

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, April/May 2018

Course: Wireless & Ad-Hoc Network (CSIB 342)
Program: B.Tech. CSE TI
Time: 03 hrs.

Semester: VI
Max. Marks: 100

Instructions: Answer all questions from Section A. There are internal choice in Section B and Section C.

SECTION A

S. No.		Marks	CO
Q 1	Briefly explain about the four components of an 802.11 wireless network?	5	CO1
Q 2	What is an Ad-Hoc network? Why ad hoc networks are required?	5	CO2
Q 3	Differentiate cellular networks and ad hoc wireless networks.	5	CO5
Q 4	List down the design goals of MAC protocol for ad- hoc networks.	5	CO3

SECTION B

Q 5	What types of topologies can be used in an 802.11 wireless network? What are the network services that are required in 802.11 wireless networks?	10	CO2
Q 6	What do you mean by quality of service (QoS) Provisioning? Write down any four issues and challenges in providing QoS in Ad-Hoc wireless networks.	10	CO5
Q 7	(i) How does frequency reuse enhance cellular network capacity? (ii) Besides the number of users, what other major factor influences the decision on cluster size? (iii) A cellular system uses frequency spectrum 1800 MHz to 1840 MHz for uplink channels and 1860 MHz to 1900 MHz for downlink channels respectively. Each channel takes 200 KHz and can be shared by 8 users. Each user needs one uplink and one downlink channel. How many users can be supported without frequency reuse in this cellular system?	10	CO3
Q 8 (A)	(i) Consider an area of 3600 square Km covered by a cellular network. If each user requires 20 KHz for communication, and the total available spectrum is 60 MHz, how many users can be supported without frequency reuse? (ii) If cells of area 36 square Km are used, how many users can be supported with cluster sizes of 3 and 7?	10	CO4

OR

Q 8 (B)	Explain the various issues and solutions for integrating MANET'S to internet in detail.	10	CO4
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SECTION-C

<p>Q 9</p>	<p>A particular cellular system has the following characteristics: cluster size = 7, uniform cell size (circular cells), user density = 100 users/sq. Km, allocated frequency spectrum = 900-949 MHz, bit rate required per user = 10 Kbps uplink and 10 Kbps downlink, and modulation code rate = 1 bps/Hz.</p> <p>A. Calculate the following for the above system if FDMA/FDD is used:</p> <ol style="list-style-type: none"> How much bandwidth is available per cell using FDD? How many users per cell can be supported using FDMA? What is the cell area? What is the cell radius assuming circular cells? <p>B. If the available spectrum is divided into 100 channels and TDMA is employed within each channel then,</p> <ol style="list-style-type: none"> What is the bandwidth and data rate per channel? How many time slots are needed in a TDMA frame to support the required number of users? If the TDMA frame is 10ms, how long is each user slot in the frame? How many bits are transmitted in each time slot? 	<p>20</p>	<p>CO3 CO4</p>
<p>Q 10 (A)</p>	<ol style="list-style-type: none"> If a normal GSM timeslot consists of 6 trailing bits, 8.25 guard bits, 26 training bits, and 2 traffic bursts of 58 bits of data, find the frame efficiency. Predict the location of nodes for an Ad-Hoc network using Predictive Location-Based QoS Routing Protocol with proper diagram. 	<p>20</p>	<p>CO1 CO5</p>
<p>OR</p>			
<p>Q 10 (B)</p>	<ol style="list-style-type: none"> Describe the problems when CSMA/CD is applied to wireless networks. Describe how CSMA/CA solve the above problems. Write down short note on the following: <ol style="list-style-type: none"> FHSS DSSS OFDM 	<p>20</p>	<p>CO1 CO5</p>

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Name of the School <small>(Please tick, symbol is given)</small>	:	SOE		SOCS	<input type="checkbox"/>	SOP	
Programme	:	B.TECH. CSE with specialization in Telecom Informatics					
Semester	:	VI					
Name of the Course	:	Wireless & Ad-Hoc Network					
Course Code	:	CSIB 342					
Name of Question Paper Setter	:	Dr. Tanmay Bhowmik					
Employee Code	:	40001610					
Mobile & Extension	:	Mob. 7302199389 Extn. 1773					
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Note: - Pl. start your question paper from next page

Model Question Paper (Blank) is on next page

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SECTION A

S. No.		Marks	CO
Q 1	Describe the problems when CSMA/CD is applied to wireless networks.	5	CO1
Q 2	An AM transmitter radiates 20KW. If the modulation Index is 0.7. Find the carrier Power.	5	CO2
Q 3	i. How does frequency reuse enhance cellular network capacity? ii. Besides the number of users, what other major factor influences the decision on cluster size	5	CO3
Q 4	Describe the steps of Early fit reservation (EFR) in reference to Bandwidth slot allocation strategies.	5	CO5

