COVER IMAGE

Aalim Muhammed Salegh College of Engineering

Question Bank

ELECTRONICS & COMMUNICATION ENGINEERING
4th YEAR

Index

Aalim Muhammed Salegh
College of Engineering

ELECTRONICS & COMMUNICATION ENGINEERING

EC2043
WIRELESS NETWORKS

SEMESTER - VIII

EC2043   WIRELESS NETWORKS   3 0 0 3

AIM

To study some fundamental concepts in wireless networks.

OBJECTIVES

- To understand physical as wireless MAC layer alternatives techniques.
- To learn planning and operation of wireless networks.
- To study various wireless LAN and WAN concepts.
- To understand WPAN and geo-location systems.

1.   MULTIPLE RADIO ACCESS   9

Medium Access Alternatives*:* Fixed-Assignment for Voice Oriented Networks Random Access for Data Oriented Networks , Handoff and Roaming Support, Security and Privacy.

2.   WIRELESS WANS   9

First Generation Analog, Second Generation TDMA – GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000)

3.   WIRELESS LANS   9

Introduction to wireless LANs - IEEE 802.11 WLAN – Architecture and Services, Physical Layer- MAC sublayer- MAC Management Sublayer, Other IEEE 802.11 standards, HIPERLAN, WiMax standard.

4.   ADHOC AND SENSOR NETWORKS   9

Characteristics of MANETs, Table-driven and Source-initiated On Demand routing protocols, Hybrid protocols, Wireless Sensor networks- Classification, MAC and Routing protocols.

5.   WIRELESS MANS AND PANS   9

Wireless MANs – Physical and MAC layer details, Wireless PANs – Architecture of Bluetooth Systems, Physical and MAC layer details, Standards.

TOTAL : 45

1. William Stallings, "Wireless Communications and networks" Pearson / Prentice Hall of India, 2nd Ed., 2007.
2. Dharma Prakash Agrawal & Qing-An Zeng, "Introduction to Wireless and Mobile Systems", Thomson India Edition, 2nd Ed., 2007.

REFERENCES :

1. Vijay. K. Garg, "Wireless Communication and Networking", Morgan Kaufmann Publishers, 2007.
2. Kaveth Pahlavan, Prashant Krishnamurthy, "Principles of Wireless Networks",Pearson Education Asia, 2002.
3. Gary. S. Rogers & John Edwards, "An Introduction to Wireless Technology", Pearson Education, 2007.
4. Clint Smith, P.E. & Daniel Collins, "3G Wireless Networks", Tata McGraw Hill, 2nd Ed,. 2007.

EC 2043 WIRELESS NETWORKS QUESTION BANK

UNIT I

1. List the advantages of ALOHA potocol.

Ans:

•   It is very simple.

•   Synchronize between mobile terminals is not necessary.

•   The terminals transmit the packet when it is ready for transmission.

2. List the disadvantages of ALOHA protocol.

Ans:

•   Low throughput under heavy load conditions.

•   Maximum throughput of pure ALOHA is 18%.

3. What do you mean by slotted ALOHA?

Ans:

In wireless channels, pure ALOHA is modified in such a way that to get 36% of throughput. This is known as slotted ALOHA.

4. List the groups made by random access methods for mobile data services?

Ans:

ALOHA-based wireless random access technique. CSMA-based wireless random access technique.

5. What is R-ALOHA?

Ans:

It means Reservation-ALOHA. Throughput of slotted ALOHA is very low for wireless data applications. So it is combined with TDMA system. It is known as R-ALOHA protocol.

6. Define BTMA.

Ans:

Multi hop adhoc networks, where there is no central station is known as BTMA (Busy Tone Multiple Access).

7. List the access methods for wireless LAN's.

Ans:

LAN is suitable for variations of the CSMA protocol. The packet length is large in LANs. So, great care is needed in packet collisions.

The access methods for wireless LANs are as follows:

•   CSMA/CD (Carrier Sense Multiple Access/Collision Detection).

•   CSMA/CA (Carrier Sense Multiple Access/Collision Avoidance)

8.   What is non-persistent mechanism?

Ans:

After sensing the channel, the terminal starts another sensing after sometime. It is known as non-persistent sensing mechanism.

9.   What is persistent mechanism?

Ans:

If the terminal sense the channel until the channel becomes free, this is known as persistent mechanism.

10.   Define wireless voice quality.

Ans:

Quality Of Service (QOS) of PSTN voice user is specified by 64Kbps PCM data rate and 100ms of maximum delay. Thus QOS is known as wire line quality.

