

II B.Tech I Semester Regular Examinations, November 2007
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

1. (a) If A and B are events with $P(A) = 1/3$, $P(B) = 1/4$, and $P(A \cup B) = 1/2$, find
 - i. $P(A/B)$
 - ii. $P(A \cap B^c)$
- (b) Three students A,B,C are in a running race. A and B have the same probability of winning and each is twice as likely to win as C. Find the probability that B or C wins.
- (c) The students in a class are selected at random one after the other for an examination. Find the probability that the boys and girls are alternate if there are
 - i. 5 boys and 4 girls
 - ii. 4 boys and 4 girls. [6+5+5]
2. (a) If X is a continuous random variable and K is a constant then prove that
 - i. $\text{Var}(X+K) = \text{Var}(X)$
 - ii. $\text{Var}(kX) = k^2 \text{Var}(X)$
- (b) Determine the probability of getting 9 exactly twice in 3 throws with a pair of fair dice. [8+8]
3. (a) The average number of phone calls/minute coming into a switch board between 2 p.m. and 4. p.m. is 2.5. Determine the probability that during one particular minute there will be
 - i. 4 or fewer
 - ii. more than 6 calls
- (b) The marks obtained in mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine
 - i. how many students got marks above 90%
 - ii. what was the highest mark obtained by the lowest 10% of the student
 - iii. within what limits did the middle of 90% of the students lie [8+8]
4. Samples of size 2 are taken from the population 4, 8, 12, 16, 20, 24 without replacement. Find
 - (a) mean of the population

- (b) standard deviation of population
 (c) the mean of sampling distribution of means
 (d) standard deviation of sampling distribution of means. [16]
5. (a) A lady stenographer claims that she can take dictation at the rate of 118 words per minute can we reject her claim on the basis of 100 trials in which she demonstrates a mean of 116 words and a S.D of 15 words.
 (b) In a large consignment of oranges a random sample of 64 oranges revealed that 14 oranges were bad. Is it reasonable to ensure that 20% of the oranges are bad? [8+8]
6. (a) The measurements of the output of two units have given the following results. Assuming that both samples have been level whether the two populations have the same variance.

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

- (b) The following are the samples of skills. Test the significant difference between the means at .05 level. [8+8]

Sample-I	74.1	77.7	74.4	74	73.8	-
Sample-II	70.8	74.9	74.2	70.4	69.2	72.2

7. (a) Fit the curve $y = ae^{bx}$ to the following data
- | | | | | | | | | | |
|----|----|----|----|----|-----|-----|-----|-----|------|
| x: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| y: | 20 | 30 | 52 | 77 | 135 | 211 | 326 | 550 | 1052 |
- (b) Fit a second degree polynomial to the following data, taking x as independent variable: [8+8]

x:	1	2	3	4	5	6	7	8	9
y:	2	6	7	8	10	11	11	10	15

8. (a) A sample of 12 fathers and their eldest sons gave the following data about their height in inches calculate the coefficient of rank correlation. [8+8]

Fathers	65	63	67	64	68	62	70	66	68	67	69	71
Sons	68	66	68	65	69	66	68	65	71	67	68	70

- (b) Given that $x = 4y + 5$ and $y = kx + 4$ are the regression lines of x on y and y on x, respectively, show that $0 \leq k \leq 25$. If $k = 0.10$ actually, find the means of the variables x and y and also their coefficient of correlation.

II B.Tech I Semester Regular Examinations, November 2007
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