SECTION B

Q 5	i. If a normal GSM timeslot consists of 6 trailing bits, 8.25 guard bits, 26 training bits, and 2 traffic bursts of 58 bits of data, find the frame efficiency. ii. What are the Goals of Routing Protocol?	10	CO1 CO2
Q 6	A particular cellular system has the following characteristics: cluster size = 7, uniform cell size (circular cells), user density = 100 users/sq. Km, allocated frequency spectrum = 900-949 MHz, bit rate required per user = 10 Kbps uplink and 10 Kbps downlink, and modulation code rate = 1 bps/Hz. Calculate the following for the above system if FDMA/FDD is used: i. How much bandwidth is available per cell using FDD? ii. How many users per cell can be supported using FDMA? iii. What is the cell area? iv. What is the cell radius assuming circular cells?	10	CO5
Q 7	Predict the location of nodes for an Ad-Hoc network using Predictive Location-Based QoS Routing Protocol with proper diagram.	10	CO3
Q 8 (A)	Explain Distributed Bellman-Ford Algorithm and describe the associated problems.	10	CO4

OR

Q 8 (B)	Explain the various issues and solutions for integrating MANET'S to internet in detail.	10	CO4
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SECTION-C

- Q 9
- (i) A 400W, 1MHz carrier is amplitude-modulated with a sinusoidal signal of 2500Hz. The depth of modulation is 75%. Calculate the sideband frequencies, bandwidth, and power in sidebands and the total power in modulated wave.
- (ii) Define Path Bandwidth and Link Bandwidth with respect to Bandwidth Routing Protocol.
- (iii) Consider the following figure and find the Link Bandwidth between the nodes and establish the Path Bandwidth between (S, A), (S, B), (S, C) and (S, D).

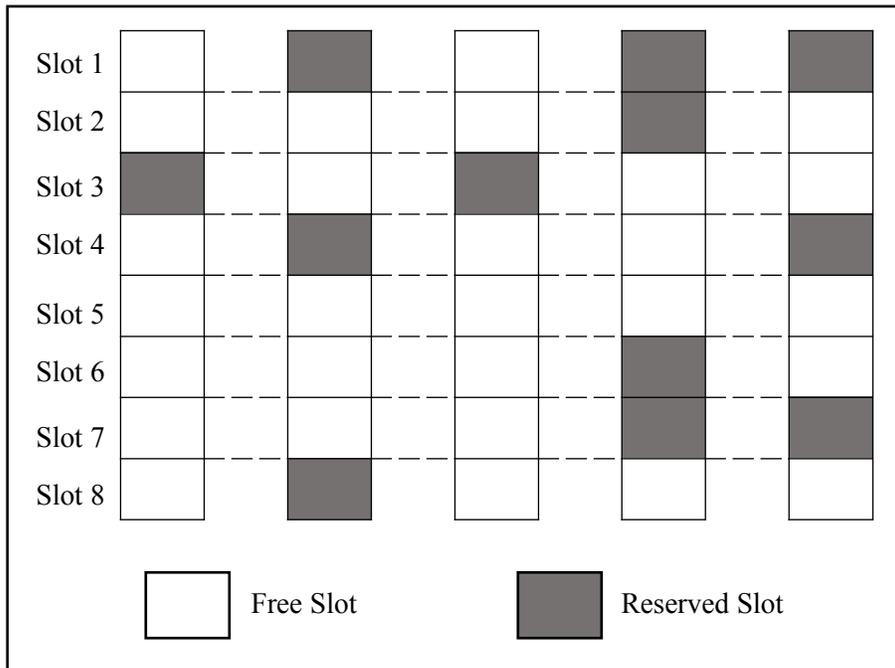


Figure 1

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CO1
CO2

- Q 10 (A)
- (i) What is Direct Sequence Spread Spectrum (DSSS)?
- (ii) Consider an area of 3600 square Km covered by a cellular network. If each user requires 20 KHz for communication, and the total available spectrum is 60 MHz, how many users can be supported without frequency reuse?
If cells of area 36 square Km are used, how many users can be supported with cluster sizes of 3 and 7?
- (iii) If a cellular operator is allocated 12.5 MHz for each simplex band and if B_t is 12.5 MHz, B_{guard} is 10kHz and B_c is 30kHz, then find the number of channels available in a FDMA system.

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CO3
CO4

OR

Q 10 (B)	i. Briefly explain about the four components of an 802.11 wireless network? ii. What types of topologies can be used in an 802.11 wireless network? What are the network services that are required in 802.11 wireless networks? iii. Differentiate cellular networks and ad hoc wireless networks.	20	CO3 CO4
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