INSTITUTE OF AERONAUTICAL ENGINEERING
(AUTONOMOUS)
M.Tech I Semester Regular Examinations, February 2020
WIRELESS LANS AND PANS
(Embedded Systems)

Time: 3 hours   Max. Marks: 70

Answer ONE Question from
each Unit All Questions Carry
Equal Marks
All parts of the question must be answered in one place only
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UNIT – I

1 (a) Discuss about the technical issues in wireless communication and explain the drawbacks of first and second generation cellular mobile communications?   [7M]
   (b) Describe slotted ALOHA in detail. Consider the pure ALOHA, slotted ALOHA and non-persistent collision sense multiple access protocol(CSMA). Which one will be used at high load?   [7M]

2 (a) What are the perfrmance techniques used in the design of collision detection protocol and also show that the maximum efficiency of pure ALOHA is 1/(2e).   [7M]
   (b) What is collision? How does carrier sense multiple access protocol(CSMA) or collision detect protocol(CD) can handle collisions.   [7M]

UNIT – II

3 (a) Describe the basic requirements of wireless LANs and discuss the major security issues in wireless networks?   [7M]
   (b) Consider a LAN with maximum distance of 2 km. at what bandwidth would the propagation delay is equal transmit delay for 100-byte packets? What about 512- byte packets?   [7M]

4 (a) Discuss in detail the frequency hopped spread spectrum model with neat block diagram and explain the performance of direct sequence spread spectrum in noise.   [7M]
   (b) List out the properties of Pseudo Noise Sequence used in direct sequence spread spectrum system.   [7M]

UNIT – III

5 (a) Illustrate the MAC layer challenges in wireless sensor networks and list out the general principles of congestion control in wireless networks.   [7M]
   (b) Discuss in detail about hidden terminal problem, reliability, collision avoidance and congestion avoidance corresponding to MAC layer issues.
                                                                                                      [7M]
6 (a) Describe the services offered by Medium Access Control layer and management sub layers of IEEE 802.11wirelessLAN.   [7M]
   (b) Discuss in detail about the Medium access control layer frame format, reliable data delivery and access control corresponding to IEEE 802.11 MAC sub layer   [7M]

UNIT – IV

7 (a) List out the unlicensed frequency bands used for WLANs and how the channel allocation is done in IEEE 802.11a standard.   [7M]
   (b) Write a technical note on physical and Medium Access control layers of Bluetooth. In what way connection management is achieved.   [7M]
8 (a) Interpret IEEE 802.15.3 high rate WPANs with respect to protocol stack and network

Topology [7M]

   (b)   Illustrate wireless personal area network and home radio frequency architectures with physical and Medium Access Control layer details [7M]

UNIT – V

9   (a)   Discuss about the Worldwide Interoperability for Microwave Access (WiMAX) IEEE 802.16 standard and its protocol stack in detail. What is the highest possible data rate of an Infrared Data Association (IrDA) device? [7M]

     (b)   Mention the three error correction mechanism used by Bluetooth system and what is the benefit of Infrared Data Association (IrDA) device as compared to Bluetooth.

[7M]

10   (a)   What are the characteristics of ideal Routing Protocols in Ad-Hoc Wireless network and give the classification of routing protocols for Ad-Hoc network, based on routing information mechanism. [7M]

     (b)   Why does transfer control protocol (TCP) not perform well in Ad-Hoc wireless network? What are the changes made to traditional networks to suit Ad-Hoc networking environment. [7M]

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Course Objectives:

The course should enable the students to:

I	Learn about First and Second Generation Cellular Systems, Cellular Communications from 1G to3G, Wireless 4G systems.
II	Understand about importance of Wireless LANs, WLAN Topologies, Transmission Techniques: Wired Networks, Wireless Networks, comparison of wired and Wireless LANs; WLAN Technologies infrared technology, UHF narrowband technology, Spread Spectrum technology.
III	Learn about Network Architecture, Physical layer, The Medium Access Control Layer; MAC Layer issues: Hidden Terminal Problem and Reliability.

Course Outcomes:

Students, who complete the course, will have demonstrated the asking to do the following:

CO 1	Describe first and second generation cellular systems and analyze cellular communications from 1G to 3G.
CO 2	Demonstrate network architecture and MAC layer issues and describe the importance of MAC layer applications.
CO 3	Demonstrate network architecture and MAC layer issues and describe the importance of MAC layer applications.
CO 4	Explore Bluetooth technology and its specifications, and describe the importance of wireless private area networks.
CO 5	Develop practical skills in use of ZigBee components and network topologies.

