

II B.Tech I Semester Supplementary Examinations, May 2005
PROBABILITY AND STATISTICS
(Electrical & Electronic Engineering)

Time: 3 hours**Max Marks: 70**

Answer any FIVE Questions
All Questions carry equal marks

1. (a) What is the chance that a leap year selected at random will contain 53 Sundays?
(b) In a bolt factory, A, B & C manufacture 25%, 35% and 40% of the total. Of their output 5%, 4% and 2% are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B or C?
2. (a) Two persons A and B toss an unbiased coin alternately on the understanding that the first who gets the head wins. If A starts the game find their respective chances of winning.
(b) A box A contains 2 white and 4 black balls. Another box B contains 5 white and 7 black balls. A ball is transferred from the box A to B then a ball is drawn from the box B. Find the probability that it is white.
3. (a) A continuous random variable X has a pdf $f(x) = 3x^2$, $0 \leq X \leq 1$. Find a and b such that
 - i. $P(X \leq a) = P(X > a)$ and
 - ii. $P(X > b) = 0.05$.
(b) The mean yield for one - acre plot is 662 kilos with a S.D 32 kilos. Assuming normal distribution, how many one-acre plots in a batch of 1,000 plots would you expect to have yield
 - i. above 700 kilos,
 - ii. below 650 kilos.
4. (a) A random sample of size 100 is taken from an infinite population having the mean $\mu = 76$ and the variance of $\sigma^2 = 256$. What is the probability that \bar{X} will be between 75 and 78?
(b) If two independent random samples of size $n_1 = 9$ and $n_2 = 16$ are taken from a normal populations, what is the probability that the variance of the first sample will be at least four times as large as the variance of the second sample?
5. (a) In a sample of 600 men from a certain large city 450 are found to be smokers. In one of 900 from another city 450 are smokers. Do the data indicate that the cities are significantly different with respect to prevalence of smoking among men?

- (b) Random samples of 400 men and 600 women in a locality were asked whether they would like to have a bus stop 'near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposals are same in the male and female. Discuss at 5% level of significance.
6. (a) It is desired to test the hypothesis $\mu_0 = 40$ against the alternative hypothesis $\mu_1 = 42$ on the basis of a random sample from a normal population with the standard deviation $\sigma = 4$. If the probability of a Type 1 error is to be 0.05 and the probability of a Type II error is to be 0.24, find the required size of the sample.
- (b) The diameter of rotor shafts in a lot has a mean of 0.249 inch and a standard deviation of 0.003 inch. The inner diameters of bearings in another lot have a mean of 0.255 inch and a standard deviation of 0.002 inch. (i) What are the mean and the standard deviation of the clearances between shafts and bearings selected from these lots? (ii) If a shaft and a bearing are selected at random, what is the probability that the shaft will not fit inside the bearing? (Assume that both dimensions are normally distributed)
7. Fit a power function of the form $y = ax^b$ to the following data and estimate y at $x=12$.

Price x	20	16	10	11	14
Demand y	22	41	120	89	56

8. Estimate (product) the blood pressure (b.P) of a woman of age 45 year from the following data which shows the ages x and systolic B.P y of 12 women. (b) Are the two variable ages x and B.P. y correlated.

Age(x)	56	42	72	36	63	47	55	49	38	42	68	60
B.P.(x)	147	125	160	118	149	128	150	145	115	140	152	155

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