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B. Sc. (Engineering) in Computer Science and Engineering
Semester Final (Online) Examination 2019 (Jul-Dec)
Level **3**, Semester **II**, Course Code: **CSE 361**, Credit: **3.0**
Course Title: **Mathematical Analysis for Computer Science**

Time: **1** hour **30** Minutes Total Marks: **90**

[N.B. The figure in the right margin indicates the marks allocated for the respective question. The split answer of any question is not allowed.]

Section-A

*Answer any **03(three)** from the following questions (1-4)*

1. a) Define the terms: linear model, central tendency with example. 6
   b) Discuss the necessary measuring scales used for measuring the response and explanatory variables. 9

2. a) What is a queue? The standard notation system of queuing systems is T/X/C/K/P/Z. Describe the meaning of each symbol in detail. 8
   b) A bank teller can service customers at a rate of 3 customers per minute. What is the expected service time? 7

3. a) Find the greatest common divisor of 123 and 277 using the Euclidean algorithm. 5
   b) Let ***a, b, c,*** and ***d*** be integers where a ≠ 0. Then prove that
      i. if $a|b$ and $a|c$, then $a|(b+c)$. 4
      ii. if $a|b$ and $b|c$, then $a|d$, then $ab|cd$. 6

4. Consider the objective function represented for a real-world optimization problem, 15
   $C(m,n) = -5m + 3n$ with subject to the following inequality constraints:

$$m + 2n \leq 6$$
$$3m + 2n \leq 12$$
$$m \geq 0,\ n \geq 0$$

   Now, minimize the objective function using the simplex method of linear programming.

Section-B

*Answer any **03(three)** from the following questions (5-8)*

5. a) Define Poisson distribution. What are the **expected value**, **variance**, and **standard deviation** of a Poisson distribution? 7
   b) You work in Quality Assurance for an investment firm. A clerk enters **75** words per minute with **15** errors per hour. What is the probability of **0 errors** in a **361-word** bond transaction? 8

6. a) What is confusion and diffusion in cryptography? Explain with example. 7
   b) Briefly describe the structure of the DES round key generation process**.** 8

7. a) Discuss various types of waiting lines. 7
   b) For *M/M/1* queuing model, write the following formulae: 8
      i. Utilization factor
      ii. The average number of customers in the system
      iii. The average number of customers in the line
      iv. The average time a customer spends in the system

8. a) Determine whether 17 is congruent to 5 modulo 6 and whether 24 to 14 modulo 6. 6
   b) Use the Transposition cipher method with **key = *351264*** to encrypt the message "**I will meet with you virtually after the examination is over**." 9