Shahjalal University of Science and Technology

Institute of Information and Communication Technology

Software Engineering

1st Year 2nd Semester Final Examination- 2019

Course No. – STA-101w (Basic Statistics and Probability)

Duration: 3 Hours **Credits:** 03 **Full Marks:** 100

PART-A

[Answer Any Two Questions]

1.

a. Define arithmetic mean, median and mode. In your consideration, which measure do you think is the best and why? 7

b. What re the absolute measures of dispersion? Describe them briefly. 6

c. The following data represents the number of road accidents in different days in a country: 12

5	15	12	18	25	10	10	15	17	20	22	25	20	21	30
21	19	20	15	16	14	11	18	21	23	24	26	32	33	35
10	8	38	30	40	19	26	28	16	17	15	12	18	24	16

i. Construct a histogram and comment on the graph.

ii. Find the quartiles and hence a measure of dispersion.

2.

a. Define co-efficient of variation. Is it superior to standard deviation? Give reasons. 7

b. Find the variance of n natural numbers. 5

c. What do you mean by moments, skewness and kurtosis? When a distribution is said to be 'symmetric' and 'mesokurtic'? 8

d. Establish the relationship- 5

$\mu_2 = \mu'_2 - \mu'^2_1$ and $\mu_3 = \mu'_3 - 3\,\mu'_1\,\mu'_2 + 2\,\mu'^3_1$

3.

a. Distinguish between correlation and regression analysis. 5

b. Set up a simple linear regression model stating the underlying assumptions. 5

c. How do you measure the direction and degree of correlation? Show that correlation coefficient lies between -1 and +1. 5

d. The data on height (in cm) (X) and weight (in kg) (Y) of 10 boys are given below: 10

X:	140	138	130	128	125	124	127	128	136	147
Y:	35	32	28	27	23	22	20	26	32	40

i. Obtain the correlation coefficient between height and weight.

ii. Fit a regression line of weight on height. Comment on the result.

iii. Estimate the weight when height would be 170 cm.

PART-B

[Answer Any Two Questions]

4.

a. Define the terms: 6
   i. Sample space
   ii. Probability of an event
   iii. Discrete random variable and continuous random variable
   iv. Mathematical expectation and variance of random variable.

b. State and prove the additional law of probability for two mutually exclusive events. 7

c. A fair coin is tossed three times. Write down the sample space and find the probability that- 6
   i. Exactly two heads occur
   ii. Exactly one tail occurs
   iii. All three show the same

d. Suppose X is a discrete random variable with probability function: 6

X:	0	1	2
P(X):	K	2k	k

Find-
   i. The value of k
   ii. P(X=1) and P(X>0)

5.

a. Define binomial variate. State the conditions which must be fulfilled for using the binomial distribution. 8

b. Show mean of binomial distribution is greater than variance. 8

c. From past experience, it is known that the germination rate of certain type of seed is 0.56. Find the probability that at most 3 seeds will be germinated among five. 5

d. What is standard normal variate? State the important features of normal distribution. 4

6.

a. What is a stochastic process? Discuss its classification. Explain the concept of Markov chain. 9

b. What is queuing system? Explain the basic characteristics of a queuing system. 7

c. Suppose, in a railway station, there is only one reservation counter. Customers arrive at the rate of 32 persons per hour and the clerk can handle 40 persons per hour. If the arrival and services follow Poisson Process, find- 9
   i. the average number of customers in the system.
   ii. How long in an arriving customer expected to wait before starting service?
   iii. The probability of at least one customer in the system.