

R07

Code No: 07A3BS03

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B.Tech II Year I Semester Examinations, November/December-2013

Probability and Statistics

(Common to CSE, IT)

Time: 3 hours

Max. Marks: 80

Answer any five questions
All questions carry equal marks

- 1.a) State the axioms of probability of an event. State and prove addition theorem of probability.
- b) In a class, 2% of the boys and 3% of girls are having blue eyes. There are 70% boys in the class.
 A student is selected and having blue eyes. What is the probability that the student is girl? [8+8]

- 2.a) A random variable X has the following probability function

x	0	1	2	3	4	5	6	7
P(X=x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Find (i) the probability that X lies between 0 and 5 (ii) mean of X.

- b) Find the mean and standard deviation of a continuous random variable X, whose probability density function is given by $f(x) = \begin{cases} \frac{1}{2}(x+1), & -1 < x < 1 \\ 0, & \text{else where} \end{cases}$. [8+8]

- 3.a) Assuming that 20% of the population of a city are literate, so that the chance of an individual being literate is $1/5$ and assuming 100 investigators each take 10 individuals to see whether they are literate, how many investigators report 3 or less were literate.
- b) A manufacturer knows from experience that the resistance of resistors he produces is normally distributed with mean 100 ohms and standard deviation 2 ohms. What percentage of resistors will have resistance between 98 ohms and 102 ohms? [8+8]

- 4.a) A coin was tossed 400 times and head turned up 216 times. Test the hypothesis that the coin is unbiased at 5% level of significance.
- b) In a city A 20% of a random sample of 900 school boys had a certain physical defect. In another city B 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant? [8+8]

- 5.a) Let $X_1, X_2, X_3, \dots, X_n$ be a random sample from a distribution with mean and standard deviation μ, σ respectively. Show that sample mean \bar{X} is unbiased estimator of population mean μ .
- b) Let $X_1, X_2, X_3, \dots, X_n$ be a random sample from a distribution with mean and standard deviation μ, σ respectively. Show that is not unbiased estimator of variance. [8+8]

- 6.a) From the following data, test whether
 i) The difference in the means is significant
 ii) The difference between standard deviations is significant

Sample	Size	mean	S.D
A	250	120	12
B	300	125	14

- b) A company manufacturing electric bulbs claims that the average life of its bulbs is 1600 hours. The average life and standard deviation of a random sample of 100 such bulbs were 1570 hours and 120 hours respectively. Do you accept the claim of the company at 5% significance level? [8+8]

- 7.a) Two independent samples of 8 and 7 items respectively had the following values of the variable (weight in ounces). Is the difference between means of the sample significant?

Sample-1	9	11	13	11	15	9	12	14
sample-2	10	12	10	14	9	8	10	--

- b) A die is thrown 60 times with the following results.

Up face	1	2	3	4	5	6
Frequency	8	11	5	12	15	9

Using Chi square test, show that the die is biased. [8+8]

- 8.a) Prove that the probability distribution of k number of arrivals to a system in a given interval of time ' t ' is given by $P_k(t) = \frac{(\lambda t)^k \cdot e^{-\lambda t}}{k!}$, where λ is the mean arrival rate.
- b) Arrivals of people at a theater ticket counter is Poisson distributed with an arrival rate of 25 per hour. Service time is fixed at 2 minutes per customer. Calculate
 i) The mean number of persons in the waiting line
 ii) Mean waiting time
 iii) Utilization factor. [8+8]