11.   What is RTS/CTS?

Ans:

• Request To Send/Clear To Send method is used in wireless LAN.

• When the station is ready to transmit, then it sends RTS packet to identify the source address, destination address and length of data.

• The corresponding destination station respond with CTS packet. Then the station transmits its packet. After receiving acknowledgement signal, the channel is free.

12.   Mention the problem in integrated services.

Ans: Multi user access is the main problem in the integrated system which includes voice and data. Transmission resources are wasted if there is no voice transmission. These resources are used for data services which does not require severe delay.

13.   Capture effect problems.

Ans: In ratio channels, collision of two packets may not destroy both packets. Due to fading, packets from different transmitting stations can arrive with different transmitting power values. The strongest packet will be transmitted.

The received power from terminal 1 is higher compared with received power from terminal 2. If two packets are collided, then the packet with weak signal is appeared as a back ground noise. Access point captures from the packet   terminal
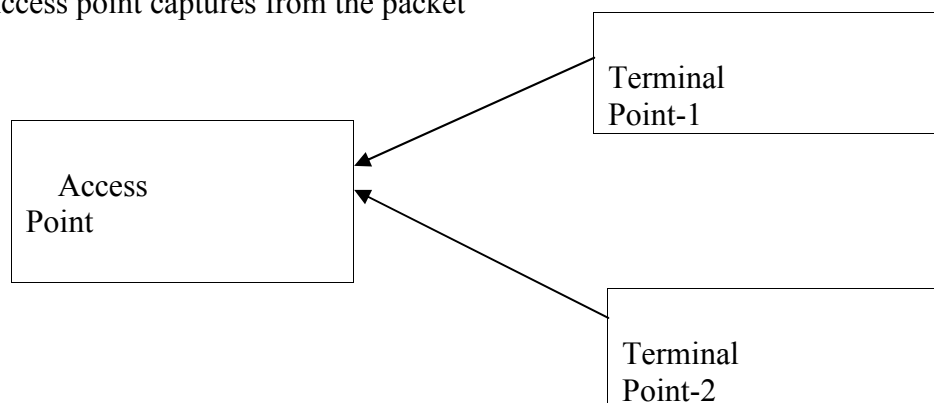
P1 and p2 – Received power

14. What is LBT?

Ans:

LBT-Listen Before Talk.

15. What do you mean by Handoff?

Ans: Handoff basically involves change of radio resources from one cell to another adjacent cell. From a handoff perspective it is important that, a free channel is available in a new cell whenever handoff occurs, so that undisrupted service is available.

16. List the parameters that influence the Handoff.
Ans:
Handoff can be initiated either by the base station or the mobile station and it could be due to
- The radio link
- Network management
- service issues

17. On what parameters Handoff depends on?

Ans:

Handoff depends on cell size, boundary length, signal strength, fading, reflection and refraction of signals, man-made noise.

18. List the units components that involved in setting up a call.

Ans:
- Basic Station Controller (BSC)
- Mobile Station (MS)
- Mobile Switching Center (MSC)

19. Give the classifications of Handoff.

Ans:

Handoff can be classified into two different types :
- Hard Handoff.
- Soft Handoff.

20. How the hard Handoff is characterized?

Ans:

Hard handoff also known as "break before make" is characterized by releasing current radio resources from the prior BS before acquiring resources from the next Base Station.

21. What does Authentication of a subscriber implies?

Ans:

Authentication of a subscriber basically implies making sure that, the user is genuine. There are many ways to ascertain this, and one simple technique is to use a hash function (just like a password) from an associated user's unique identification.

22. List the services of security it can be classified.

Ans:

The services of security can be classified in the following categories:

- Confidentiality
- Non repudiation
- Authentication
- Integrity
- Availability

23. List the categories of security mechanisms.

Ans:

- Security prevention
- Security detection
- Recovery

24. List the categories of attacks.

Ans:

The attacks can be categorised as follows

- Interruption
- Interception
- Modification
- Fabrication

25. Define Secure system.

Ans:

Secure system can be defined as one where as intruder has to spend an unacceptable amount of

time and effort in interpreting the system.

26.Mention any two advantages and limitations of CDMA system.

Ans:

Adv:- Format flexibility,performance in multipath fading and system capacity handoff,reduced level of interference.

Limitations:-Since same channel is shared by several users there may be a problem of near far effect.