1. (a) Two cards are selected at random from 10 cards numbered 1 to 10. Find the probability that the sum is even if
 - i. the two cards are drawn together
 - ii. the two cards are drawn one after the other with replacement.
- (b) State and prove Baye's theorem.
- (c) The probabilities of A,B,C to become M.D'S of a factory are $\frac{5}{10}$, $\frac{3}{10}$, $\frac{2}{10}$. The probabilities that bonus scheme will be introduced if they become M.D's are .02, .03 and .04. Find the probabilities A,B,C to be become M.D's if bonus scheme introduced. [5+5+6]
2. (a) Two dice are thrown. Let X the random variable assign to each point (a,b) in S 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 7 heads. [8+8]
3. (a) If the variance of a poisson variate is 3. Find the probability that
 - i. $x=0$
 - ii. $1 \leq x < 4$
 - iii. $0 < x \leq 3$
- (b) Given that the mean heights of students in a class is 158 cms with standard deviation of 20cms. Find how many students heights lie between 150 cms and 170 cms, if there are 100 students in the class. [8+8]
4. Samples of size 2 are taken from the population 4, 8, 12, 16, 20, 24 without replacement. Find
 - (a) mean of the population
 - (b) standard deviation of population
 - (c) the mean of sampling distribution of means
 - (d) standard deviation of sampling distribution of means. [16]
5. (a) A sample of 100 iron bars is said to be drawn from a large number of bars. Whose lengths are normally distributed with mean 4 feet and S.D 0.6ft. If the sample mean is 4.2 ft, can the sample be regarded as a truly random sample?

- (b) A random sample of 500 apples was taken from a large consignment and 60 were found to be bad. Within the 98% confidence limits for the percentage number of bad apples in the consignment. [8+8]

6. The following are the average weekly losses of worker hours due to accidents in 10 industrial plants before and after a certain safety programme was put into operation:

Before:	45	73	46	124	33	57	83	34	26	17
After:	36	60	44	119	35	51	77	29	24	11

Test whether the safety programme is effective in reducing the number of accidents at the level of significance of 0.05? [16]

7. (a) The measurements of humidity and the moisture content in a raw material are given in the following table. Fit a Straight line of the form $y = ax + b$

Humidity (x)	42	35	50	43	48	62	31	36	44	39	55	48
Moisture	12	8	14	9	1	16	7	9	12	10	13	11

- (b) Find the most plausible values of x and y

$$x + 2y - 7 = 0 \quad 2x + 3y - 2 = 0$$

$$x + 8y - 3 = 0 \quad 3x - y + 5 = 0.$$

[8+8]

8. (a) The regression equations of two variables x and y are $x = 0.7y + 5.2$, $y = 0.3x + 2.8$. Find the mean of the variables and the coefficient of correlation between them

- (b) Consider the following data:

x	-4	-3	-2	-1	0	1	2	3	4
y	0.1	2.5	3.4	3.9	4.1	3.8	3.5	2.8	0.3

Find the correlation coefficient 'r'.

[6+10]

II B.Tech I Semester Regular Examinations, November 2007**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

1. (a) Of the three men, the chances that a politician, a businessman or an academician will be appointed as a Vice-Chancellor (V.C.) of a University are 0.5, 0.3, 0.2 respectively. Probability that research is promoted by these persons if they are appointed as V.C. are 0.3, 0.7, 0.8 respectively.
 - i. Determine the probability that research is promoted
 - ii. If research is promoted, what is the probability that V.C. is an academician
- (b) There are two boxes in box I, 11 cards are there numbered 1 to 11 and in box II, 5 cards numbered 1 to 5. A box is chosen and a card is drawn. If the card shows an even number then another card is drawn from the same box. If card shows an odd number another card is drawn from the other box. Find the probability that
 - i. both are even
 - ii. both are odd
 - iii. if both are even. What is the probability that they are from box I. [8+8]
2. (a) Define random variable, discrete probability distribution, continuous probability distribution and cumulative distribution. Give an example of each.
- (b) The mean of Binomial distribution is 3 and the variance is $\frac{9}{4}$. Find
 - i. The value of n
 - ii. $p(x \geq 7)$
 - iii. $p(1 \leq x < 6)$. [8+8]
3. (a) Average number of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents are
 - i. at least one
 - ii. at most one
- (b) If X is a normal variate, Find the probability
 - i. to the left of $z = -1.78$
 - ii. to the right of $z = -1.45$
 - iii. corresponding to $-0.80 \leq z \leq 1.53$
 - iv. to the left of $z = -2.52$ and to the right of $z = 1.83$. [8+8]

4. (a) A random sample of size 81 is taken from an infinite population having the mean 65 and standard deviation 10. What is the probability that \bar{x} will be between 66 and 68?
- (b) Write about
- i. Critical region
 - ii. Two tailed test. [8+8]
5. (a) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence.
- (b) Among 900 people in a state 90 are found to be chapatti eaters. Construct 99% confidence interval for the true proportion.
- (c) A random sample of 1200 apples was taken from a large consignment and found that 10% of them are bad. The supplier claims that only 2% are bad. Test his claim at 95% level. [5+5+6]
6. Measurements of the fat content of two kinds of ice creams brand A and brand B yielded the following sample data.

