

- Q.4 A random variable X follow Poisson's distribution and satisfies the condition. [2]
 $P(r=2) = P(r=4)$, find $P(r=0)$
- Q.5 Define optimization technique for multivariable problems without constraints. [2]
- Q.6 Define objective function. [2]
- Q.7 Write down the names of any two methods that are used to solve the transportation problems. [2]
- Q.8 Define key element. [2]
- Q.9 Evaluate $-\left(\frac{\Delta}{h}\right)^2 f(x)$ where h is the interval of differencing. [2]
- Q.10 Write down the Newton's backward difference interpolation formula. [2]

PART - B

- Q.1 The probability distribution for a random variable X is given as - [4]

X	0	1	2	3	4	5	6	7
P(X)	0	$\frac{1}{10}$	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{3}{10}$	$\frac{1}{100}$	$\frac{2}{100}$	$\frac{17}{100}$

- (i) Find $P\left(\frac{1.5 < X < 4.5}{X > 2}\right)$ and (ii) The smallest value of λ for which $P(X \leq \lambda) > \frac{1}{2}$ [4]

- Q.2 If 3% of electric bulbs, manufactured by a company be defective, find the probability of 2 or less than 2 defectives in a lot of 100 bulbs. ($e^{-3} = 0.0498$). [4]

- Q.3 Derive moment generating function for exponential distribution. Hence find mean and variance. [4]

- Q.4 Calculate the coefficient of correlation of the following data analyze it. [4]

X	-10	-5	0	5	10
Y	5	9	7	11	3

- Q.5 Find the solution of the following problem using the Lagrange's multiplier method $\min f(x, y) = kx^{-1}y^{-2}$ [4]
s.t $g(x, y) = x^2 + y^2 - a^2 = 0$.

- Q.6 Find the maxima and minima of $x^3 y^2 (1 - x - y)$. [4]
- Q.7 Use Stirling's formula to compute $u_{12.2}$ from the following table - [4]

x	10	11	12	13	14
$10^5 u_x$	23967	28060	31788	35209	38368

PART - C

- Q.1 The first four moments in a certain probability distribution about the point 4 are -1.5, 17, -30 and 108. Calculate β_1 and β_2 state whether the distribution is Leptokurtic or Platykurtic. [10]
- Q.2 Fit a parabola to the following data - [10]

x	1	3	5	7	9
y	2	7	10	11	9

- Q.3 There are five jobs to be assigned, one each to five machines and the associated cost matrix is as follows. Solve the following assignment problem - [10]

Jobs ↓	← Machines →				
	I	II	III	IV	V
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

- Q.4 Solve the following LPP by Big M-method [10]
- $$\min z = x_1 + x_2$$
- $$\text{s.t } 2x_1 + x_2 \geq 4$$
- $$x_1 + 7x_2 \geq 7$$
- and $x_1, x_2 \geq 0$
- Q.5 Using Runge-Kutta method, find approximate value of y for $x = 0.2$ if [10]
- $$\frac{dy}{dx} = x + y^2, \text{ given that } y = 1 \text{ when } x = 0.$$