PART-B

1.Explain the following (16)

a.Bandwidth efficiency b.Power efficiency c.Out of band of radiation d.UWB pulse transmission

2.What is OFDM? Explain about multicarrier, multisymbol and multirate OFDM. (16)

3.Why we are going for diversity? Explain the time diversity using rake receiver and traditional modems & equalizers. (16)

4. Explain about space and frequency diversity. ` (16)

5. Explain about random access method? (16)**Nov/Dec 2014,April/May2015, Nov/Dec 2013, Nov/Dec 2012.**

6.Explain about integration of voice traffic. (16)

7.Explain the main properties of basic multiple access techniques used in wireless networks(10) April/May2015

8.Write a note on security and privacy issues in wireless networks   (16) Nov/Dec 2014,April/May2015, Nov/Dec 2013.

9.Explain the two main functions of mobility management in wireless technologies(6) April/May2015

10.Explain non persistent,Ipersistent amd P persistent CSMA protocols(10) April/May2014

11.Compare the throughput performance of ALOHA ,slotted ALOHA and CSMA protocols (6) April/May2014

12.Explain the principle,frame structures and working of TDMA systems(8) April/May2014

13.What is meant by Handoff.Describe the different Handoff mechanism(8) April/May2014, Nov/Dec 2013.

14.Explain about the performance of fixed assignment access methods with the traffic engineering and delay estimation methods (8) Nov/Dec 2012.

15. What are the mechanisms available to support mobile environment? **(16)**

16. Explain the two fundamental types topologies used in the wireless networks? **(16)**

17. Comparison of adhoc and infrastructure topologies. **(16)**

18. Explain the concept of cellular topology and cell fundamentals with examples. **(16)**

19. Explain in detail about capacity expansion technique. **(16)**

20. Explain in detail about channel allocation technique. **(16)**

21. Comparison of FCA and DCA. **(16)**

22. What are the parts available in location management and explain in detail. **(16)**

23. What is meant by handoff? What are the issues available in hand off management explains with neat diagram. **(16)**

24. Discuss about power control mechanism with example. **(16)**

UNIT II

1.   List the four layers involved in SMS? (A/M 2008)

Ans:

Four layers are:
- The Application Layer (AL).
- The Transfer Layer (TL).
- The Relay Layer (RL).
- The Link Layer (LL).

2.   Name the five major challenges for implementation of wireless LANs that existed from the beginning of this industry. (A/M 2008)

Ans:
- Complexity and cost
- Bandwidth
- Coverage
- Interference
- Frequency administration

3.Is CDMA an access method or an air interface? Justify your answer. (M/J 2009)
Ans:

CDMA appears increasingly attractive as the wireless access method of choice. Integration of various types of traffic is readily accomplished in a CDMA environment as coexistence on such an environment does not require any specific coordination among user terminals. CDMA is both an access method and air interface.

4.What is meant by capacity on demand principle in GPRS networks? (M/J 2009)
Ans:

Capacity demand principle: It means that the capacity allocation for GPRS is based on the actual need for packet transfer. GPRS does not need permanently allocated physical channels.

5.What are VLR and HLR? Where they are physically located and why we need them? (N/D 2009)
Ans:

VLR-Visitor Location Register

HLR-Home Location Register

They are physically located in Base Station. HLR is database software that handles the management of the mobile subscriber account. VLR is the temporary database software similar to the HLR indentifying the subscribers' visiting inside the coverage area of an Mobile Switching Centre (MSC).

6.   What is AMPS?
 Ans:

AMPS- Advanced Mobile Telephone Service.

The original cellular telephone networks provided along traffic channels; these are now referred to as first generation systems. Since the early 1980s the most common first generation system in north America has been the Advanced Mobile Phone Service(AMPS) developed by AT&T. This approach is also common in
South America, Australia and China.

7.   List the AMPS parameters.
Ans:

The AMPS parameters are as follows
- Base station transmission band
- Mobile unit transmission band

Spacing between forward and reverse channels, cell size, radius channel bandwidth, data transmission rate, error control coding, modulation voice channel, modulation control channel.

8.   What do you mean by NAM?
Ans:

Each AMPS capable of cellular telephone includes a Numeric Assignment Module(NAM) is read-only memory. The NAM contains the telephone number of the phone which is assigned by the service provider and the serial number of the phone, which is assigned by the manufacturer.

9. For what purpose second generation systems have been developed?
Ans:

Second generation systems have been developed to provide higher quality signals, higher data rates for support of digital services and greater capacity.

