b) i) Samples of two types of electric bulbs were tested for length of life and the following data were obtained.

	Size	Mean	S.D.
Sample I	8	1234 hours	36 hours
Sample II	7	1036 hours	40 hours

Is the difference in means sufficient to warrant that type I bulbs are superior to type II bulbs at 5% level ?

ii) From the following Table two sample values are given, find out whether they have come from the same population at 5% level

Sample I :	17	27	18	25	27	29	27	23	17
Sample II :	16	16	20	16	20	17	15	21	

15. a) Find the correlation matrix given joint probability mass function for X_1 and X_2 as

X_1/X_2	–1	0	1
–1	2/16	1/16	2/16
0	2/16	2/16	2/16
1	2/16	1/16	2/16

(OR)

b) i) Let X be distributed as $N_3(\mu, \Sigma)$, $\mu = (-1, 2, 1)$ and $\sum = \begin{pmatrix} 1 & 0 & -2 \\ -2 & 0 & 5 \\ 0 & 2 & 0 \end{pmatrix}$. Are (1) X_1, X_2 independent ? (2) X_1, X_3 independent ? (3) (X_1, X_3) and X_2 independent ?

ii) Compute the principle component of a random vector whose covariance matrix is $\sum = \begin{pmatrix} 1 & 4 \\ 4 & 100 \end{pmatrix}$.

7. Define type I and type II errors.

8. What is χ^2-test of independence of attributes ?

9. Give the types of estimates.

10. Give the principle of method of moments.

PART – B (5×16=80 Marks)

11. a) i) At a busy traffic junction, the probability of an individual having an accident is $p = 0.0001$. However, during a certain part of the day 2000 cars pass through the junction. What is the probability that two or more accidents occur during that period ?

ii) The life in years of a laser ray device used to inspect cracks in aircraft wings is continuous random variable X with pdf $f(x) = \begin{cases} \frac{1}{2}e^{-\frac{x}{2}}, & x \geq 0 \\ 0, & \text{otherwise} \end{cases}$

1) Find the probability that the laser ray device last for less than 2 years and

2) Find the probability that the life of the laser ray device is between 2 and 3.

(OR)

b) i) Find the moment generating function of uniform distribution and also obtain its mean and variance.

ii) An electrical firm manufacturers light bulbs that have a life, before burn-out, that is normally distributed with mean equal to 800 hours and a SD of 40 hours.

1) Find the proability that a bulb burns more than 835 hours and

2) Find the probability that a bulb burns between 778 and 840 hours.

12. a) i) The joint probability density function of a two dimensional random variable (X, Y) is given by $f(x, y) = \begin{cases} axy, & 1 \leq x \leq 3,\ 2 \leq y \leq 4 \\ 0, & \text{otherwise} \end{cases}$

Find a, marginal densities and conditional densities of X and Y.

ii) Given $f(x, y) = xe^{-x(y+1)}$; $x \geq 0$, $y \geq 0$.

Find the regression curve of Y on X.

(OR)