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Daffodil International University

# Daffodil International University

**Department of Software Engineering**
**Faculty of Science & Information Technology**
**Midterm Examination, Summer 2025**
**Course Code: SE123; Course Title: Discrete Mathematics**
**Sections: A to P; Teachers: NF, DSM, KR, NIR, MMN**

**Time: 1 Hour 30 Mins** **Marks: 25**

## Answer ALL Questions

*[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]*

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| 1. | | Read the following scenario carefully and **interpret** the logical relationships embedded in the policy:<br><br>The company's management introduces a new policy for remote work. According to this policy, if an employee submits their daily reports on time, they are allowed to work from home. Additionally, if they attend the morning meeting, they receive a performance point. However, if they do neither, neither submit the report nor attend the meeting, their access to remote work is revoked. Furthermore, if an employee receives a performance point and is working from home, they become eligible for a bonus.<br><br>**a)** Interpret the scenario and identify four fundamental propositions. Clearly define each and assign appropriate propositional variables.<br>**b)** Using your interpretation of the story, write a compound logical statement that accurately represents the policy using the defined propositions.<br>**c)** Construct the full truth table for the compound logical statement, considering all four variables. | **[Marks:3+3+4]** | **CLO-1**<br>*Level-2* |
| 2. | | A classroom has 15 boys and 10 girls. Three students are randomly selected to participate in a probability experiment. After selection, each of the three selected students tosses a fair coin once. Now **apply** the concept of probability and show the full solution to the following problems:<br><br>a) What is the probability that exactly 2 boys and 1 girl are selected?<br>b) Given that exactly 2 boys and 1 girl are selected, what is the probability that all three tosses result in heads?<br>c) What is the probability that the selected group contains at least one girl, and at least one tail is observed in the coin tosses? | **[Mark: 7.5 (2.5+2.5+2.5)]** | **CLO-2**<br>*Level-3* |

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| 3. | | A university has a batch of 25 students enrolled in three elective courses: Data Science, Cybersecurity, and Digital Marketing. Among these students, 15 are enrolled in Data Science, 12 are enrolled in Cybersecurity, and 10 are enrolled in Digital Marketing. Additionally, 5 students are enrolled in both Data Science and Cybersecurity, 4 students are enrolled in both Data Science and Digital Marketing, and 3 students are enrolled in both Cybersecurity and Digital Marketing. Notably, 2 students are enrolled in all three courses. Now **apply** the concepts of set theory and answer the following questions:<br><br>a) What is the number of students who are enrolled in exactly one course?<br>b) How many students are enrolled in at least two courses?<br>c) What is the number of students who are enrolled in none of the three courses? | **[Mark: 7.5 (2.5+2.5+2.5)]** | **CLO-2** *Level-3* |

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