10. List the mobile wireless TDMA design consideration requirements.
Ans:

- Number of logical channels.
- Maximum cell radius.
- Frequency.
- Maximum vehicle speed (Vm)
- Maximum coding delay.
- Maximum delay speed (Δm).
- Bandwidth.

11. List the components in Base Station Subsystem.
Ans:

A Base Station Subsystem consists of a Base Station Controller (BSC) and one or more Base Transreceiver stations. Each Base Transreceiver Station (BTS) defines a single cell; it includes a radio antenna and a link to a Base Station controller.

12. List the advantages of CDMA.
Ans:
CDMA has a number of advantages for a cellular network. They are:

- Frequency Diversity
- Multipath resistance
- Privacy
- Graceful degradation

13. What is soft hand off?
Ans:

A smooth handoff from one cell to next requires that the mobile unit acquires the new cell before it relinquishes the old. This is referred to as a soft hand off and is more complex than the hard hand off used in FDMA and TDMA schemes.

14. What do you mean by self-jamming?
 Ans:

Unless all the mobile users are perfectly synchronized the arriving transmissions from multiple user's will not perfectly aligned on chip boundaries. Thus the spreading sequences of the different users are not orthogonal and there is some level of cross correlation. This is distinct from either TDMA or FDMA which for reasonable time or frequency guard bands respectively the received signals are nearly so.

15. What is near far problem?

Ans: Signals closer to the receiver are received with less attenuation than signals farther away. Given the lack of complete orthogonality, the transmissions from the more remote units may be one or more difficult to recover. Thus power control techniques are very important in CDMA.

16. List the capabilities of third generation systems.

Ans:

☐   Voice quality comparable to the public switched telephone network.

☐   144 Kbps data rate available to users in high speed motor vehicles over large area.

☐   384 Kbps available to pedestrians standing or moving over small area.

☐   Support for 2.048 Mbps for office use.

☐   Symmetrical and asymmetrical data transmission rates.

☐   Flexibility to allow the introduction of new services and technologies.

17. Give the limitations of GPRS.

Ans:

☐   There is only a limited cell capacity for all users.

☐   Speed is lower

☐   When MS is not available there are no storage and forward services.

18. What is SMS?

Ans: SMS was developed as part of GSM phase-2 specifications. It is operated over all GSM networks. It uses the same network entities, the same physical layer and intelligently reuses the logical channels of GSM to transmit very short alphanumeric messages.

19. **Write the difference between CDMA2000 and W-CDMA.**

Ans:

CDMA 2000	W-CDMA
It proposes multiples of 1.22 Mcps chip rates. Mainly it employs 3.6864Mcps	It employs 3.84 Mcps.
It is more compatible with IS-95.	It is less compatible with IS-95.
Frame length is 20ms.	Frame length is 10ms.
In IS-95 and CDMA 2000 the BSs operates synchronously.	BSs operates asynchronously.

20. What is GPRS?
Ans:

GPRS is an overlay on the top of the GSM physical layer and it extends data capabilities of GSM and provides connection to external packet data networks through the GSM infrastructure with short access time. The GPRS services are provided based on capacity on demand principle.

21. What are the two types of services provided by SMS?
Ans:

☐ **Delivery service** if the destination MS is active.

☐ **Forward service** if the MS is inactive.

22.Name the baseic logic channels in GSM
Ans:

Traffic channels(TCH)-Full Duplex and Half Duplex

Control channels(CCH)-Broadcast ,common ,Dedicated control

 channels

PART-B

1.Highlight the significant advancement of mobile services offered by wireless networks from 1G to 3G and beyond evolution path (16)April/May 2015

2.Draw the protocol architecture of GSM and explain in detail. **(16)April/May 2015,Nov/Dec 2014, Nov/Dec 2013, Nov/Dec 2012.**

3.Explain in detail about IS-95 CDMA forward channels? **(16)Nov/Dec 2013.**

4.Explain in detail about IS-95 CDMA reverse channels? **(16) Nov/Dec 2012.**

5.Explain in detail about IMT-2000. **(16)**

6.What is GPRS? Explain in detail about architecture,location and handoff management in GPRS network. **(16) Nov/Dec 2014, April/May 2014.**

7.**Compare GSM and CDMA (6) April/May 2014**

8.**Describe the different air interface connection between MS and BTS in a GSM network (10)April/May 2014**

9.**Explain about the forward and reverse channels in W-CDMA and CDMA-2000 .Also explain about the handoff and power control mechanisms.(16) April/May 2013.**

