SEMESTER III IN-SEMESTER EXAMINATION (CCE/CSE/ICT) – DECEMBER 2021
SUBJECT: ENGINEERING MATHEMATICS III (MAT 2155)

Duration: 90 Minutes **Max. Marks:** 20

Instructions.

1. Write your **Name**, **Roll No.**, and **Registration No.**, and put your **signature on the top of the answer sheet**.
2. Scan your answer sheet as a **PDF** file and name the file as **Roll No.** ⟨**space**⟩ **Name** ⟨**space**⟩ **Registration No.**

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1. Let a, b, c be elements in a lattice $(L, \leq)$. Show that $a \leq b$ if and only if $a \vee (b \wedge c) \leq b \wedge (a \vee c)$. (3M)

2. Show that the number of derangements of n distinct objects is approximately $\frac{n!}{e}$. (3M)

3. How many different strings can be formed using 2 A's, 3 B's, 2 C's, and 1 E, once each? In how many of these strings are all the vowels non-adjacent? (3M)

4. Show that the number of partitions of n in which odd parts are not repeated but even parts can occur any number times is equal to the number of partitions of n in which every part is either odd or a multiple of 4. (3M)

5. Compute the CNF and DNF of the Boolean expression $E(x_1, x_2, x_3) = \overline{a \wedge \left(\overline{b} \vee (\overline{c} \wedge a)\right)}$. (4M)

6. Find both the 78^{th} and 112^{th} permutations of 1, 2, 3, 4, 5 in each of (i) lexicographical order (ii) Fike's order. (4M)