Code No: 07A4BS01 **R07** **Set No. 2**

II B.Tech II Semester Examinations,November 2010
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

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1. (a) One make of a motor car developed engine trouble in 5 races out of 100 races and another make of motor car developed engine trouble in7 races out of 200 races. Test the significance between the difference of two proportions at 5% level
   (b) In a year among 1000 births 600 male children were borne and another town among 900 births 400 male children were borne.Is there any significant difference between the two proportions? Test at .05 level. [8+8]

2. (a) Find 95% confidence interval for the mean of a normally distributed population from which the following sample was taken 15,17,10,18,16,9,7,11,13 and 14
   (b) A random sample of size 225 is taken whose mean is 80. Can this be regarded as a sample from a population with mean weight 82 and standard deviation15. [8+8]

3. (a) A random sample of size 64 is taken from an infinite population having the mean 45and the standard deviation 8 What is the probability that $\bar{x}$ will be between 46 and 47.5.
   (b) A random sample of size 160 is taken from an infinite population with the standard deviation 15 Find
      i. The standard error
      ii. Probable error [8+8]

4. On an average 96 patients per 24 hour day require the service of an emergency clinic. Also on average, a patient requires 10 minutes of active attention. Assume that the facility can handle only one emergency at a time. Suppose it costs the clinic Rs. 100 per patient treated, to obtain an average servicing time of 10 minutes and that each minute of decrease in this average time would cost Rs. 10 per patient treated. How much would have to be budgeted by the clinic to decrease the average size of queue from 1 patient to 1 / 2 patient. [16]

5. (a) Find the Mode of Poisson Distribution.
   (b) In a distribution exactly normal 7% of the items are under 35 and 89% are under 63. find the mean and the Standard deviation of mark [8+8]

6. (a) A continuous Random variable has the p.d.f f(x)=K(1- x^2) , $1 \leq x \leq 4$;=0 else where Determine
      i. K

ii. the mean

iii. variance

(b) The probability that the life of a bulb is 100- days is .05.Find the probability that out of 6 bulbs

i. At least one

ii. None

iii. more than 4 will have a life of 100 days. [8+8]

7. (a) What is the probability of getting two queens , if we draw two cards from a pack of 52 cards.

i. With replacement

ii. Without replacement

(b) In a certain college 25% of the students failed in mathematics, 15% failed in chemistry. A student is selected at random.

i. If he failed in Mathematics, what is the probability that he failed in Chemistry

ii. If he failed in Chemistry, what is the probability that he failed in Mathematics. [8+8]

8. Determine whether there is really a relationship between the employees performance in the company in training program and his/ her ultimate success in the job taking a sample of 400 cases [16]

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Code No: 07A4BS01 **R07** **Set No. 4**

II B.Tech II Semester Examinations,November 2010
PROBABILITY AND STATISTICS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) There are 9 items of which 5 are defective
   i. Write the distribution of defective items
   ii. Find mean
   iii. The variance
   (b) If 15 dice are thrown. The probability of getting 2 or 5 on the face is a success. Find
   i. P(X >2)
   ii. P(1 < x < 5)
   iii. P(x= 5) [8+8]

2. (a) If 2% of light bulbs are defective .Find
   i. At least one is defective
   ii. Exactly 7 are defective
   iii. P(1 < x < 8) in a sample of 100
   (b) Twelve coins are tossed. Find the probability of getting 6 to 10 heads using normal distribution [8+8]

3. (a) Derive formulae for
   i. The mean waiting time in the system.
   ii. Expected waiting time of a customer in a non empty queue
   (b) The customers arrive at a fast food centre at an interval of 11 minutes and they are served at the rate of 1/9 per minute..Find
   i. Average length of the queue
   ii. Average waiting time in the queue [8+8]

4. Four methods are under development For making discs of a super conducting material. Fifty discs are made by each method and they are checked for super conductivity when cooled with liquid nitrozen.

	Method-I	Method-II	Method-III	Method-IV
Super Conductor	31	42	22	25
Failures	19	8	28	25

Perform a Chi-square test at .o5 level whether there is a significance difference between the proportions. [16]

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5. (a) A sample of 100 electric bulbs produced by a manufacturer A showed a mean life time of 1190hrs and a standard deviation of 90 hrs. Another sample of75 bulbs produced by a manufacturer B showed a mean life of 1230hrs with a S.D of 120hrs. Test the significance of the difference between the means at 99% level.

