

II B.Tech I Semester(R07) Regular/Supplementary Examinations, December 2009  
**PROBABILITY AND STATISTICS**  
 (Common to Computer Science & Engineering, Information Technology and Computer Science &  
 Systems Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
 All Questions carry equal marks

**KOTTAM**  
 INSTITUTIONS

1. (a) State and prove Baye's Theorem.  
 (b) For any two events, prove that  $P(A \cup B) = P(A) + P(B) - P(A \cap B)$  [8+8]
2. (a) Two dice are thrown. Let X the random variable assign to each point (a, b) is the maximum of its numbers. Find the distribution, the mean and variance of the distribution.  
 (b) Ten coins are tossed simultaneously. Find the probability of getting at least 6 heads. [8+8]
3. (a) A random variable has normal distribution with  $\mu = 62.4$ . Find its standard deviation if the probability is 0.20 that it will take on a value greater than 79.2.  
 (b) Prove that normal distribution is a limiting form of Binomial distribution. [8+8]
4. Find the mean and Standard deviation of sampling distribution of variances for the population 2, 3, 4, 5 by drawing samples of size two with replacement.[16]
5. (a) 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. Find the confidence limits for the mean if  $x = 82$ ?  
 (b) Measurements of the weights of a random sample of 200 ball bearing made by a certain machine during one week showed a mean of 0.824 and a standard deviation of 0.042. Find maximum error at 95% confidence interval. Find the confidence limits for the mean if  $x = 32$ ?[8+8]
6. (a) What is meant by Level of significance ? (LOS)  
 (b) What is one tailed and two tailed tests?  
 The mean life time 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 that the mean life time of the tubes produced by the company is 1580 hrs. [6+10]
7. A company wanted to introduce a new plan of work and a survey was conducted for this purpose. Out of sample of 500 workers in one group 62% favoured the new plan and another group of sample of 400 workers 41% were against the new plan.  
 Is there any significant difference between the two groups in their attitude towards the new plan at 5% level of significance?[16]
8. In a maintenance shop, the inter-arrival times at tool crib are exponential with an average time of 10 minutes. The length of the service time (i.e the amount of time taken by the tool crib operator to meet the needs of the maintenance man) is assumed to be exponentially distributed, with mean 6 minutes. Find:
  - (a) Estimate the fraction of the day that tool crib operator will be idle
  - (b) The probability that there will be six or more operator waiting for the service
  - (c) The manager of the shop will install a second booth when an arrival would expect to have to wait 10 minutes or more for the services. By how much must the rate of arrival be increased in order justify a second booth? [4+6+6]

II B.Tech I Semester(R07) Regular/Supplementary Examinations, December 2009  
PROBABILITY AND STATISTICS

(Common to Computer Science & Engineering, Information Technology and Computer Science & Systems Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
All Questions carry equal marks

**KOTTAM**  
INSTITUTIONS

1. (a) If  $B \subseteq A$  and  $A$  and  $B$  are two events such that  $P(A) = 3P(B)$  and  $A \cup B = 5$ , find  $P(B)$ .  
(b) A class has 10 boys and 5 girls. Three students are selected at random one after the other. Find the probability that
  - i. First two are boys and third is girl.
  - ii. First and third of same sex and second is of opposite sex. [8+8]
2. (a) The probability density function is  
 $y = k(3x^2 - 1)$  in  $-1 \leq x \leq 2$   
 0 elsewhere  
 Find the value of  $k$  and find  $P(-1 \leq x \leq 0)$   
(b) If  $X$  is a continuous random variable and  $Y = aX + b$ , where  $V$  stands for variance.  
 Prove that  $E(Y) = aE(X) + b$  and  $V(Y) = a^2V(X)$ , where  $V$  stands for variance. [8+8]
3. (a) In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and variance of the distribution.  
(b) Show that if  $p$  is small and  $n$  is large, then the binomial distribution  $B(n, p)$  is approximated by the Poisson distribution. [8+8]
4. (a) If the distribution of the weights of all men traveling by air between Delhi and Mumbai has a mean of 163 pounds and a standard deviation of 18 pounds. What is the probability that the consigned gross weight of 36 men traveling between these two cities is more than 6000 pounds.  
(b) Find the value of the finite population correction factor for  $n=10$  and  $N=1000$ . [10+6]
5. (a) Show that sample mean  $\bar{x}$  is an unbiased estimator of population mean  $\mu$ .  
(b) Explain maximum error of estimation and give its relation.  
(c) 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? [8+4+4]
6. A simple sample of the height of 6400 Englishmen has a mean of 67.85 inches and a S.D of 2.56 inches while a simple sample of heights of 1600 Austrians has a mean of 68.55 inches and S.D. of 2.52 inches.  
Do the data indicate the Austrians are on the average taller than the Englishmen? (Use  $\alpha$  as 0.01). [16]
7. (a) Write the properties of  $t$  - distribution  
(b) The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with a S.D of 5 months. A random sample of 6 such bulbs gave the following values. Life of months: 24, 26, 30, 20, 20, 18. Can you regard the producer's claims to be valid at 1% level of significance? [4+12]
8. (a) Discuss Queuing theory. Explain its applications.  
(b) General structure of a Queuing System. [12+4]

