

## Part B

1. Describe Binomial distribution  $B(n,p)$  and obtain the moment generating function. Hence compute (1) the first four moments and (2) the recursion relation for the central moments.
2. Derive the MGF of Poisson distribution and hence or otherwise deduce its mean and variance.
3. Find the  $n$ th moment about mean of normal distribution.
4. 4 coins were tossed simultaneously. What is the probability of getting (i) 2 heads (ii) atleast 2 heads (iii) at most 2 heads.
5. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of 2 successes.
6. If 10% of the screws produced by an automatic machine are defective, find the probability that out of 20 screws selected at random, there are (i) exactly 2 defective (ii) Atmost 3 defective (iii) Atleast 2 defectives
7. In a large consignment of electric bulbs 10% are defective. A random sample of 20 is taken for inspection. Find the probability that (i) All are good bulbs, (ii) Atmost there are 3 defective bulbs (iii) Exactly there are three defective bulbs.
8. A manufacturer of pins knows that 2% of his products are defective. If he sells pins in boxes of 100 and guarantees that not more than 4 pins will be defective what is the probability that a box will fail to meet the guaranteed quality? ( $e^{-2} = 0.13534$ )

9. If  $X$  is a Poisson variate  $P(X = 2) = 9P(X = 4) + 90P(X = 6)$ , find (i) mean of  $X$  (ii) variance of  $X$ .

10. Suppose that a trainee soldier shoots a target in an independent fashion. If the probability that the target is shot on any one shot is 0.8.

- (i) What is the probability that the target would be hit on 6<sup>th</sup> attempt
- (ii) What is the probability that it takes him less than 5 shots
- (iii) What is the probability that it takes him an even number of shots

11. The time (in hours) required to repair a machine is exponentially distributed with parameter  $\lambda = 1/2$ . What is the probability that the repair time

- (a) exceeds 2 hours
- (b) exceeds 5 hours

12. The marks obtained by a number of students in a certain subject are approximately normally distributed with mean 65 and S.D. 5. If 3 students are selected at random from this group, what is the probability that at least one of them would have scored above 75? (Given the area between  $z=0$  and  $z=2$  under the standard normal curve is 0.4772).

13. The weekly wages of 1000 workmen are normally distributed around a mean of Rs.70 with a S.D. of Rs.5. Estimate the number of workers whose weekly wages will be (i) between Rs.69 and Rs.72 (ii) less than Rs.69 (iii) more than Rs.72.

14. In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find mean and standard distribution.

15. The probability functions of an infinite discrete distribution is given by  $P(X = j) = \frac{1}{2^j}, j=1,2,3,\dots$ . Find its MGF, mean and variance.

16. A car hire firm has 2 cars which it hires out day by day. The number of demands for a car in each day is distributed with mean 1.5. Calculate the proportion of days in which

- i) Neither car is used
- ii) Some demand is refused