Bangabandhu Sheikh Mujibur Rahman Science and Technology University

Department of Computer Science and Engineering

2nd Year 1st Semester Final B.Sc. Engineering Examination-2021

Course Code: STA205 **Course Title: Applied Statistics and Queuing Theory**

Total Marks: 60 **Time: 3 (Three) Hours**

N.B.:

i. Answer **SIX** questions taking any **THREE** from each section.

ii. All parts of a question must be answered sequentially.

Section-A

1. a) What is Statistics? Write down its uses in computer science and limitations. **4**

b) Define Variable. What are the different types of variables known to you? Give examples of each type. **4**

c) What are the different sources of primary data and secondary data? **2**

2. a) What are the different Measures of Central Tendency? Write down the uses of Arithmetic, Geometric and Harmonic mean. **3**

b) What are the advantages and disadvantages of median and mode? **3**

c) Consider the following data: **4**

Class Int.	100-125	125-150	150-175	175-200	200-225	225-250	250-275
Freq.	3	2	4	5	3	2	2

i. Calculate AM, GM, HM and show that AM>GM>HM.

ii. Find Median and Mode of the data set.

3. a) What do you understand by measure of dispersion with example? What are the various methods of measuring dispersion? Write down the important properties of variance. **5**

b) The following data give the numbers of pieces of junk mail received by 20 families during the past month. **5**

20 22 40 35 23 32 38 25 29 23 41 33 28 21 29 19 14 31 39 36

Find the range, variance, standard deviation and co-efficient of variation.

4. a) What is Probability? Explain the classical and empirical approaches of defining probability. **2**

b) Explain the terms with example – a) Sample space, b) Mutually exclusive events, c) Equally Likely events, d) Conditional Probability **4**

c) Write down the additive and multiplicative law of probability. In a class of 120 students, 60 are studying English, 50 are studying French and 20 are studying both subjects. If a student is randomly selected from the class, what is the probability that he is studying English if it is given that he is studying French? **4**

Section-B

5. a) What do you mean by Probability distribution? Define Binomial distribution. In a course, the probability of getting A grade is 0.20. Five students sit for the exam. Now find the probability that (i) Two of them will get A grade, (ii) None will get A grade and (iii) At least two of them will get A grade. **5**

b) Define Poisson distribution. Give some examples where Poisson distribution can be applied. If 2% fuses produced by a company are usually found defective then what is the probability that in a box of 200 fuses there will be (i) No defective fuse, (ii) 1 defective fuse and (iii) 2 defective fuses? **5**

6. a) What is correlation analysis? Define regression analysis with examples. Distinguish between correlation analysis and regression analysis. **4**

b) The following table gives information on the number of megapixels and the prices of nine randomly selected point-and-shoot digital cameras that were available on BestBuy.com on July 22, 2009. **6**

Megapixels	10.3	10.2	7.0	9.1	10.0	12.1	8.0	5.0	14.7
Price($)	130	150	62	160	200	280	125	60	400

i. Find the correlation coefficient and interpret the result.
ii. Find the regression equation $\hat{y} = a + bx$ where x is the number of megapixels and y is the price.

7. a) Define the Skewness and Kurtosis of a graph. Explain the terms – Positively skewed and Negatively skewed curve. **4**

b) What are the different types of Kurtosis and how to detect them? Provide related graphs. **3**

c) The first four central moments of a distribution are 0, 4, 0 and 37.6. Find the co-efficient of skewness and kurtosis and comment on the shape characteristics of the distribution. **3**

8. a) Define stochastic process. Specify different types of stochastic process with some real life examples. Identify the type of stochastic process for the following systems with justification. **5**
i. Number of students waiting for the bus per hour of a day.
ii. Waiting time of customers.
iii. Number of calls at a phone set at any time during the day.

b) What do you mean by queuing process? Write down the different elements of queuing model. Explain the different characteristics of M/M/1 queuing model with infinite capacity. **5**