COMSATS University Islamabad

QUIZ 3

Course Title:	Introduction to Probability Theory				Course Code:	MTH262	Credit Hours:	3(3,0)
Course Instructor/s:	Dr. Tajammal Hussain				Programme Name:	BST		
Semester:	3rd	Batch:	BCS	Section:	A	Date:	27 May, 2023	
Time Allowed:	02 Hour				Maximum Marks:	40		
Student's Name:					Reg. No.	CIIT/		

Important Instructions / Guidelines:

- Attempt all questions.

Question 1: (10)

A biased coin with a probability of head of 0.65 is thrown 15 times at random. Define an appropriate probability distribution for the number of heads and find the following probabilities:

i. There are at most 4 heads on 15 throws.

ii. There are at least 5 heads of 15 throws.

Question 2: (10)

A highly sophisticated automation system works with 2 errors per shift on average. Develop an appropriate probability distribution for the occurrence of malfunctioning and find the probability that:

i. At least 3 errors will occur during any given shift.

ii. Exactly 3 errors will occur during any 2-shifts.

Question 3: (10)

To avoid detection at customs, a traveller has placed 6 narcotic tablets in a bottle containing 12 other vitamin pills that are similar in appearance. If the customs official selected 3 of the tablets at random for analysis, what is the probability that the traveller will be arrested for illegal possession of narcotics? Also, justify the use of hyper-geometric in this case.

Question 4: (10)

Oil drilling company ventures into various locations, and their success or failure is independent of one location to another. Suppose the probability of successful oil exploration at a specific location is 0.25.

i. What is the probability that the 3rd successful drilling is actually made at the 12^{th} attempted drilling?

ii. What is the probability that for 2 successful drillings at most 6 attempts are required?

iii. What is the probability that for 4 successful drillings, at least 6 attempts are required?

iv. What is the probability that 1st successful drillings will occur on 7^{th} attempt?

v. On average how many attempts are required to have 4 successful attempts? Also, report variance and standard deviation.

Question 5: (10)

From the past data, it is observed that for admission to a renowned University, 50% of applicants choose IT programs as their first preference, 30% Engineering, and 20% other programs. Find the probability that if 50 students are asked about their first preference this year, 30 will prefer IT, 15 Engineering, and the remaining will prefer other programs.