

II B.Tech II Semester Examinations, April/May 2012**PROBABILITY AND STATISTICS**

Common to CE, ME, CHEM, MECT, MEP, AME

Time: 3 hours**Max Marks: 80****Answer any FIVE Questions****All Questions carry equal marks**

1. (a) In a certain factory there are two independent processes for manufacturing the same item. The average weight in a sample of 400 items produced from one process is found to be 150 gms with a standard deviation of 20 gms while the corresponding figures in a sample of 500 items from the other process are 190 and 24. Is there significant difference between the means (test at 95% level).
(b) Among 100 fish caught in a large lake, 18 were inedible due to the pollution of the environment. With what confidence can we assert that the error of this estimate is at most .065? [8+8]
2. A population consists of 1, 2, 3, 4, 5, 6. Consider all samples of size two, which can be drawn with replacement. Find
 - (a) The population mean
 - (b) The population Standard deviation
 - (c) The mean of the sampling distribution of mean
 - (d) The standard deviation of the means of sampling distribution of means. [16]
3. (a) A random sample of 10 boys has the following I.Q 70,120,110,101,88,83,95,98,107 and 100. Construct 95% confidence interval for the mean.
(b) If the average time taken to a mechanic to rotate the tyres of a car is 39.5 minutes. If the sample size is 40 and the standard deviation is 1.6. What confidence can be asserted that the sample mean does not differ from the true mean by more than 0.5 minutes. [8+8]
4. (a) If the mean of a Poisson variate is 4, Find the probabilities when $x = 0, 1, 2, 3, 4$ and 5 using recurrence formula
(b) In a distribution exactly normal 30% of the items are under 26 and 90% are under 42. find the mean and the Standard deviation of number of items. [8+8]
5. (a) Two boxes contain ten chips numbered 1 to 10. One chip is drawn from each box. Find the probability that their sum is greater than 4.
(b) If 4 cards are drawn from a pack of 52 cards, find the probability of having
 - i. Two spades and two diamonds
 - ii. One red and three black
(c) If A and B are two mutually exclusive events and $A \cup B \neq \phi$, then prove that $P(A / (A \cup B)) = \frac{P(A)}{P(A) + P(B)}$ [5+6+5]

6. (a) Define the terms
- Mean service rate
 - The traffic intensity
 - Idle time
 - Queue length
- (b) A branch of Punjab national bank has only one typist. Since the typing work varies in length the typing rate is randomly distributed approximating a Poisson distribution with mean service rate of 8 letters per hour. The letters arrive at a rate of 5 per hour during the entire 8 hours working day. If the type writer is valued at Rs.1.50 per hour, determine
- Equipment utilisation
 - The percentage time that an arriving letter has to wait. [8+8]
7. (a) Two dice are thrown. Let a random variable X assign each point (a, b) to the sum of its numbers. Find
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- At least one
 - At the most 2 times. [8+8]
8. 200 digits were chosen at random from a set of tables. The frequencies of the digits are

digits	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use χ^2 test to assess the correctness of hypothesis that the digits were distributed in equal numbers in the table. [16]

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