

Dt: - 26/9/22



Numerical and statistical Methods

Note : 1. All questions are compulsory
2. Each questions carry 15 marks

Time : 2 ½ hours

Q.1 Attempt any three

A. Find significant digits for following

- i) 0.0345 ii) 1.079×10^3 iii) 340.0 (iv) 500

B. Answer the following

i)) What is true error ?

ii) What is relative error?

C. Find the root of $x^3 - 3x + 4 = 0$ in the interval $[-2, -3]$

D. Prepare forward difference table for

$$f(x) = x^3 + 5x - 7$$

E. CIPLA manufactures two brands of antibiotic capsules A & B which are prescribed to the typhoid patient.

A contains 2 unit of ampicillin and 1 unit of cloxacillin. Capsule B contains 1 unit of ampicillin and 3 unit of cloxacillin. It is found that 2 units of ampicillin and and 3 units of cloxacillin are required to get immediate relief form the infection. The cost of capsule A is Re. 1 and that of capsule B is Rs. 4. Formulate the L.P.P. for getting immediate relief at minimum cost.

Q.2 Attempt Any three.

A. Obtain root of equation $x^3 - 4x - 9 = 0$ correct upto 3 decimal places using bisection method.B. Obtain root of $\sqrt[3]{18}$ by bisection method.C. Obtain root of $f(x) = x^3 - x - 4$ using Regula-Falsi methodD. Find root of $x^4 - x - 10 = 0$ by newton -Raphson method

E. Find the missing entries in the following table: - using Newton's forward difference interpolation formula or Lagrange's Interpolation formula.

x	2	4	5	6	7	8
f(x)	4	7	-	11	-	18

Q.3 Attempt Any three.

A. Solve following system of equation with Gauss-Seidal Method
 $5x + 8y + 29z = 71$, $83x + 11y - 4z = 95$, $7x + 52y + 13z = 104$



B. Solve the following linear equations using Gauss Jordan Method
 $x+y+z=90, 2x+3y+6z=370, 3x-8y-4z=-340$

C. Evaluate following integral using Simpson's one third rule

$$\int_0^6 1 \div (1+x) dx$$

D. Use Taylor series method to obtain the solution of $dy/dx=x-y$.
Given $y(0)=1$. Find $y(0.2)$

E. Use Euler's method to compute $y(0.1)$. Given that $dy/dx=x+y$ with
 $y(0)=1$ (Take $h=0.05$)

Q.4 Attempt Any three.

A. The table below gives the heights of fathers (X) and the heights of their sons (Y) respectively.

heights of fathers (inches) (X)	64	62	66	63	67	61	69	65	67	66
heights of sons (inches) (Y)	67	65	67	64	68	65	67	64	70	66

Find the regression equation Y on X.

B. The marks obtained by eight students are as follows:

Marks in Statistics:	53	59	72	43	93	35	55	80
Marks in Economics:	35	49	63	36	75	28	38	71

Calculate Karl Pearson's correlation coefficient

C. By using the following data, find out the two lines of regression and from them compute the Karl Pearson's Coefficient of correlation.

$$\sum x = 260; \quad \sum y = 450; \quad \sum xy = 7050; \quad \sum x^2 = 4720; \quad \sum y^2 = 12230;$$

$n=20$.

D. Formulate Linear programming problem: A company manufactures two model of Jeeps A & B. To stay in business it must produce at least 50 Jeeps of model A per month. It also does not have the facilities to produce more than 150 Jeeps of model B per month. The total demand for both the models does not exceed 200 per month. The profit on each Jeep of model A & model B are Rs. 40,000/- and Rs. 60,000/- respectively

E. Solve graphically following L.P. problem:

$$\text{Maximize } z=6x+7y$$

$$2x+3y \leq 12$$

$$2x+y \leq 8$$

$$x \geq 0, y \geq 0$$



Q.5 Attempt Any three.

- A. If $E(x) = 8$ and $v(x) = 10$, if $y(x) = (X+3)/4$ find $E(y)$ and $V(y)$.
B. If a random variable X has the density function given by

$$f(x) = Ax^3 \text{ when } 0 \leq x \leq 1 \\ = 0 \quad \text{otherwise}$$

Find the value of A , hence find the probability that

- i. X lies between 0.2 to 0.5
- ii. X is less than 0.3

- C. If a random variable X follows Poisson distribution with probability mass function:

$$f(x) = \frac{e^{-\lambda} \lambda^x}{x!} \quad \text{When } x = 0, 1, 2, 3, \dots \\ = 0 \quad \text{otherwise}$$

Show that Mean of Poisson distribution is λ .

- D. If a Poisson distribution has probability of 2 is equal to probability of 3 success. Find the probability of 4 successes.
E. Find the binomial distribution if its mean is 48 and standard deviation is 4.