COURSE LEARNING OUTCOMES:

BESB03.01	Understand and Analyze First and Second Generation Cellular Systems with architectures.
BESB03.02	Analyze Cellular Communications from 1G to 3G with architectures of AMPs, GSM and GPRS.
BESB03.03	Explain Wireless 4G systems & Wireless Spectrum of 4G with increased bandwidth and speed.
BESB03.04	Distinguish Random Access Methods of Pure ALOHA and Slotted ALOHA.
BESB03.05	Describe Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).
BESB03.06	Describe importance of Wireless LANs with components such as BSS, stations, ESS, Distributed systems
BESB03.07	Explain WLAN Topologies of infrastructure and adhoc mode of operations.
BESB03.08	Analyze Transmission Techniques and Distinguish wired and wireless LANs.
BESB03.09	Explain Network Architecture of IEEE 802.11 standard for wireless lans and Analyze MAC Layer issues.
BESB03.10	Describe importance of Wireless PANs and explain Bluetooth technology with Specifications and Enhancements.
BESB03.11	Explain Bluetooth interference issues, Traffic Engineering, QoS and Dynamics Slot Assignment.
BESB03.12	Describe IEEE 802.15.3 architecture.
BESB03.13	Understand ZigBee technology, components and network topologies.
BESB03.14	IEEE 802.15.4 LR-WPAN Device architecture: Physical Layer, Data Link Layer, The Network Layer, Applications.

MAPPING OF SEMESTER END EXAMINATION (SEE) TO COURSE LEARNING OUTCOMES (CLOs):

SEE Question No.			Course Outcomes	Blooms Taxonomy Level
1	a	CO 1	Describe First and Second Generation Cellular Systems and Analyze Cellular Communications from 1G to 3G.	Remember
	b	CO 1	Describe First and Second Generation Cellular Systems and Analyze Cellular Communications from 1G to 3G.	Understand
2	a	CO 1	Describe First and Second Generation Cellular Systems and Analyze Cellular Communications from 1G to 3G.	Apply
	b	CO 1	Describe First and Second Generation Cellular Systems and Analyze Cellular Communications from 1G to 3G.	Understand
3	a	CO 2	Understand and Analyze WLAN Topologies and Analyze Transmission Techniques.	Remember
	b	CO 2	Understand and Analyze WLAN Topologies and Analyze Transmission Techniques.	Apply
4	a	CO 2	Understand and Analyze WLAN Topologies and Analyze Transmission Techniques.	Remember
	b	CO 2	Understand and Analyze WLAN Topologies and Analyze Transmission Techniques.	Understand
5	a	CO 3	Demonstrate Network Architecture and Analyze MAC Layer issues and Describe importance of Wireless Local Area Networks.	Apply
	b	CO 3	Demonstrate Network Architecture and Analyze MAC Layer issues and Describe importance of Wireless Local Area Networks.	Remember
6	a	CO 3	Demonstrate Network Architecture and Analyze MAC Layer issues and Describe importance of Wireless Local Area Networks.	Apply
	b	CO 3	Demonstrate Network Architecture and Analyze MAC Layer issues and Describe importance of Wireless Local Area Networks.	Remember
7	a	CO 4	Explore Bluetooth technology and Bluetooth specifications and Describe importance of Wireless Private Area Networks.	Understand
	b	CO 4	Explore Bluetooth technology and Bluetooth specifications and Describe importance of Wireless Private Area Networks.	Understand
8	a	CO 4	Explore Bluetooth technology and Bluetooth specifications and Describe importance of Wireless Private Area Networks.	Remember
	b	CO 4	Explore Bluetooth technology and Bluetooth specifications and Describe importance of Wireless Private Area Networks.	Understand
9	a	CO 5	Develop practical skills in the use of ZigBee components and network topologies.	Understand
	b	CO 5	Develop practical skills in the use of ZigBee components and network topologies.	Remember
10	a	CO 5	Develop practical skills in the use of ZigBee components and network topologies.	Understand
	b	CO 5	Develop practical skills in the use of ZigBee components and network topologies.	Remember

HOD, ECE