National University

of Computer & Emerging Sciences Peshawar Campus

Name: _____ Roll No: _____

Program: BS (CS)
Semester: Spring – 2021
Time Allowed: 1: 20 (hour: min)
Course: Parallel & Distributed Computing

Examination: Mid-Online
Total Marks: 60 Weightage: 30
Date:
Instructor: Muhammad Amin

NOTE: Attempt all questions. ***All questions carry equal marks***

Q5. Suppose each computer in a distributed system keeps an approximate real-time clock Ri in addition to a Lamport-like clock Li. A computer's real-time clock Ri is an always-increasing integer (i.e., for any two reads r1, r2 of Ri such that r1 →i r2, we have r2 > r1), but the real-time clocks at different computers may drift relative to each other (i.e., Rj − Ri is non-constant for j /= i).

Consider the following modification, Shamport, to Lamport's partial-ordering algorithm:

Rule 1: Before each event at computer i, set Li = min(Li + 1, Ri).

Rule 2: When sending a message m, apply Rule 1 and include the time Li as part of the message (i.e. send (m, Li) instead of just m).

Rule 3: When receiving a message (m, t) at computer j, set Lj = max(Lj , t) and then apply Rule 1 before timestamping the message-arrival event.

Let the Shamport global time of an event **e** at computer **i** be S(e) = Li(e).

In the algorithm above, underline the difference between Shamport and Lamport's algorithm. (Underline as little as possible).