10.**Explain in detail about the architecture of the 2G GSM system (6) May/June 2013**

11.**Describe about short message servicing(6) Nov/Dec 2014.**

12.**How will you achieve power control and handoff mechanism in IS-95.(8)Nov/Dec 2013**

13.**Discuss the evolution and advancement of first generation Analog to second generation Digital TDMA based GSM networks(8) Nov/Dec 2013.**

UNIT-III

1. **What are the advantages of wireless LAN?**
Ans:
- ☐   Flexibility
- ☐   Planning
- ☐   Robustness
- ☐   Design
- ☐   Cost

2. What are the properties of ISM band?
Ans:

Frequency of operation 902-928 MHZ 2.4-2.483 GHZ 5.725-5.875 GHZ
Transmit power limitation of 1 watt for DSSS and FHSS low power with any modulation.

3. Mention the three basic rules (or) etiquette of spectrum.
Ans:

- □   Listen Before Talk (or Transmit)
- □   Low Transmit Power
- □   Restricted duration of transmission

4. State the features of wireless LAN.
Ans:

- □   Power management to save the battery power.
- □   The handling of hidden nodes.
- □   The ability to operate world wide.

5. Draw the frame format of IEEE 802.11 physical layer using FHSS.
Ans:

Sync (80)	SFD (16)	PLW (12)	PSF (4)	HEC (16)	MPDU variable

6. Draw the frame format of IEEE 802.11 physical layer using DSSS.
Ans:

Sync 128 bits	SFD (16)	Signal (8)	Service (8)	Length (16)	HEC (16)	MPDU variable

7. List the type of architecture used in IEEE 802.11
Ans:

- □   Infrastructure based
- □   Ad-hoc based.

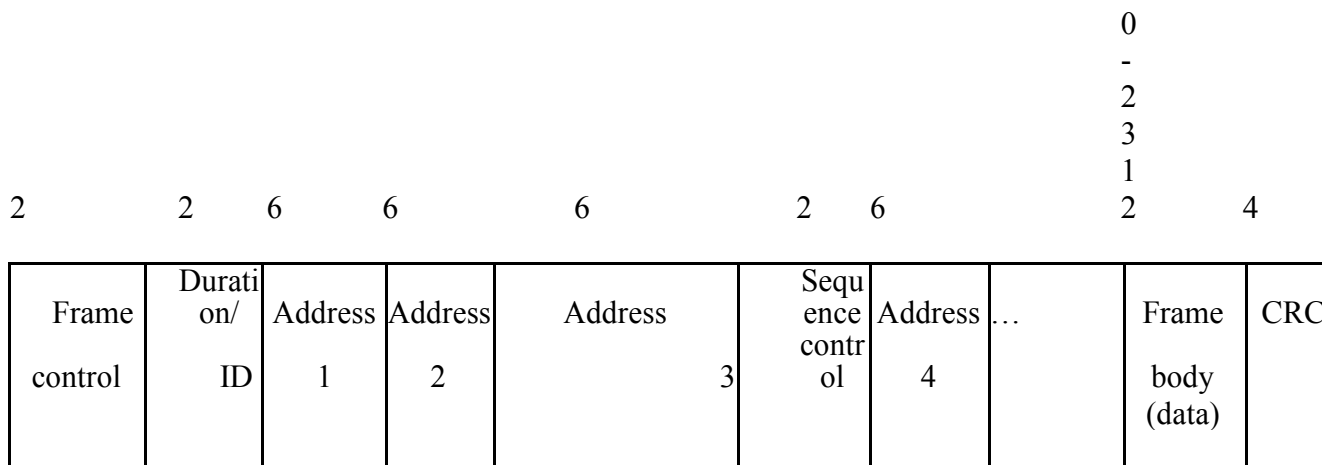**8. What are the characteristics of DSSS?**
Ans:

- □   bustness against interference.
- □   Insensitivity to multipath propagation.
- □   Implementation is complex compared to FHSS.

9. What is the formula used in DSSS and FHSS to scramble the transmitted bits?
Ans:

$S(Z) = Z^7 + Z^4 + 1$ for dc blocking and whitening of spectrum.

