University of Asia Pacific

Department of Computer Science & Engineering

Mid-Semester Examination Fall -2020

Program: B. Sc. Engineering (4ᵗʰ Year/ 1ˢᵗ Semester)

Course Title: Mathematics for Computer Science.   Course No. CSE 401   Credit: 3.00

Time: 1.00 Hour.   Full Mark: 60

There are **Four** Questions. **Answer three questions including Q-1 and Q-2.**

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1. a. Suppose, we are working with the Josephus problem in which every third person **[15]** is eliminated, instead of every second. Find out the solution for J (N) by using the general solution of Josephus problem.
   Where N = ((Last 3 digit of your student Id +2) mod 10 + 20

   b. Find out the GCD of the two numbers N_1, N_2 using the recursive equation. **[5]**
   Where N_1 = (Last 3 digit of your student Id +5) mod 30 + 30
        N_2 = (Last 3 digit of your student Id +10) mod 40 + 50

2. a. Consider the roulette wheel with N slots, numbered 1 to N. Find out the possible **[15]** number of winner when we play the game for N times.
   Where, N = ((Last 3 digit of your student Id) mod 100 + 1050

   b. Draw 4 lines in a plane to find out the maximum number of non-overlapping **[5]** region.

3. a. Let, we have a recursive equation **[15]**

$$T_0 = d_n$$
$$a_n T_n = b_n T_{n-1} + c_n$$

Where, a_n = (Last 3 digit of your student Id) mod 5 + 1
      b_n = (Last 3 digit of your student Id +1) mod 6 + 1
      c_n = (Last 3 digit of your student Id +2) mod 7 + 1
      d_n = (Last 3 digit of your student Id) mod 2

Simplify the aforementioned recursive equation by multiplying with a suitable summation factor to find the sum-recurrence form and finally solve the recurrence.

   b. Write the Sigma-notation and delimited form of the following statement. **[5]**
   "The square sum of all the prime numbers between N1 and N2"
   Where N1 = (Student ID) mod 100 + 200 and N2 = N1 + 1000

OR

4. a. Let, we have a recursive equation: **[15]**

$$C_0 = N_1$$
$$(n+1)C_n = (n+2)C_{n-1} + N_2 *(n+3)$$

Where, N_1 = (Last 3 digit of your student Id) mod 4 + 1
and N_2 = (Last 3 digit of your student Id) mod 5 + 2
Simplify the aforementioned recursive equation by multiplying with a suitable summation factor to find the sum-recurrence form and finally solve the recurrence.

b. Write the Sigma-notation and delimited form of the following statement.   **[5]**
"The sum of reciprocals of numbers between N1 and N2"
Where N1 = (Student ID) mod 100 +150 and N2 = N1 + 1000