Brand A	13.5	14.0	13.6	12.9	13.0
Brand B	12.9	13.0	12.4	13.5	12.7

Test the significant between the means at 0.05 level. [16]

7. (a) Derive normal equations to fit the parabola $y = a_0 + a_1x + a_2x^2$
- (b) Fit the parabola $y = a_0 + a_1x + a_2x^2$ for the following data [6+10]

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

8. A chemical company wishing to study the effect of extraction time on the efficiency of an extraction operation obtained in the data shown in the following table.

Extraction time x	27	45	41	19	35	39	19	49	15	31
Extraction efficiency y	57	64	80	46	62	72	52	77	57	68

Calculate the coefficient of correlation between x and y and the two lines of regression. [16]

II B.Tech I Semester Regular Examinations, November 2007
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

1. (a) If A and B are any two arbitrary events of the sample space then Prove that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
- (b) A problem in statistics is given to three students A,B,C whose chances of solving it are $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{1}{4}$ respectively. What is the probability that the problem is solved.
- (c) Find the probability of getting a sum of 10 if we throw two dice. [5+5+6]
2. (a) For the continuous probability function $f(x) = kx^2 e^{-x}$ when $x \geq 0$ find
 - i. k
 - ii. mean
 - iii. variance
- (b) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random.
 - i. none is defective
 - ii. one is defective
 - iii. $p(1 < x < 4)$ [8+8]
3. (a) The average number of phone calls/minute coming into a switch board between 2 p.m. and 4. p.m. is 2.5. Determine the probability that during one particular minute there will be
 - i. 4 or fewer
 - ii. more than 6 calls
- (b) The marks obtained in mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine
 - i. how many students got marks above 90%
 - ii. what was the highest mark obtained by the lowest 10% of the student
 - iii. within what limits did the middle of 90% of the students lie [8+8]
4. Samples of size 2 are taken from the population 4, 8, 12, 16, 20, 24 without replacement. Find
 - (a) mean of the population
 - (b) standard deviation of population
 - (c) the mean of sampling distribution of means

- (d) standard deviation of sampling distribution of means. [16]
5. (a) In a study of an automobile insurance a random sample of 80 body repair costs had a mean of Rs. 472.35 and a standard deviation of Rs 62.35. If \bar{x} is used as a point estimate to the true average repair costs, with what confidence we can assert that the maximum error doesn't exceed Rs. 10. Find also the confidence interval with that confidence.
- (b) A manufacturer of electric bulbs claims that the percentage defectives in his product doesn't exceed 6. A sample of 40 bulbs is found to contain 5 defectives. Would you consider the claim justified? [8+8]
6. (a) It has been suggested that an average college teacher in Andhra Pradesh spends less than 10 hours in a week on his own academic schedule. The figures for the time spent during a week are given below for 12 teachers.

7.1	13.1	7.8	3.6	8.4	4.9
9.6	3.4	0.1	7.2	20.3	11.1

Is the claim justified with the level of significance of 0.05?

- (b) Test of the fidelity and the selectivity of 190 radio receivers produced the results shown in the following table: [8+8]

			Fidelity		
		Low	Average	High	
	Low	6	12	32	
Selectivity	Average	33	61	18	
	High	13	15	0	

7. Fit an equation of the form $Y=ab^x$ to the following data: [16]

x:	2	3	4	5	6
y:	144	172.8	207.4	248.8	298.5

8. A chemical company wishing to study the effect of extraction time on the efficiency of an extraction operation obtained in the data shown in the following table.

Extraction time x	27	45	41	19	35	39	19	49	15	31
Extraction efficiency y	57	64	80	46	62	72	52	77	57	68

Calculate the coefficient of correlation between x and y and the two lines of regression. [16]