10. Draw the MAC layer frame format of IEEE 802.11.

2	2	6	6	6	2	6		0-2312	4
Frame control	Duration/ ID	Address 1	Address 2	Address 3	Sequence control	Address 4	…	Frame body (data)	CRC

11. Draw the MAC management frame format.
Ans:

Frame control
Duration
DA-Destination Address
SA-Starting Address
BSSID
Sequence control
Frame body
FCS-Frame Check Sequence

12. What is meant by wireless ATM?
Ans:

Wireless ATM is sometimes called as mobile ATM or WATM. It does not only describe a transmission technology, but specify a complete communication system. It develops a set of specifications that extends the use of ATM technology to wireless network.

13. Draw the packet frame format of WATM.
Ans:

Wireless Header	ATM Header (5 bytes)	ATM Payload (48 bytes)	Wireless Trailor

14. Draw the IEEE 802.11 MAC frame.
   Ans:

Octets:	2	2	6	6	2	60-2312	4
	FC	D/I	Address	Address	SC	Address	Data	FCS

FC-Frame Control
D/I-Duration/Connection ID
SC-Sequence Control
FCS-Frame Check Sequence

15. What are the possibilities of communication between mobile terminal and a fixed terminal?
Ans:
There are three possibilities:
☐   WLAN to LAN
☐   WLAN to ATM
☐   WATM to ATM

16. What are the versions of HIPER LAN?
 Ans:
☐   HIPER LAN-1
☐   HIPER LAN-2
☐   HIPER Access
☐   HIPER Link

17. List the protocols used in HIPER LAN-2.
Ans:
☐   Radio Link Control (RLC) protocol.
☐   DLC connection Protocol.
☐   Radio Resource Protocol (RRC)
☐   Association control Function (ACF)

18. What is meant by data link layer?
Ans: Data Link Layer(DLC) provides the logical link between an access point and the mobile terminals over the FDM physical layer.

19. What are the phases available in HIPER LAN-1 MAC layer?
Ans:
☐   **Prioritization Phase:** It determines the highest priority of a data packet ready to be sent by competing nodes.

☐   **Contention phase:** Eliminate all but one of the contenders if more than one sender has the current priority.

☐   **Transmission Phase:** Finally, transmit the packet of the remaining node.

20. List the services provided by IEEE 802.11.

Ans: Association, Authentication, De Authentication, Disassociation, Integration, MSDU Delivery, Privacy, Re association.

21. Draw the frame control field of IEEE 802.11 MAC frame.

Ans :

Bits: 2   2   4   1   1   1   1   1   11

Protocol Version	Type	Sub Type	To DS	From DS	MF	RT	PM	MD	W	O

DS-Distribution System

MF-More Fragments

RT-Retry

PM-Power Management

MD-More Data

W-Wired Equivalent Privacy Bit

O-Order

22. What are the differences between the 802.11a and HIPET LAN-2?

Ans:

The HIPER LAN-2 standard uses the same physical layer as 802.11a with a MAC that supports the needs of the cellular telephone industry is supporting mechanisms for tariff, integration with existing cellular systems and providing QOS.

IEEE 802.11camp is a connectionless WLAN camp that evolved from data oriented computer communications. HIPER LAN-2 camp is connection based WLANs addressing the needs of voice oriented cellular telephone.

23. State the relationship between HYPER LAN-2 and WATM.

Ans:

HIPER LAN-2 aims at higher data rates and intends to accommodate ATM as well as IP type access.

24. What do you mean by WPA?

Ans: The 802.11itasks group has developed a set of capabilities to address the WLAN security capabilities to address the WLAN security issues. In order to accelerate the introduction of strong security into WLANs, the WI-FI alliance promulgated WI-FI Protected Access (WPA) as WI-FI standard. WPA is a set of security mechanisms that eliminate most 802.11 security issues and was based on the current state of the 802.11i standard.

PART –B

1.Explain in detail about SMS and mobile application protocol. **(16) Nov/Dec 2014.**

2.What are the services of IEEE 802.11 WLAN standards.(8)

3.Differentiate LAN and MAN (4)

4.What is a MAC sublayer and explain in detail.(8)

5.Tabulate and compare all the IEEE 802.11 standards in detail.(8)

6.What are the advantages of WLAN in mobile computing.Compare it with wired networks.(6)

7.Describe the MAC layer features and functionalities of IEEE 802.11 and wireless LAN (10) April/May 2015,Nov/Dec 2014.

8.Compare the features of different WLAN standards (6) April/May 2015.

9.Explain in detail about WIMAX IEEE 802.16 MAC layer and its functionalities (10) Nov/Dec 2013.

10.State the features and requirements of HIPERLAN and WIMAX standards.(4)April/May 2015.

