International Islamic University Chittagong (IIUC)

Department of Electronic and Telecommunication Engineering

Final Examination

Program: **B.Sc. (Engg.)**
Course Code: **STAT 2441**
Total Marks: **50**

Semester: **Autumn 2023**
Course Title: **Probability and Statistics**
Time: **2 Hours 30 Minutes**

(i) Answer the following questions. The figures in the right-hand margin indicate full marks.
(ii) Course Outcomes (COs) and Bloom's Levels are mentioned in additional Columns.

Course Outcomes (COs) of the Questions	
CLO1	Demonstrate understanding of descriptive statistics by practical application of quantitative reasoning and to the solution of engineering problems with data visualization.
CLO2	To be able to compute and interpret the results of correlation and regression.

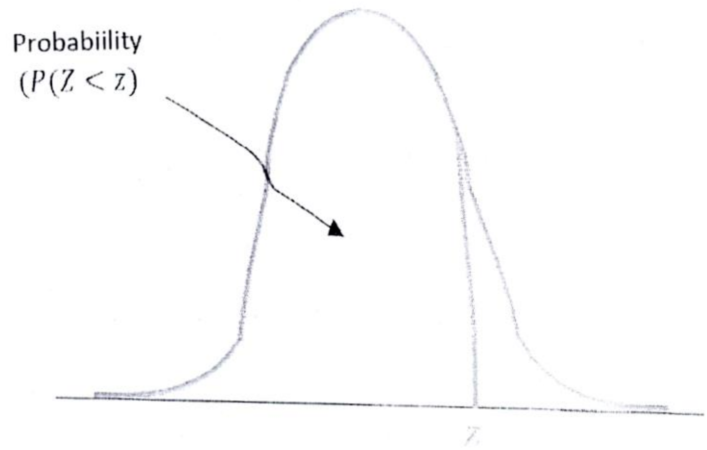
Bloom's Levels of the Questions

Letter Symbols	R	U	Ap	An	E	C
Meaning	Remember	Understand	Apply	Analyze	Evaluate	Create

PART A

Q1.	a)	Define the following terms: **i)** Probability Experiment **ii)** Sample space **iii)** Event **iv)** Complement of an event **v)** Elementary event **vi)** Mutually exclusive events **vii)** Independent events	CLO1/ CLO2	Ap /E	7
	b)	A student goes to the nearest snack to have a breakfast. He can take tea, coffee, or milk with bread, cake and sandwich. How many possibilities does he have?	CLO2	E	3
Q2.	a)	Solve the following cases: **i)** Suppose we have four letters A,B, C, D. How many permutations are there taking all the four? **ii)** Suppose we have four letters A,B, C, D. How many permutations are there taking two letters at a time? **iii)** How many different permutations can be made from the letters in the word "CORRECTION"?	CLO1/ CLO2	An /E	5
	b)	Among 15 clocks there are two defectives .In how many ways can an inspector chose three of the clocks for inspection so that: **i)** There is no restriction. **ii)** None of the defective clock is included. **iii)** Only one of the defective clocks is included. **iv)** Two of the defective clock is included.	CLO2	E	5
		OR			
Q2.	a)	A box of 80 candles consists of 30 defective and 50 non defective candles. If 10 of this candles are selected at random, what is the	CLO1/ CLO2	Un /E	5

		probability **i)** All will be defective. **ii)** 6 will be non-defective **iii)** All will be non-defective			
	b)	For a student enrolling at freshman at certain university the probability is 0.25 that he/she will get scholarship and 0.75 that he/she will graduate. If the probability is 0.2 that he/she will get scholarship and will graduate. What is the probability that a student who get a scholarship graduate?	CLO2	E	2.5
	c)	If the probability that a research project will be well planned is 0.60 and the probability that it will be well planned and well executed is 0.54, what is the probability that it will be well executed given that it is well planned?	CLO2	E	2.5
		PART B			
Q3.	**a)**	Explain random variable with an example. What are the types of random variables? Write examples for each of them.	CLO1/ CLO2	Un /E	5
	b)	Suppose a charity organization is mailing printed return-address stickers to over one million homes in the Ethiopia. Each recipient is asked to donate \$1, \$2, \$5, \$10, \$15, or \$20. Based on past experience, the amount a person donates is believed to follow the following probability distribution: $X=x$: \$1, \$2, \$5, \$10, \$15, \$20 $P(X=x)$: 0.1, 0.2, 0.3, 0.2, 0.15, 0.05 What is expected that an average donor to contribute? Find the mean and the variance of the random variable X in this example.	CLO2	E	5
Q4.	**a)**	What is binomial distribution? How it is expressed mathematically? Write down the assumptions of a binomial distribution. Write down some examples of binomial distribution.	CLO1 /CLO 2	Un /E	5
	b)	Suppose that an examination consists of six true and false questions, and assume that a student has no knowledge of the subject matter. The probability that the student will guess the correct answer to the first question is 30%. Likewise, the probability of guessing each of the remaining questions correctly is also 30%. **i)** What is the probability of getting more than three correct answers? **ii)** What is the probability of getting at least two correct answers? **iii)** What is the probability of getting at most three correct answers? **iv)** What is the probability of getting less than five correct answers?	CLO2	E	5
Q5.	**a)**	Write down the properties of normal distribution.	CLO1 /CLO 2	Un /E	5
	b)	Find the area under the standard normal distribution which lies **i)** To the left of Z=-0.35 **ii)** Between Z=-0.67 and Z=0.75 **iii)** Between Z=0.25 and Z=1.25	CLO1 /CLO 2	Un /E	5
		OR			
Q5.	**a)**	Write about the following with examples: **i)** Types of Correlation Type I **iii)** Types of Correlation Type III	CLO1 /CLO 2	Un /E	5
	b)	Write about the following: **i)** Karl Pearson's Coefficient of Correlation **ii)** Spearman's Rank Coefficient of Correlation	CLO1 /CLO 2	Un /E	5



