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Question Paper Code: BESB03



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

UNIT – I

- 1 (a) With the help of block diagram explain the operation of cellular systems and write a short notes on first, second, third generation of cellular mobile communications [7M]
- (b) Explain in detail the operation of slotted ALOHA. Consider the delay of pure ALOHA versus slotted ALOHA at low load. Which one will provide less delay? [7M]
- 2 (a) Assume CSMA/CD protocol. Find the minimum frame length for a 1Mbps bit rate and maximum network span of 10 kilometers with no repeaters. Assume a medium propagation delay of 4.5 nanoseconds per meter. Is CSMA/CD a reasonable protocol for a network of this span and bit rate. [7M]
- (b) Briefly explain about ALOHA, CSMA, CSMA/CD and CSMA/CA protocols and compare their performances. [7M]

UNIT – II

- 3 (a) Classify wired media and wireless media and explain infrared, microwave and radio systems corresponding to ISM bands. [7M]
- (b) How many categories does digital wireless transmission techniques divided according to their applications. Explain each one of them briefly. [7M]
- 4 (a) Discuss Fast frequency hopping spread spectrum technology with neat block diagram and relate it with slow frequency hopping spread spectrum technology. [7M]
- (b) Classify Narrowband technology and Ultra High Frequency narrow band technology With applications. [7M]

UNIT – III

- 5 (a) Compare IEEE 802.11A and IEEE 802.11B WLAN standards. [7M]
- (b) What is meant by Congestion? List the general principles of congestion control. [7M]
- 6 (a) Interpret IEEE 802.11 Distributed Coordination Function(DCF) protocol with back off mechanism with example consider two nodes and back off intervals. [7M]
- (b) Discuss in detail about the energy efficiency and congestion control corresponding to IEEE 802.11 MAC layer issues. [7M]

UNIT – IV

- 7 (a) What is Adhoc networking? Distinguish bluetooth piconet architecture and bluetooth scatternet architecture with neat block diagram. [7M]
- (b) Mention the specifications of voice and data transmission in bluetooth and explain the two types of data and voice applications. [7M]
- 8 (a) With neat sketch draw the high level overflow of bluetooth security architecture together with the security components. [7M]
- (b) Explain bluetooth star architecture with neat diagram. what are the security modes in bluetooth generic access profile. [7M]

UNIT – V

- 9 (a) Classify ZigBee technology with Wi-Fi and bluetooth. What are the IEEE 802.15.3 wireless personal area network standard applications. [7M]
- (b) Explain the architecture of ZigBee technology with ZigBee components and network topologies. [7M]

- 10 (a) Explain ZigBee frame structure with different fields. Summarize the various ZigBee application profiles? [7M]
- (b) Discuss IEEE 802.15.4 LR-WPAN Device architecture with block diagram and what are the drawbacks present in this architecture. [7M]

(Autonomous)
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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 to 3G, 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:

COs	Description
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.		CLO Code	Course learning Outcomes	CO code	Blooms Taxonomy Level
1	a	BESB03.02	Analyze Cellular Communications from 1G to 3G.	CO 1	Understand
	b	BESB03.04	Describe Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance(CSMA/CA).	CO 2	Remember
2	a	BESB03.04	Describe Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance(CSMA/CA).	CO 2	Remember
	b	BESB03.04	Describe Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance(CSMA/CA).	CO 2	Remember
3	a	BESB03.05	Explain WLAN Topologies and Analyze Transmission Techniques	CO 2	Remember
	b	BESB03.05	Explain WLAN Topologies and Analyze Transmission Techniques	CO 2	Understand
4	a	BESB03.05	Explain WLAN Topologies and Analyze Transmission Techniques	CO 2	Remember
	b	BESB03.05	Explain WLAN Topologies and Analyze Transmission Techniques	CO 2	Understand
5	a	BESB03.08	Explain Network Architecture and Analyze MAC Layer issues.	CO 3	Understand
	b	BESB03.09	Describe importance of Wireless Private Area Networks.	CO 4	Remember
6	a	BESB03.08	Explain Network Architecture and Analyze MAC Layer issues.	CO 3	Understand
	b	BESB03.09	Describe importance of Wireless Private Area Networks.	CO 4	Remember
7	a	BESB03.10	Explain Bluetooth technology and Bluetooth specifications.	CO 4	Understand
	b	BESB03.11	Analyze Enhancements to Bluetooth technology and applications	CO 4	Understand
8	a	BESB03.10	Explain Bluetooth technology and Bluetooth specifications.	CO 4	Remember
	b	BESB03.11	Analyze Enhancements to Bluetooth technology and applications	CO 4	Understand
9	a	BESB03.12	Describe IEEE 802.15.3, The IEEE 802.15.4	CO 4	Understand
	b	BESB03.13	Understand ZigBee components and network topologies.	CO 5	Remember
10	a	BESB03.14	Analyze Device architecture and network topologies	CO 5	Understand
	b	BESB03.12	Describe IEEE 802.15.3, The IEEE 802.15.4	CO 4	Remember