

**PART-B**

**UNIT 2, STANDARD DISTRIBUTIONS**

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. Describe gamma distribution. Obtain its moment generating function. Hence compute its mean and variance.
4. Find the  $n$ th moment about mean of normal distribution.
5. 4 coins were tossed simultaneously. What is the probability of getting (i) 2 heads (ii) atleast 2 heads (iii) at most 2 heads.
6. A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of 2 successes.
7. 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
8. 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.

9. 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? ( $e^{-2} = 0.13534$ )
10. If  $X$  is a Poisson variate  $P(X = 2) = 9P(X = 4) + 90P(X = 6)$ , find (i) mean of  $X$  (ii) variance of  $X$ .
11. 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.
- What is the probability that the target would be hit on 6<sup>th</sup> attempt
  - What is the probability that it takes him less than 5 shots
  - What is the probability that it takes him an even number of shots
12. Buses arrive at a specified stop at 15 minute intervals starting at 7 a.m. If a passenger arrives at the stop at a time that is uniformly distributed between 7 and 7.30 a.m. Find the probability that he waits (a) less than 5 minutes for a bus (b) more than 10 minutes for a bus.
13. 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
- exceeds 2 hours
  - exceeds 5 hours
14. 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 atleast 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) .

15. 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.

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