	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
	0.5000	0.5040	0.5080	0.5120	0.5160	0.5199	0.5239	0.5279	0.5319	0.5359
	0.5398	0.5438	0.5478	0.5517	0.5557	0.5596	0.5636	0.5675	0.5714	0.5754
	0.5793	0.5832	0.5871	0.5910	0.5948	0.5987	0.6026	0.6064	0.6103	0.6141
	0.6179	0.6217	0.6255	0.6293	0.6331	0.6368	0.6406	0.6443	0.6480	0.6517
	0.6554	0.6591	0.6628	0.6664	0.6700	0.6736	0.6772	0.6808	0.6844	0.6879
	0.6915	0.6950	0.6985	0.7019	0.7054	0.7088	0.7123	0.7157	0.7190	0.7224
	0.7258	0.7291	0.7324	0.7357	0.7389	0.7422	0.7454	0.7486	0.7518	0.7549
	0.7580	0.7612	0.7642	0.7673	0.7704	0.7734	0.7764	0.7794	0.7823	0.7852
	0.7881	0.7910	0.7939	0.7967	0.7996	0.8023	0.8051	0.8079	0.8106	0.8133
	0.8159	0.8186	0.8212	0.8238	0.8264	0.8289	0.8315	0.8340	0.8365	0.8389
	0.8413	0.8438	0.8461	0.8485	0.8508	0.8531	0.8554	0.8577	0.8599	0.8621
	0.8643	0.8665	0.8686	0.8708	0.8729	0.8749	0.8770	0.8790	0.8810	0.8830
	0.8849	0.8869	0.8888	0.8907	0.8925	0.8944	0.8962	0.8980	0.8997	0.9015
	0.9032	0.9049	0.9066	0.9082	0.9099	0.9115	0.9131	0.9147	0.9162	0.9177
	0.9192	0.9207	0.9222	0.9236	0.9251	0.9265	0.9279	0.9292	0.9306	0.9319
	0.9332	0.9345	0.9357	0.9370	0.9382	0.9394	0.9406	0.9418	0.9430	0.9441
	0.9452	0.9463	0.9474	0.9485	0.9495	0.9505	0.9515	0.9525	0.9535	0.9545
	0.9554	0.9564	0.9573	0.9582	0.9591	0.9599	0.9608	0.9616	0.9625	0.9633
	0.9641	0.9649	0.9656	0.9664	0.9671	0.9678	0.9686	0.9693	0.9700	0.9706
	0.9713	0.9719	0.9726	0.9732	0.9738	0.9744	0.9750	0.9756	0.9762	0.9767
	0.9773	0.9778	0.9783	0.9788	0.9793	0.9798	0.9803	0.9808	0.9812	0.9817
	0.9821	0.9826	0.9830	0.9834	0.9838	0.9842	0.9846	0.9850	0.9854	0.9857
	0.9861	0.9865	0.9868	0.9871	0.9875	0.9878	0.9881	0.9884	0.9887	0.9890
	0.9893	0.9896	0.9898	0.9901	0.9904	0.9906	0.9909	0.9911	0.9913	0.9916
	0.9918	0.9920	0.9922	0.9925	0.9927	0.9929	0.9931	0.9932	0.9934	0.9936
	0.9938	0.9940	0.9941	0.9943	0.9945	0.9946	0.9948	0.9949	0.9951	0.9952
	0.9953	0.9955	0.9956	0.9957	0.9959	0.9960	0.9961	0.9962	0.9963	0.9964
	0.9965	0.9966	0.9967	0.9968	0.9969	0.9970	0.9971	0.9972	0.9973	0.9974
	0.9974	0.9975	0.9976	0.9977	0.9977	0.9978	0.9979	0.9980	0.9980	0.9981
	0.9981	0.9982	0.9983	0.9983	0.9984	0.9984	0.9985	0.9985	0.9986	0.9986
	0.9987	0.9987	0.9987	0.9988	0.9988	0.9989	0.9989	0.9989	0.9990	0.9990
	0.9990	0.9991	0.9991	0.9991	0.9992	0.9992	0.9992	0.9992	0.9993	0.9993
	0.9993	0.9993	0.9994	0.9994	0.9994	0.9994	0.9994	0.9995	0.9995	0.9995
	0.9995	0.9995	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9996	0.9997
	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9997	0.9998	0.9998