

III B.Tech I Semester Supplementary Examinations, November 2006
PROBABILITY AND STATISTICS
(Metallurgy & Material Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) For any three arbitrary events A,B,C , prove that $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(B \cap C) - P(C \cap A) + P(A \cap B \cap C)$
- (b) In a certain town 40% have brown hair, 25% have brown eyes and 15% have both brown hair and brown eyes. A person is select at random from the town
 - i. If he has brown hair, what is the probability that he has brown eyes also
 - ii. If he has brown eyes, determine the probability that he does not have brown hair
2. (a) Calculate expectation and variance of x, if the probability distribution of the random variable x is given by

X	-1	0	1	2	3
f	0.3	0.1	0.1	0.3	0.2

- (b) Determine the probability of getting 9 exactly twice in 3 throws with a pair of fair dice.
3. (a) Find the mean of the normal distribution .
- (b) Suppose the weights of 800 male students are normally distributed with mean $\mu = 140$ pounds and standard deviation 10pounds. Find the number of students whose weights are
 - i. between 138 and 148pounds
 - ii. more than 152pounds
4. (a) Suppose that we want to investigate whether on the average men earn more than Rs.20 per week more then women in a certain industry. A sample data show that 60 men earn on the average while 60 women earn on an average $\bar{x}_2 = 266.10$ per week with a standard deviation of Rs.18.20, what can we conclude at 0.01 level of significance?
- (b) A sample of 900 members has a mean 3-4cms and S.D 2.61cms. Is this sample has been taken from a large population of mean 3.25cms and S.D 2.61cms.
5. (a) In a random sample of 160 workers exposed to a certain amount of radiation, 24 experienced some ill effects. Construct a 99% confidence interval for the corresponding ture percentage.

- (b) What is the size of the sample required to estimate an unknown proportion to within a maximum error of 0.06 with at least 5% confidence given that standard deviation is 2?
- (c) The performance of a computer is observed over a period of 2 years to check the claim that the probability is 0.20 that its downtime will exceed 5 hours in any given week. Testing the null hypothesis $P = 0.20$ against the alternate hypothesis $P \neq 0.20$, what can we conclude at the level of significance $\alpha = 0.05$, if there were only 11 weeks in which the downtime of the computer exceeded 5 hours? [5+5+6]
6. (a) In a city A 20% of a random sample of 900 school boys had a certain slight physical defect. In another city B 18.5% of a random sample of 1600 school boys had the same effect. Is the difference between the proportions, test at .05 level
- (b) 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

[8+8]

7. (a) Fit a straight line $y = a + bx$ for the following data

x	1	2	3	4	5	6
y	14	33	40	63	76	85

- (b) Fit a curve of the $y = ax^b$ for the following data

x	1	2	3	4	5
y	.5	.2	4.5	8	12.5

[8+8]

8. The following sample data were collected to determine the relation ship between two processing variables and the current gain of a certain kind of transistor.

Find regression line of x_3 on x_1 and x_2 by the method of least sequences.

X_1	1.5	2.5	.5	1.2	2.6	.3	2.4	2.0	.7	1.6
X_2	66	87	69	141	93	105	111	78	66	123
X_3	5.3	7.8	7.4	9.8	10.8	9.1	8.1	7.2	6.5	12.6

[16]
