

Code No: R22011

**R10**

**SET - 1**

**II B. Tech II Semester Supplementary Examinations, April/May-2017**

**PROBABILITY AND STATISTICS**

(Com. to CE, CHEM, PE)

Time: 3 hours

Max. Marks: 80

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

1. a) There are two boxes .In Box –I , 11 cards there numbered 1 to 11 and in (7M)  
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  
the card shows an odd number , then another card is drawn other box .Find the  
probability that (i) both are even (ii) both are odd (iii) if both are even it is from  
box –I
- b) A, B, and C in order toss a coin. The first one to toss head wins the game. What (8M)  
are the probabilities of winning, assuming that the game may continue  
indefinitely.
2. a) The p.d.f of  $f(x) = \begin{cases} \frac{x}{k} & , 0 \leq x \leq 400 \\ \frac{800-x}{k} & , 400 \leq x \leq 800 \end{cases}$  ,then find value of k and (7M)  
also , 'a' so that  $P(x < a) = 0.7$
- b) Define (i) random variable (ii) continuous (iii) discrete random variables with (8M)  
examples
3. a) Derive the expression for mean and variance of Binomial distribution (7M)
- b) Find the moment generating function of  $f(X) = \begin{cases} 1 & , 0 < x < 1 \\ 0 & , otherwise \end{cases}$  (8M)
4. Samples of size 2 are taken from the population 3, 6.9, 15, 27 with (16M)  
replacement. Find a) The mean of the population b) The standard deviation  
of the population c) Mean of the sampling distribution of means d) The  
standard deviation of the sampling distribution of means
5. a) Explain i) level of significance ii) critical region iii) confidence limits (7M)
- b) In a survey of water coolers produced by company A, it was found that 19 (8M)  
machines were defective in a random sample of 200 while for company B, 5  
were defective out of 100. At 0.05 level, is there a reason to believe that there is  
a significant difference in the performance of the coolers of the two brands A  
and B.

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6. a) A die is thrown 264 times with the following results. Show that the die is biased. ( $\chi^2_{0.05} = 11.07$  for 5 d.f) (7M)

|                         |    |    |    |    |    |    |
|-------------------------|----|----|----|----|----|----|
| No. appeared on the die | 1  | 2  | 3  | 4  | 5  | 6  |
| Frequency               | 40 | 32 | 28 | 58 | 54 | 52 |

- b) Five coins are tossed 320 times the number of heads observed is given below. (8M)  
Examine whether the coin is unbiased.

|              |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|
| No. of heads | 0  | 1  | 2  | 3  | 4  | 5  |
| Frequency    | 15 | 45 | 85 | 95 | 60 | 20 |

7. a) Find the coefficient of correlation between X and Y. (7M)

|   |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|
| X | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  |
| Y | 12 | 11 | 13 | 15 | 14 | 17 | 16 | 19 | 18 |

- b) The number of defects on 20 items are given below (8M)  
Item No. 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20  
No. of defects: 2,0,4,1,0,8,0,1,2,0,6,0,2,1,0,3,2,1,0,2  
Devise a suitable control scheme for the future.

8. a) Explain (M/M/1):(∞/FCFS) Queueing model (7M)

- b) Barber A takes 15 minutes to complete one hair cut. Customers arrive in his shop at an average rate of one every 30 minutes. Barber B takes 25 minutes to complete one hair cut and customers arrive at his shop at an average rate of one every 50 minutes. The arrival processes are poisson and the service times follow an exponential distribution. i) Where would you expect a bigger queue. ii) Where would you require more time waiting included to complete a hair cut (8M)