Mid-West University

Examinations Management Office

Semester End Examinations 2081

Bachelor level/ B.E. Computer/ 5th Semester — Full Marks: 50

Time: 3 hours — Pass Marks: 25

Subject: Probability and Statistics (SH510/SH452/SH204)

- *Attempt all the questions*
- *Figures in the margin indicate full marks.*
- *Assume suitable values, with a stipulation, if necessary.*
- *Candidates are required to answer the questions in their own words as far as possible.*

1. State and prove that Baye's theorem of probability. In a certain neighborhood, 90% of children fell ill due to the flu and 10% due to measles, with no other diseases reported. The probability of observing rashes for measles is 0.95 and for the flu is 0.08. If a child develops rashes, find the probability of the child having the flu. [2+4]
2. In a study between the amount of rain fall and the quantity of air pollution removed the following data were collected: [4]

Daily rainfall:(x) (in .01 cm)	4.3	4.5	5.9	5.6	6.1	5.2	3.8	2.1
Pollution removed (Y)(mg/m^3)	12.6	12.1	11.6	11.8	11.4	11.8	13.2	14.1

Find the regression line of Yon X.

3. Define probability mass function. Four coins are tossed simultaneously, find the probability of getting i) 2 head and 2 tail ii) at least 2 heads iii) at least one head. [2+3]
4. What do you mean by null and alternative hypothesis? An I.Q test was administrated to 5 persons before and after they were trained. The results are given below: [2+4]

Before training	110	120	123	132	125
After training	120	118	125	136	121

Is training effective at 5% level of significance?

5. Write short note on confidence interval. A gym trainer claimed that all the new boys in the gym are above average weight. A random sample of thirty boys weight have a mean score of 112.5 kg and the population mean weight is 100 kg.and the standard deviation is 15. Is there a sufficient evidence to support the claim of gym trainer? [2+4]
6. If the joint probability function of X and Y is
   F(x,y)= A(x+y); 0<x<2, 0<y<1
   i) Determine A
   ii) Find marginal p. d. f of X and Y
   iii) Find conditional distribution of x given that Y=y [2+2+2]
7. Define interval estimation. A random sample of 50 gave a mean of 7.5 kg and a standard deviation of 1.5 kg. Find 95% and 99% confidence limit for the population mean. [2+3]
8. Define cumulative distribution. The probability density functions of random variable. [2+4]

$$f(x)=\begin{cases} x, & 0<x<1 \\ 2-x, & 1<x<2 \\ 0, & otherwise \end{cases}$$

   i. Find P (x>1.5)
   ii. Find cumulative distribution function.
9. If a random variable has gamma distribution with $\alpha=2$ and $\beta=3$. Find the mean and variance of this distribution. [2]
10. In a normal distribution 7% of items under 35 and 89% under 63. What are the mean and standard deviation of the distribution? [4]

The End