II B.Tech I Semester(R07) Regular/Supplementary Examinations, December 2009  
**PROBABILITY AND STATISTICS**  
 (Common to Computer Science & Engineering, Information Technology and Computer Science &  
 Systems Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
 All Questions carry equal marks

**KOTTAM**  
 INSTITUTIONS

1. (a) State the three axioms of probability.  
 (b) In a group consisting of equal number men and women 10% of the men and 45% of the women are un-employed. If a person is selected randomly form the group then find the probability that the person is an employee.[8+8]
  
2. (a) The frequency function of a continuous random variable is given by  
 $f(x) = y_0 x(2-x)$ ,  $0 \leq x \leq 2$   
 Find the value of  $y_0$ , mean and variance of  $x$ .  
 (b) If two cards are drawn from a pack of 52 cards which are diamonds. Using Poisson distribution find the probability of getting two diamonds at least three times in 51 consecutive trails of two cards drawing each time.[8+8]
  
3. (a) Wireless sets are manufactured with 25 soldered joints each. On the average 1 joint in 500 is defective. How many sets can be expected to be from defective joints in a consignment of 10,000 sets.  
 (b) The mean and variable of binomial distribution are 4 and  $4/3$  respectively. Find  $P(x \geq 1)$ . [8+8]
  
4. If the population is 3, 6, 9, 15, 27.  
 (a) List all possible samples of size 3 that can be taken without replacement from the finite population.  
 (b) Calculate the mean of each of the sampling distribution of means  
 (c) Find the standard deviation of sampling distribution of means. [16]
  
5. (a) What is more efficient unbiased estimator, explain briefly ?  
 (b) What is "nternal Estimation". Give the relations used to find the confidence Internal of large and small samples.  
 (c) Explain about "Internal Estimation". [4+6+6]
  
6. (a) The mean life time 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 that the mean life time of the tubes produced by the company is 1580 hrs.  
 (b) Write a short Note on Type I error and Type II error. [10+6]
  
7. Perform a two - way ANOVA on the data given below

Plots of Land	Treatment
	ABCD
I	38 40 41 39
II	45 42 49 36
III	40 38 42 30

[16]

8. (a) Explain about queing theory characteristics?  
 (b) Define preemptive discipline and non preemptive priority? [12+4]

II B.Tech I Semester(R07) Regular/Supplementary Examinations, December 2009  
**PROBABILITY AND STATISTICS**  
 (Common to Computer Science & Engineering, Information Technology and Computer Science &  
 Systems Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
 All Questions carry equal marks

**KOTTAM**  
 INSTITUTIONS

1. (a) if the probability that a communication system will have high fidelity is 0.81 and the probability that it will have high fidelity and selectivity is 0.18. what is the probability that a system with high fidelity will also have high selectivity?  
 (b) A can hit a target once in five shots B can hit two targets in 3 shots. C can hit one target in 4 shots. What is the probability that 2 shots hit the target?  
 [8+8]
2. (a) A random variable X is defined as the sum of the numbers on the faces when two dice are thrown. Find the mean of X.  
 (b) A continuous random variable has the probability density function,  
 $f(X) = Kxe^{-\lambda x}$  if  $x \geq 0, \lambda > 0$   
 $= 0$  otherwise  
 Determine the constant K, find mean and variance.  
 [8+8]
3. (a) A distributor of bean seeds determines from extensive tests that 5% of large batch of seeds will not germinate. He sells the seeds in packets of 200 and guarantees 90% germination. Determine the probability that a particular packet will violate the guarantee.  
 (b) Show that the mean deviation from the mean equals (approximately) to  $4/5$  of standard deviation for normal distribution.[8+8]
4. A population consists of the five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size 2, that can be drawn with replacement from this population. Find  
 (a) The mean of the population  
 (b) The Standard deviation of the population  
 (c) The mean of the sampling distribution of means  
 (d) The standard deviation of the sampling distribution of means (the standard error). [16]
5. (a) Explain about "Bayesian Estimation".  
 (b) What is a "Good Estimator", Explain its properties. [8+8]
6. A sample of the height of 6400 Indians has a mean of 72.85 inches and a S.D of 2.56 inches while a sample of heights of 1600 Asians has a mean of 74.55 inches and S.D. of 2.52 inches.  
 Do the data indicate the Asians are on the average taller than the Indians? (Use  $\alpha$  as 0.01).[16]
7. (a) Write the properties of t - distribution  
 (b) The manufacturer of a certain make of electric bulbs claims that his bulbs have a mean life of 25 months with a S.D of 5 months. A random sample of 6 such bulbs gave the following values. Life of months: 24, 26 30, 20, 20, 18. Can you regard the producers, claims to be valid at 1% level of significance?  
 [4+12]
8. (a) Explain about poisson distribution?  
 (b) Explain about exponential distribution? [8+8]