UNIVERSITY OF CENTRAL PUNJAB

ASSIGNMENT # 02 Probability and Statistics

(CLO 02 Based Assignment)

Course Title	Probability and Statistics	Course Code	MAT253
Course Instructor	M. Bilal	Section	
Time Allowed	One Week	Total Marks	**20**
Student Name		Registration No.	

I declare that I have prepared the assignment according to the following guidelines, and I shall be responsible for any deduction of marks if the instructions are not abide by:

Submission Instructions:

1. The assignment is handwritten. It is NOT TYPED IN WORD or any text editor. If it is not HANDWRITTEN, ZERO marks will be awarded.

2. The Assignment is written on plain A4 size pages or assignment sheets enclosed by assignment cover.

3. Form a group of three, divide the work equally, and submit a single assignment with all three handwriting styles visible.

4. All questions and pages or in order. (20 % marks will be deducted if pages or not in order)

5. Follow the deadline. Finish your work one day before, so you could submit in time.

LATE SUBMISSION WILL NOT BE ACCEPTED.

I have read and follow the instructions above. In case, some instructions are not followed, I shall be responsible for deduction of marks as mentioned above.

Name: _____

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Question No: 01 **[05]**

A company's database system can be attacked through **phishing** or **malware**.

- 40% of attacks are phishing attempts.
- 70% of phishing attempts are detected by the system. 90% of malware attacks are detected.

If an attack was detected, what is the probability that it was a phishing attempt?

Question No: 02 **[05]**

A cybersecurity analyst classifies alerts as either **True Threat (T)** or **False Alarm (F)**.

- 30% of alerts are true threats.
- The system correctly identifies 90% of true threats (True Positive).
- The system incorrectly marks 20% of false alarms as threats (False Positive).
  a) Draw a **tree diagram** showing all possible outcomes.

  b) Using the tree, find the probability that a randomly selected alert is **correctly identified**.

Question No: 03 **[05]**

The random variable **X** represents the number of times a hacker successfully breaches a system in 4 attempts. The probability distribution is:

X	0	1	2	3	4
P(X)	0.1	0.2	0.4	0.2	0.1

Find:

a) Mean (μ) of X

b) Variance (σ^2) of X

Question No: 04 **[05]**

A cyber security tool detects malicious login attempts with a probability of **0.8**. If 6 login attempts are made, find the probability that:

1. Exactly 4 are detected
2. Fewer than 5 are detected
3. At least 6 are detected