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# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal-500043, Hyderabad

B.Tech VII SEMESTER END EXAMINATIONS (REGULAR) - DECEMBER 2023

Regulation: UG-20

WIRELESS SENSOR NETWORKS

(ELECTRONICS AND COMMUNICATION ENGINEERING)

Time: 3 Hours

Max Marks: 70

Answer ALL questions in Module I and II

Answer ONE out of two questions in Modules III, IV and V

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

## MODULE – I

- (a) Identify the challenges in wireless sensor networks (WSN). Discuss the characteristics of WSN.  
[BL: Understand| CO: 1|Marks: 7]
- (b) Outline the process of structural health monitoring using WSN with neat sketch.  
[BL: Understand| CO: 1|Marks: 7]

## MODULE – II

- (a) Describe in detail the principle of contention based protocols with scheduling mechanism. List the advantages of reservation based MAC protocol over contention based MAC protocol.  
[BL: Understand| CO: 2|Marks: 7]
- (b) Evaluate the performance of MAC protocols for wireless sensor networks and estimate the duty cycle.  
[BL: Understand| CO: 2|Marks: 7]

## MODULE – III

- (a) Illustrate about QoS based routing protocol to find path that consume minimum resources.  
[BL: Understand| CO: 3|Marks: 7]
- (b) How does the SPBM protocol ensure efficient multicast for large numbers of receivers? Distinguish between proactive routing protocols and reactive routing protocol.  
[BL: Understand| CO: 3|Marks: 7]
- (a) Classify the dynamic power management in WSN network with example. Give three reasons why dynamic power management is a crucial concern in WSN.  
[BL: Understand| CO: 4|Marks: 7]
- (b) Enlist the six different operational modes of the ATmega128L microcontroller. Discuss hierarchical routing protocols and explain its types.  
[BL: Understand| CO: 4|Marks: 7]

## MODULE – IV

- (a) State the principle of time synchronization protocol and discuss about transceiver synchronization protocol with example  
[BL: Understand| CO: 5|Marks: 7]

(b) Discuss the differences and similarities in the design of the timing-sync protocol for sensor networks (TPSN) and the light weight tree-based synchronization (LTS) synchronization protocols.

[BL: Understand| CO: 5|Marks: 7]

6. (a) List various services offered by localization. Discuss in detail about the localization mechanisms and its services.

[BL: Understand| CO: 5|Marks: 7]

(b) Node A sends a synchronization request to node B at 3150 (on node A's clock). At 3250, node A receives the reply from node B with a time stamp of 3120.

i) What is node A's clock offset with respect to the time at node B (you can ignore any processing delays at either node)?

ii) Is node A's clock going too slow or too fast?

iii) How should node A adjust the clock?

[BL: Apply| CO: 5|Marks: 7]

### MODULE – V

7. (a) Write note on network security attacks and key management in wireless sensor network.

[BL: Understand| CO: 6|Marks: 7]

(b) With neat sketch describe about IEEE 802.15.4 physical layer in WSN security

[BL: Understand| CO: 6|Marks: 7]

8. (a) Compare the security protocol for WSN in terms of overhead, encryption, freshness, key agreement and MAC.

[BL: Understand| CO: 6|Marks: 7]

(b) Illustrate about authenticated broadcast for severely resource constrained networks in WSN.

[BL: Understand| CO: 6|Marks: 7]

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