Midterm Exam (Sample)

Student Name: _____

Student NetID: _____

Question	Score
1	
2	
3	
4	
5	
Total	

Question 1.1: What are the differences between distributed embedded systems and networked embedded systems? (5 points)

Question 1.2: What are the differences between goodput and throughput? (5 points)

Question 1.3: What are the differences between OSI reference model, Internet protocol stack and embedded/real-time protocol stack? (5 points)

Question 2.1: What are the key ideas of 6LoWPAN? What are the key benefits of the 6LoWPAN technology? (10 points)

Question 2.2: Please convert the following IPv6 address to 128-bit binary format: 2001:0db8:85a3:: 8a2e:0370:7334 (5 points)

Question 2.3: If the first two bytes of a 6LoWPAN packet is 0x42 and 0xA2, please explain how the IPv6 header is compressed. (10 points)

Question 3.1: Please describe the principles of the THREE distributed and centralized access methods applied in 802.11 MAC layer. (Both mandatory and optional) (10 points)

Question 3.2: Please describe the key differences between unslotted and slotted CSMA/CA algorithms applied in 802.15.4 MAC. (10 points)

Question 4.1: Please describe the key idea of Distributed Queueing (DQ). (5 points)

Question 4.2: A key drawback of the existing DQ is that it only works with star topologies. Please discuss how DQ can be extended to support multi-hop network topologies (tree, mesh, etc.). (15 points)

Question 5.1: Please describe how the Orchestra system brings TSCH to dynamic networks and achieves high-level of reliability in non-deterministic scenarios. (10 points)

Question 5.2: If a periodic application increases its sampling rate (with a reduced period), can the Orchestra system react to such increased bandwidth request properly? If yes, please explain how it works; if no, please explain the reason. (10 points)