

Code No: R6-31004-MCA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

MCA-I Semester Regular Examinations, February 2010

PROBABILITY AND STATISTICS

Time: 3hours

Max.Marks:60

Answer any Five questions
All questions carry equal marks

- 1.a) State and prove Baye's theorem.
- b) A factory has three plants. Records show that the plant I produced 30% of the items of the output, the plant II produces 45% of the items of the output and the plant III produces 25% of the items of the output. Further, 2%, 5% and 3% of the items produced by the plants I, II and III are defective respectively. If a defective item is drawn at random, find the probability that the defective item was produced by plant II.
- 2.a) A sales executive recalls his past sales records per phone call as follows:

| | | | | | | |
|----------------|------|------|------|------|------|------|
| Sales in units | 0 | 1 | 2 | 3 | 4 | 5 |
| Probability | 0.15 | 0.20 | 0.10 | 0.05 | 0.30 | 0.20 |

Calculate his average and standard deviation of units sold per call.

- b) Show that the function $f(x)$ defined as

$$f(x) = e^{-x} \quad \text{for } x \geq 0$$

$$= \quad \text{for } x < 0$$

is a probability density function and hence find the mean and variance.

- 3.a) Fit a Poisson distribution to the following observations.

| | | | | | |
|---|-----|----|----|---|---|
| X | 0 | 1 | 2 | 3 | 4 |
| P | 122 | 60 | 15 | 2 | 1 |

- b) In a factory the workers strength is 5000 and wages are normally distributed. The mean wages of the workers is Rs 800 p.m. and the standard deviation Rs 200. Estimate
- i) The number of workers getting salary between Rs. 700 and Rs.900
- ii) Percentage of workers getting salary below Rs. 600
- 4.a) A machine produced 20 defective items in a batch of 400. After overhauling it produced 10 defective items in a batch of 300. Has the machine improved.
- b) Intelligence tests on two groups of boys and girls gave the following results.

| | | | |
|-------|------|-----|-----|
| | Mean | S.D | N |
| Girls | 75 | 15 | 150 |
| Boys | 70 | 20 | 250 |

Is there significant difference in the mean scores obtained by boys and girls?

Cont...2

5. A population consists of six number bus 2,4,6,8,12,16. Consider all possible samples of size two which can be drawn without replacement from this population. Find
- The mean of the population
 - The standard deviation of the population
 - The mean of the sampling distribution of means
 - The standard deviation of the sampling distribution of means
 - Verify c) and d) directly from a) and b) by use of suitable formula.
- 6.a) In measuring reaction time, a psychologist estimates that the standard deviation is 0.05 seconds. How large a sample of measurements must be taken in order to be 95% confident that the error of his estimate will not exceed 0.01 seconds.
- b) A sample of 150 brand A light bulbs showed a mean life time of 1400 hours and a standard deviation of 120 hours. A sample of 200 brand B light bulbs showed a mean life time of 1200 hours and a standard deviation of 80 hours. Find 99% confidence limits for the difference of the mean life times of the populations of brands A and B.
- 7.a) A survey of 320 families with 5 children revealed the distribution given below. Is the result consistent with the hypothesis that male and female births are equally probable

| No.of boys and girls | 5 boys 0girls | 4 boys 1 girl | 3 boys 2 girls | 2 boys 3 girls | 1 boy 4 girls |
|----------------------|---------------|---------------|----------------|----------------|---------------|
| No. of families | 18 | 56 | 110 | 88 | 40 |

- b) Two independent samples of 8 and 7 items respectively had the following weights in order

| Sample I | 9 | 11 | 13 | 11 | 15 | 9 | 12 | 14 |
|-----------|----|----|----|----|----|---|----|----|
| Sample II | 10 | 12 | 10 | 14 | 9 | 8 | 10 | |

Do the two estimates of population variance differ significantly.

8. For the following data

| X | 1.2 | 1.8 | 3.1 | 4.9 | 5.7 | 7.1 | 8.6 | 9.8 |
|---|-----|-----|-----|-----|-----|-----|-----|-----|
| Y | 4.5 | 5.9 | 7.0 | 7.8 | 7.2 | 6.8 | 4.5 | 2.7 |

- Find the correlation coefficient between X and Y.
- Fit a least square parabola having the form

$$y = a + bx + cx^2.$$