11.Classify the HIPERLAN standards based on their architecture and protocol specifications (12) April/May 2015.

12.Why do u have the two divisions in the MAC layer itself for IEEE 802.11 and explain in detail about the MAC layer (16)May/June2013

13.Explain the three different functions which are used for the operational differences for MAC layer(10) May/June 2013

14. What are the layers available in HYPERLAN-2? explain each layer with suitable diagram. **(16)April/May 2015, April/May 2013.**

15**.** What is HYPERLAN? Explain in detail about HYPERLAN-1. **(16) April/May 2015,Nov/Dec 2014, April/May 2014.**

16. Explain in detail about overview, reference architecture, layered architecture of IEEE802.11? **(16) Nov/Dec 2013.**

17. Explain the following: **Nov/Dec 2013**
a. Overview of the LAN industry **(8)**
b. Evolution of the WLAN industry **(8).**

18.Write notes on WIMAX standards (8)Nov/Dec 2014,April/May 2014, April/May 2013,Nov/Dec 2012.

UNIT-IV

1. Define MANET.
Ans:

MANET can be defined as an autonomous system of nodes or MSs (also serving as routers) connected by wireless links, the union of which forms a communication networks modeled in the form of an arbitrarily communication graph.

2. List the characteristics of MANETs.
Ans:

- Dynamic topologies
- Bandwidth-constrained and variable capacity links.
- Energy-constrained operation.
- Limited physical security.

3. List the application of MANETs.
Ans:

- Defense applications.
- Crisis-management applications
- Telemedicine
- Tele-geo processing applications
- Virtual navigation
- Education via the internet

4. List the factors that involves in routing of a MANET.
Ans:

Routing in a MANET depends on many factors, including modeling of the topology, selection of routers, initiation of a route request and specific underlying characteristics that could serve as heuristics in finding the path efficiently.

5. List the major goals when selecting a routing protocol.
Ans:

- Provide the maximum possible reliability by selecting alternative routes if a node connectivity fails.

- Route network traffic through the path with least cost in th network by minimizing the actual length between the source and destination through the least number of intermediate nodes.

- Give the nodes the best possible response time and throughput. This is especially important for interactive sessions between user applications.

6. Give the classifications of routing protocol in MANET.
Ans:

Existing routing protocols can be classified either as proactive or reactive:

- **Proactive** protocols attempt to evaluate continuously the routes

within the network, so that when a packet needs to be forwarded, the router is already known and can be immediately used.

☐ **Reactive** protocols on the other hand invoke a route determination procedure only on demand .

The routing protocols may also be categorized as follows:
Table-driven protocols.
Source-initiated on-demand protocols.

6. List the table driven protocols.
Ans:
☐ Destination-Sequenced Distance Vector (DSDV).
☐ Cluster Head Gateway Switch Routing (CHGSR).
☐ Wireless Routing Protocol (WRP).

7. List the Source-initated On-Demand Routing Protocols.
Ans:
☐ Adhoc On-Demand Distance Vector Routing (AODV).
☐ Dynamic Source Routing (DSR).
☐ Temporarily Ordered Routing Algorithm (TORA).
☐ Associativity Based Routing (ABR).
☐ Signal Stability Based Routing (SSR).

8. What do you mean by hybrid protocols.
Ans: Hybrid Protocols attempt to take advantage of best reactive and proactive schemes.

The main idea behind such protocols is to initiate route discovery on demand but at a limited search cost.

9. List the hybrid protocols.
Ans:
☐ Zone Routing Protocol (ZRP)
☐ Fisheye State Routing (FSR)
☐ Landmark Routing (LANMAR) for MANET with group mobility (LANMAR)
☐ Location-Aided Routing (LAR)
☐ Distance Routing Effect Algorithm for Mobility (DREAM)
☐ Relative Distance Micro discovery Adhoc Routing (RDMAR)
☐ Power aware Routing
☐ Multipath Routing Protocols

