International Islamic University Chittagong

Dept. of Computer Science & Engineering

Final examination, Spring-2019

Course code: **STAT-2311** Course Title: **Statistics and Probability**

Total Marks: 50 **Time: 2.30 hours**

*[Answer any **Two** questions from **Group-A** and any **three** questions from **Group-B**; Separate answer script must be used for Group-A and Group-B]*

Group-A

1.(a) What is model in regression? How do you explain the regression model of **2**

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_1 + \beta_3 x_1 + \cdots \ldots \ldots \ldots + \varepsilon$$

1.(b) A researcher carefully computes the correlation coefficient between two variables and gets r = 1.06. What does this value mean? Interpret the following correlation coefficients: (i) r = 0.9; (ii) r = -0.4; (iii) r = 1; (iv) $r^2 = 0.90$ **4**

1.(c) An article in the IEEE Transactions on Instrumentation and Measurement described the use of a simple linear regression model to express drain current y (in milliamperes) as a function of ground-to-source voltage x (in volts). The data are as follows: **4**

y	0.73	0.88	1.04	1.19	1.35	1.50	1.66	1.81
x	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8

(i) Fit a simple linear regression model to these data.

(ii) Estimate the value of y when voltage of x = 2.4

2.(a) What is scatter diagram? Create scatter diagrams to show possible forms for the following values of the product moment correlation coefficient, r. **5**

(i) r = 0.8, (ii) r = -1, (iii) r = -0.75, (iv) r = 0

2.(b) Eight students in an intelligent test were ranked by two examiners E_1 and E_2 in the following order: **5**

E_1	5	1	2	4	7	8	3	6
E_2	6	2	1	3	4	7	5	8

Calculate rank correlation coefficient and comment.

3.(a) Distinguish between (i) Sample Space and Event; (iii) Conditional probability and Independent **5**

3.(b) The distribution of number of stores according to size in 3 areas is given in following table: **5**

Area	Store size		
	Large(L)	Medium(M)	Small(S)
A	30	45	75
B	150	125	275
C	20	130	150

Find the probabilities (i) P(M); (ii) P[CM] (iii) P(B U L) and (iv) P(A | M) (v) Are the events A and L independent?

Group-B

4.(a) Explain the terms: (i) Random variable (ii) Mathematical expectation and (iii) Probability **5**

density function.

4.(b) Suppose that in a certain region of a country the daily rainfall (in inches) is a continuous random variable X with probability density function f(x) given by **5**

$$f(x) = \frac{3}{12}\left(6x - 3x^2\right) \quad ,0 < x < 2$$

Find the probability that at a given day in this region the rainfall is (i) not more than 1.5 inches. (ii) between 0.5 and 1.5 inches. Also calculate mean and variance of the daily rainfall (in inches).

5.(a) Define Standard normal variate. Write down the important properties of normal distribution. **4**

5.(b) The phone lines to an airline reservation system are occupied 40% of the time. Assume that the events that the lines are occupied on successive calls are independent. Assume that 10 calls are placed to the airline. (i) What is the probability that for exactly three calls the lines are occupied? (ii) What is the probability that for at least one call the lines are not occupied? (iii) What is the expected number of calls in which the lines are all occupied? **6**

6.(a) Discuss the different steps of formulation of a test of hypothesis. Write some applications of χ^2-test? **4**

6.(b) The following contingency table shows the classification of 200 peoples according to the gender and preference of city:

City	Gender	
	Male	Female
Dhaka	60	40
Chittagong	25	35
Barisal	25	15

Test whether there is any relationship between gender and preference of city at α=0.05

7.(a) What is mean mutually exclusive event? Consider two events A and B such that P (A) $= \frac{1}{8}$, P ($A \mid B$) $= \frac{1}{4}$ and P (B) $= \frac{1}{6}$. Examine the following statements and comment on the validity of each of these: **5**

(i) A and B are independent (ii) A and B are mutually exclusive
(iii) Find the value of P (A U B)

7.(b) A discrete random variable X has the following probability function:

X	0	1	2	3
f (X)	0.20	?	0.35	0.20

For what value of f (1) the function will be a probability function? Also find
(i) P[X ≤ 2] , (ii) P[X >1] ; (iii) E[3X] and (iv) S.D [X]

THE END