

Time: 3 Hours

Note: (i) First question is compulsory and answer any four questions from the remaining six questions. Each questions carries 14 Marks.

(ii) Answer to each question must be written at one place only and in the same order as they occur in the question paper.

(iii) Missing data, if any, may be suitably assumed.

1. a) A ball is drawn at random from a box containing 6 red balls, 4 white balls and 5 blue balls. Find the probability that it is red or white.
- b) Find the probability that in five tosses of a fair die a 3 appears at most once.
- c) Find the moment generating function for the uniform distribution.
- d) Fit a straight line of the form $y = a + bx$ to the following data.

x	2	4
f	12	17

- e) State any two applications of χ^2 - test.
- f) A random variable X has density function $f(x) = \begin{cases} ce^{-3x}, & x > 0 \\ 0, & x \leq 0 \end{cases}$, then find c .
- g) Find the angle between two lines of regression.

2. a) State Baye's theorem.

- b) One bag contains 4 white balls and 2 black balls; another contains 3 white balls and 5 black balls. If one ball is drawn from each bag, find the probability that (i) both are white, (ii) both are black, (iii) one is white and one is black.

3. a) If 20% of the bolts produced by a machine are defective, determine the probability that out of 4 bolts chosen at random (i) 1, (ii) 0, (iii) less than 2, bolts will be defective.
- b) Find the moment generating function of the Poisson distribution.

- a) The random Variable X is normally distributed with mean 24 and standard deviation 4. Find the probabilities (i) $X \geq 32$, (ii) $X < 32$ and (iii) $20 \leq X \leq 32$. ($P(0 \leq z \leq 2) = 0.4772$, $P(0 \leq z \leq 1) = 0.3413$).
- b) Find the mean of the exponential distribution.

- a) Using the method of least squares, fit a curve of the form $y = a + b + cx^2$ to the following data.

x	1	2	4	5
y	1	15	61	93

b) Ranks obtained by ten students in two examinations are as follows. Find the rank correlation coefficient.

x	5	8	4	7	10	2	1	6	9	3
y	4	9	8	1	2	3	10	5	7	6

6. Two independent samples of sizes 7 and 8 have the following values.

Sample 1	55	49	65	60	56	59	54	
Sample 2	45	69	70	49	54	57	59	48

Find whether the difference between the sample means is significant. Test at 5% level of significance.

7. A set of five similar coins is tossed 320 times and result is as follows

No. of heads	0	1	2	3	4	5
Frequency	6	27	72	112	71	32

Test the hypothesis that the data follow a binomial distribution?

OU-16006