

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2017

PROBABILITY & STATISTICS

(Biotechnology)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Define conditional probability and prove Baye's theorem.
- 2 (a) A continuous random variable X has the distribution function.

$$F(x) = \begin{cases} 0, & \text{if } x \leq 1 \\ k(x-1)^4, & \text{if } 1 \leq x \leq 3 \\ 1, & \text{if } x \geq 3 \end{cases}$$
 Then determine (i) f(x) (ii) k.
 (b) For x = 1, 2, 3,.....n find the mean and variance of the uniform probability distribution given by $f(x) = \frac{1}{n}$.
- 3 (a) The marks obtained in statistics in a certain examination found to be normally distributed. If 15% of students ≥ 60 marks, 40% < 30 marks. Find the mean and standard deviation.
 (b) Derive mean for binomial distribution.
- 4 (a) Define (i) population (ii) sample (iii) sampling distribution of mean.
 (b) A population consists of 5, 10, 14, 18, 13, 24. Consider all possible samples of size two which can be drawn without replacement from the population. Find
 (i) Mean of the population. (ii) The standard deviation of the population.
 (iii) The mean of the sampling distribution of means.
- 5 (a) A sample of size 10 was taken from a population S.D of sample is 0.3. Find the maximum error with 99% confidence.
 (b) A random sample of 400 items is found to have mean 82 and S.D. of 18. Find the maximum error of estimation at 95% confidence interval.
- 6 The mean lifetime of a sample of 100 light tubes produced by a company is found to be 1560 hrs with a population S.D. of 90 hrs. Test the hypothesis for $\alpha = 0.05$ that the mean life time of the tubes produced by the company is 1580 hrs.
- 7 The blood pressures of 5 women before and after intake of a certain drug are given below. Test whether there is significant change in blood pressure at 1% level of significance.

Before	110	120	125	132	125
After	120	118	125	136	121
- 8 Customers arrive at one window drive in bank according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The car space in front of the window including that for the serviced can accommodate a maximum of 3 cars. Other cars can wait outside the space.
 - (a) What if the probability that an arriving customer can drive directly to the space in front of the window?
 - (b) What is the probability that an arriving customer will have to wait outside the indicated space?
 - (c) How long is an arriving customer expected to wait before starting service?
