Code: IUT 9ABS304

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B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013
PROBABILITY STATISTICS
(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 A student appears for tests I, II and III. The student is successful if he passes either in tests I and II or tests I and III. The probabilities of the student passing in test I, II, III are p, q and ½ respectively. If the probability that the student is successful is ½ then find the relation between p and q.

2 The probability density P(x) of a continuous random variable is given by $P(x) = Y_0\, e^{-|x|}$, $-\infty < x < \infty$. Prove that $Y_0 = 1/2$. Find the mean and variance of the distribution.

3 If two cards are drawn from a pack of 52 cards which are diamonds. Using Poisson distribution find the probability of getting two diamonds at least three times in 51 consecutive trials of two cards drawing each time.

4 The following are the times between six calls for an ambulance in a city and the patient's arrival at the hospital: 27, 15, 20, 32, 18 and 26 minutes. Use these figures to judge the reasonableness of the ambulance services claim that it takes on the average 20 minutes between the call for an ambulance and patient's arrival at the hospital.

5 (a) What is the S.D. of the population, if the maximum error of estimate with probability 0.99 is 0.15 and the size of the sample is 100?
  (b) A random sample of size 81 was taken whose variance is 20.25 and mean is 32. Construct a 98% confidence interval for the true mean.
  (c) Maximum error is 0.7. The S.D. of the population is 5. What is the sample size for 0.05 level?

6 (a) A sample of heights of 6400 English men has a mean of 67.85 inches and a S.D. of 2.56 inches while a sample of heights of 1600 Australians has a mean of 68.55 inches and S.D. of 2.52 inches. Do the data indicate the Australians are on average taller than the English men? (Use $\alpha = 0.01$).
  (b) An insurance agent has claimed that the average age of policy holders who issue through him is less than the average for all agents which are 30.5 years. A random sample of 100 policy holders who had issued through him gave the following age distribution.

Age	16 - 20	21 - 25	26 - 30	31 - 35	36 - 40
No. of persons	12	22	20	30	16

Calculate the arithmetic mean and the S.D. of this distribution and use these values to test his claim at 5% level of significance.

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7 (a) Find the maximum difference that we can expect with probability 0.95 between the means of samples of sizes 10 and 12 from a normal population if their S.D is found to be 2 and 3 respectively.

(b) A mechanist is making engine parts with axle diameters of 0.007 inch. A random sample of 10 parts shows a mean diameter of 0.742 inch with a S.D. of 0.040 inch. Compute the statistic you would use to test whether the work is meeting the specification at 0.05 levels of significance.

8 Patients arrive at a clinic according to a Poisson distribution at a rate of 30 patients per hour. The waiting room does not accommodate more than 13 patients are not including the one that is been examined. Examination time per patient is exponential with mean rate of 20 per hour:

(i) Find the effective arrival rate at the clinic.

(ii) What is the probability that an arriving patient will not wait? What is the probability that he finds a vacant seat in the room?

(iii) What is the expected waiting time until the patient is discharged from the clinic

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