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 (SH452/SH510/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. a) State and prove the Baye's theorem of probability. If a machine is correctly set up it will produce 90% acceptable items. If it is incorrectly set up it will produce 30 % acceptable items. Past experience shows that 80 % of set ups are correctly done. If after a certain set up, first item produced is acceptable, what is the probability that the machine is correctly set up? **[3+3]**

b) Write the merits and demerits of standard deviation. During the 10 weeks of a session, the population marks scored by two candidates A and B taking the computer program course are given bellow: **[2+4]**

A	58	59	60	54	65	66	52	75	49	52
B	87	89	78	71	73	84	65	66	56	46

i. Who is the better scorer?

ii. Who is more consistent?

2. a) Define the probability mass function (pmf). A random variable X has the following probability distribution: **[5]**

X	0	1	2	3	4	5	6	7	8
P(x)	a	3a	5a	7a	9a	11a	13a	15a	17a

i. Determine the value of a.

ii. Find $P(X < 5), P(X \geq 3), P(5 < X \leq 7)$.

b) Define Beta and Gamma distribution. The daily consumption of milk in Surkhet city in excess 200000 litters. in approximately distributed as gamma variate with parameters $\alpha = 2$ and $\beta = 10^5$. The city has a daily stock of milk 300000 litters. What is the probability that the stock is insufficient on a particular day? **[2+2]**

3. a) If the height of 300 students are normally distributed with mean 64.5 inches and standard deviation 3.3 inches. How many students have height? **[3]**

i. less than 5 feet ii. Between 5 feet and 5 feet 9 inches.

b) Define joint probability distribution. Two balls are selected at random from a box containing three red, two green and four white. If X and Y are the number of red balls and green balls respectively included among the two balls drawn from the box, Find **[4]**

i. Joint probability of X and Y.

ii. Marginal probability of X and Y.

iii. Conditional distribution of X given $Y = 1$.

4. Define point estimation. A sample of 900 members has a mean 3.5 cm. and sd. 2.61. If the population is normal and its mean is unknown, find the 95 % and 98 % fiducial limits of true mean. [4]

5. Differentiate between the correlation and regression analysis? From the information given bellow, calculate $R_{2.13}$ *and* $r_{12.3}$ [5]

$\sum x_1^2 = 90$	$\sum x_2^2 = 60$	$\sum x_3^2 = 50$
$\sum x_1 x_2 = 40$	$\sum x_1 x_3 = 55$	$\sum x_2 x_3 = 35$

It is given that $n = 6$, where x_1, x_2 *and* x_3 are variables measured from their means.

6. A dice is thrown 600 times and it turns up 5 or 6, 2100 times. Can we consider the die is fair? [3]

7. A random sample of size 20 from a normal population gives a sample mean of 42 and sample standard deviation of 6. Test the hypothesis that the population mean is 44. [4]

8. What do you mean by null and alternative hypothesis? The sales figure of an item in eight shops before and after advertisement is given as: [2+4]

Before	70	65	48	72	80	92	98	100
After	72	70	53	75	84	95	105	104

Test whether advertisement was effective.

The End