   (b) In a random sample of 400 industrial accidents , it was found that 231 were due to unsafe working conditions Find

      i. The maximum error

      ii. Construct 95% confidence interval for the proportion. [8+8]

6. (a) A, B and C in order toss a coin. The first one to toss a head wins the game. What are their probabilities of winning , assuming that the game will continue indefinitely.

   (b) There are three boxes. I contain 2 black one white and 3 red balls II contains- 5 Black and 2 white and 4 red balls III contains- 4 Black and 3 white and 3 red balls

   A box is chosen at random and a ball is selected. If it is red find the probability that it is from

      i. Box- I

      ii. Box-II

      iii. Red. [8+8]

7. (a) the maximum error, with 90% confidence is 2.8 and the sample size is 750 then find the standard deviation of the sample .

   (b) A random sample of size n is taken. The maximum error with .95 is 1.2the standard deviation is 10, then find the sample size.

   (c) A sample of 100 students is found to have a mean height of 160 cms. Can this be regarded as a sample from a population with mean weight 165 cms. and standard deviation25 cms. [5+5+6]

8. A population consists if five numbers 12,32,40.51,60.Consider all Samples of size two which can be taken without replacement from this population. Find

   (a) The population mean

   (b) The population Standard deviation

   (c) The mean of the sampling distribution of mean

   (d) Standard deviation of the sampling distribution of means [16]

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Code No: 07A4BS01 **R07** **Set No. 1**

II B.Tech II Semester Examinations,November 2010
PROBABILITY AND STATISTICS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) A random sample from a companys very extensive files shows that orders for a certain piece of machinery were filled, respectively in 10,12,19,14,15,18,11 and 13 days. Test the claim that on the average such orders are filled in 10.5 days. Test at .01 level.

   (b) Two independent samples of 8 and 7 items respectively had the following values of the variables. Do the estimates of population variances differ significantly?

Sample I	9	11	13	11	16	10	12	14
Sample II	11	13	11	14	10	8	10	-

   Test whether the sample having the values 63,63,64,55,66,69,70,70,73,83,69 and 81 has been chosen from a population with mean 67 at .01 level. [8+8]

2. (a) If the varience of a Poisson variate is 1.8, then find
   i. P(x > 1)
   ii. P(x =5)
   iii. P(0 < x < 5)

   (b) 2000 students appear for an examination. It was found that the marks are normally distributed with mean 50 and standard deviation 7. Find the number of students who get
   i. Marks between 45 and 70
   ii. Marks below30
   iii. More than 70 [8+8]

3. (a) A can hit a target once in 5 shots. B can hit 2 among 3. C can hit one among 4. What is the probability that two shots hit the target?

   (b) Box A contains 11 cards numbered 1 to 11. Box B contains 7 cards numbered 1 to 7. A box is chosen and one card is drawn from it. If the number is even, what is the probability that the card is from box A. [8+8]

4. (a) Write notes on basic queuing process.

   (b) Arrival rate of telephone calls at a telephone booth are with an average time of 9 minutes between two consecutive arrivals. The length of telephone call is assumed to be exponentially distributed with mean 3 minutes. Find
   i. Average length of the queue that forms from time to time
   ii. The manager of the shop will install a second booth when an arrival would have to wait for 4 minutes or more for the service By how much must the rate of arrival be increased in order to justify a second booth. [8+8]

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5. Apopulation consists of five numbers 5,8,15,24,32,.Consider all Samples of size two which can be taken without replacement from this population.Find
   (a) The population mean
   (b) The population Standard deviation
   (c) The mean of the sampling distribution of mean
   (d) Standard deviation of the sampling distribution of mean [16]

6. (a) A random sample of 1000 men from northern India gives their main wages to be Rs. 30 per day with a standard deviation of Rs.1.50.A sample of 1500 men from southern India gives a mean wage of Rs. 32 per day with a S.D of Rs.2. test the significance of the difference between the means.
   (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 significance between the difference of two proportions at 5% level. [8+8]

