The Open University of Sri Lanka
B.Sc Degree Programme
Pure Mathematics - Level 05
PEU5302 Combinatorics
CAT I - Open Book Test 2024/2025
Duration: One hour

Date: 06.09.2024   **Time: 9:00 a.m. - 10:00 a.m.**

INSTRUCTIONS TO CANDIDATES

- There are **TWO** questions in this paper. Answer **ALL** of them.

1. (a) Using the principle of mathematical induction, show that any postage more than $Rs.18$ can be made from $Rs.4$ and $Rs.7$ stamps alone.

    (20 marks)

   (b) Suppose that there are 14 faculty members in the mathematics department and 12 in the computer science department. How many ways are there to select a committee to develop a discrete mathematics course in the faculty if the committee is to consist of four faculty members from the mathematics department and three from the computer science department?

    (15 marks)

   (c) Find the number of integer solutions to the equation $x_1 + x_2 + x_3 = 12$, where $x_1 \geq 0$, $x_2 \geq 2$ and $x_3 \geq 1$.

    (15 marks)

2. (a) Consider a square with length of a side is $3cm$. Now put 10 dots inside the square. Show that, it is always possible to find two dots whose distance apart is at most $\sqrt{2}cm$.

    (20 marks)

   (b) Draw a flowchart to find the sum of all the even numbers from 1 to 10.

    (15 marks)

   (c) A committee of 7 is to be formed from 11 level three students, 8 level four students and 7 level five students. If the committee is randomly formed, then what is the probability that there is at least 3 level three students in the committee given that there is exactly 2 level five students?

    (15 marks)