - IV

Paper Code: BSC401

Full Marks: 70 Time: 2 hours

Answer all questions. Each question is of 10 marks.

1. A) Compute f(0.23), using suitable formula from the table given below:

х	0.20	0.22	0.24	0.26	0.28	0.30
f(x)	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

OR

B) Using Lagrange's Formula find the polynomial

X	1	2	4	8	10
F(x)	0	1	5	21	27

2. A) Using suitable interpolation, find f(1.28) from the below table :

x	1.00	1.10	1.20	1.30
f(x)	0.8415	0.8912	0.9320	0.9636

OR

B) Compute the value of f(3.5) using Newton's interpolation from the following table:

X	3	4	5	6	7	8
f(x)	27	64	125	216	343	512

3. A) Find the root of $x^6 + x^4 + x^2 - 1 = 0$, which lies between 1.4 and 1.5, by Newton-Raphson Method, correct to three decimal places.

OR

B) Using Runge-Kutta method of 4th order, solve for y(0.5) from y' = x + y + xy, y(0) = 1 with h = 0.25.

4. A) The joint P.d.f of (X,Y) is given by

$$f(x, y) = 2; 0 < x < 1, 0 < y < x$$

= 0; elsewhere.

Find the marginal density functions of X and Y.

OR

- **B**) Consider the following set of points: $\{(-2, -1), (1, 1), (3, 2)\}$ Find the least square regression line for the given data points.
- **5.** A) Let the joint p.d.f of X and Y be

$$f(x,y) = (x+y), 0 \le x \le 1, 0 \le y \le 1$$
$$= 0, otherwise$$

Find E(X), E(Y), E(XY).

OR

B) Mice with an average lifespan of 32 months will live up to 40 months when fed by a certain nutrition food. If 64 mice fed on this diet have an average lifespan of 38 months and standard deviation of 5.8 months, is there any reason to believe that average lifespan is less than 40 months. Use 5% level of significance. Given that the significant value of Z at 5% level of significance is 1.645.

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6. A) A random sample of 10 boys had the IQs 70,120,110,101,88,83,95,98,107,100. Do this data support the assumptions of a population mean IQ of 160? Use 5% level of significance. Tabulated value of t at 5% level for 9 degree of freedom is 2.26.

OR

B) Is it likely that a sample of 300 items whose mean is 16.0 is a random sample from a normal population with mean 16.8 and s.d. 5.2? test at 0.01 level of significance. Given that P(0 < Z < 2.58) = 0.4951

7. A) The rainfall of sikkim is measured for a few days and the measurements (in mm) are 9.4, 8.8, 10.6, 12.2, 11.8, 11.4, 9.9, 10.8, 12.1, 11.7. Compute 99% confidence interval for average rainfall and standard deviation of the rainfall, assuming that the measurement of rainfall is normal. [Given P(|t| < 3,250) = 0.99 for d.o.f. 9]

OR

B) X and Y are two random variable having joint density function = $\frac{1}{27}(2x + y)$,

Where x and y can assume only integer values 0,1, and 2. Find conditional distribution of Y for X = x.