7. (a) Prove that for a random sample of size n, x_1, x_2,x_3.....x_n taken from a finite population $S^2 = \frac{1}{n}\sum_1^n (x_i - \bar{x})^2$ is not unbiased estimator of the parameter σ^2 ,but $\frac{1}{(n-1)}\sum_1^n (x_i - \bar{x})^2$ is unbiased.
   (b) Researchers collected serum amylase values from a random sample of 50 apparently healthy subjects. They want to know whether they can conclude that the mean of the population from which the sample of serum amylase determinations came is different from 120. The mean and standard deviation computed from the sample are 96 and 35 units/100 ml,. Use the 5% level of significance under the assumption that the population is normally distributed. [8+8]

8. (a) TA continuous Random variable has the p.d.f f(x)=e^{-x} If x≥0, =0 otherwise Determine
      i. P(0≤ x ≤ 2)
      ii. The mean
      iii. Variance
   (b) It has been claimed that in 60% of all solar heat installation the utility bill is reduced by at least one third. Find the probability that the utility bill will be reduced by at least one third.
      i. Only 7 times
      ii. In four of 5 times
      iii. At least 4 of 5 times [8+8]

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Code No: 07A4BS01 **R07** **Set No. 3**

II B.Tech II Semester Examinations,November 2010
PROBABILITY AND STATISTICS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Two random samples drawn from 2 normal populations are given below. Do the estimates of variances differ significantly?

Sample I	20	16	26	27	23	22	18	24	25	19	-	-
Sample II	17	23	32	25	22	24	28	16	31	33	20	27

   (b) The following values gives the lengths of 12 samples of Egyptian cotton taken from a consignment 48,46,49,46,52,45,47,47,46,46,45 and 50 Test whether the sample had been taken from a sample whose average length is 50 at .05 level. [8+8]

2. A population consists of 2, 5, 12, 34.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 means of sampling distribution.
   (d) The standard deviation of the means of sampling distributionof means. [16]

3. (a) Following discrete random variable has the following distribution.

x	8	12	16	20	24
P(x)	$\frac{1}{8}$	$\frac{1}{6}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{1}{12}$

   Find
      i. mean
      ii. variance
   (b) A coin is tossed 7 times. Getting a head is a success Find
      i. P($1 < x \leq 4$)
      ii. P($x > 3$)
      iii. P(x= 5) [8+8]

4. (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 defect. Is the difference between the proportions is significant at .05 level of significance
   (b) Samples of students were drawn from two universities and from their weights in kgm and deviations are calculated. Make a large sample test to test the significance of the difference between the means [8+8]

5. (a) The probabilities of a poisson, variate taking the values 3 and 4 are equal. Find
   i. μ
   ii. P(x≥2)
   iii. P(3<x<7)
   (b) Suppose the weights of 400 male students are normally distributed with mean =60 kgs with a standard deviation of 9. Find the number of students whose weights are
   i. Between 50 and 75
   ii. less than 80 [8+8]

6. (a) A random sample of size 64 was taken whose S.D is 9.What confidence can be assert that the sample mean does not differ from the true mean by more than .45.
   (b) A random sample of size 25 is taken. The maximum error with .99 is .1.Find the standard deviation.
   (c) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and variance 16 minutes. Test the claim at .05 levels [5+5+6]

7. A road transport company has one reservation clerk on duty at a time. She handles information of bus schedules and makes reservation. Customers arrive at a rate of 8 per hour and the clerk can service 12 customers on an average per hour. Find
   (a) Average number of customers waiting for the service.
   (b) Average time a customer has to wait before getting service.
   (c) The management is contemplating to install a computer system to handle the information and reservations. This is expected to reduce the service time from 5 to 3 minutes. The additional cost of having the new system works out to be 12 paise per minute spent waiting before being served. Assume 8 hour working day. Should the company install the computer system? [16]

8. (a) If A and B are two events and P(A) = 3/5 and P(B) = 1/ 2, then Prove that
   i. P(A ∪ B) ≥ 3 / 5
   ii. $1/10 \leq P(A \cap B) \leq 1/2$
   (b) A purse contains 7 silver and 8 copper coins and a second purse contains 12 silver and 8 copper coins. A coin is selected from one of the purses. Find the probability that it is
   i. From purse I
   ii. From purse-II. [8+8]

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