11. What do you mean by wireless sensor network.
Ans:
A wireless sensor network is a collection of tiny disposable and low power devices. A sensor node is a device that converts a physical attribute (eg. Temperature ,vibration) into a form understandable by users.
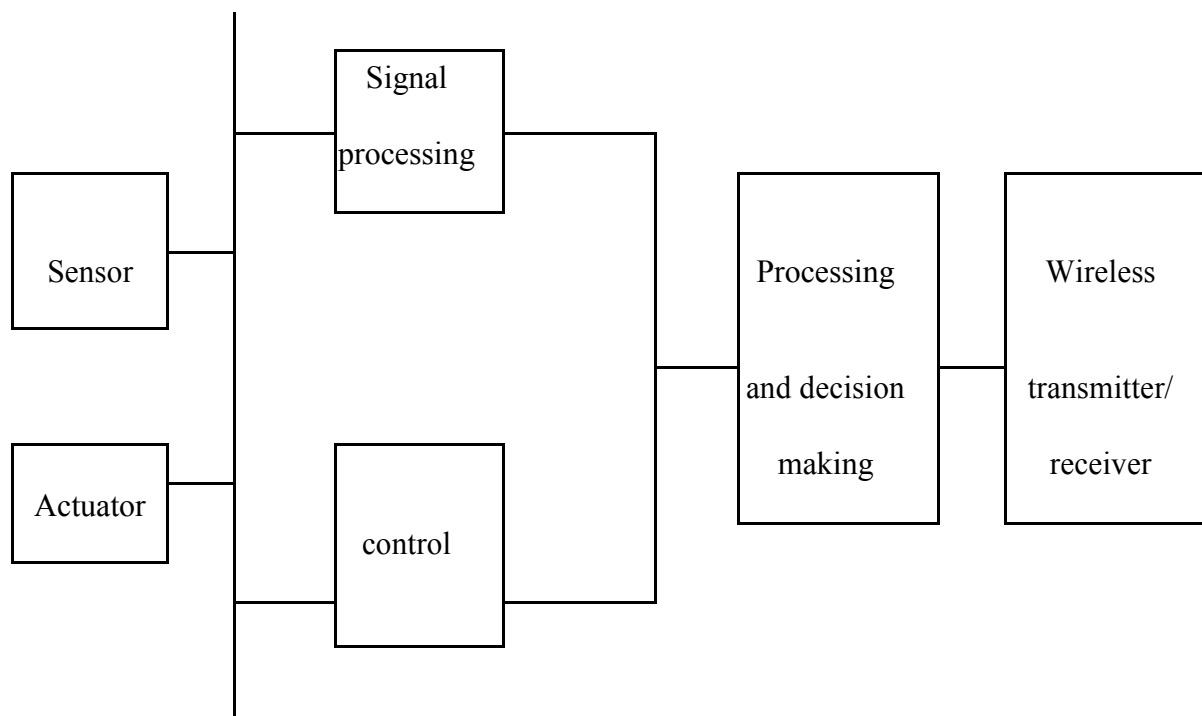
12. List the advantages of wireless sensor network.
Ans:
- □ Ease of deployment
- □ Extended range
- □ Fault tolerance
- □ Mobility

13. Draw the architecture of a fixed sensor node.
Ans:

```
                    ┌──────────────┐
                    │   Signal     │
                    │  processing  │
                    └──────────────┘
  ┌──────────┐                          ┌──────────────┐    ┌──────────────┐
  │          │                          │  Processing  │    │   Wireless   │
  │  Sensor  │                          │ and decision │    │ transmitter/ │
  │          │                          │   making     │    │   receiver   │
  └──────────┘                          └──────────────┘    └──────────────┘
  ┌──────────┐       ┌──────────────┐
  │ Actuator │       │   control    │
  └──────────┘       └──────────────┘
```

14. Give the classification of sensor networks.
Ans:
Sensor networks are classified into two types:
- □ Proactive networks
- □ Reactive networks

15. List the two types of schemes available to allocate a single broadcast channel among competing nodes.
Ans:
- □ Static channel allocation.
- □ Dynamic channel allocation

16. Compare hierarchical routing and flat routing in sensor networks.
   Ans:

Hierarchial	Flat
Reservation-based scheduling.	Contention based scheduling.
Collision avoided.	Collision overhead present.
Data aggregation by cluster head.	Node on multi hop path aggregates incoming data from neighbor.
Simple but less than optimal routing	Routing is complex but optimal

17.Define LEAP and LEACH protocol.
   Ans;
         LEAP is Light Weight Extensible Authentication Protocol which is used in wireless networks.It is designed for providing hogh degree of security for WLAN networks.

         LEACH is Low Energy Adaptive Clustering Hierarchy Protocol that is a clustering based protocol that makes use of randomized rotation of local protocol.The protocol helps to reduce transmission power and useful for wireless sensor networks.

PART –B

1.   Explain in detail about wireless ATM. **(16)**

2.   Explain in detail about three choices of PHY layer. **(16)**

3.   Explain in detail about MAC sub layer with suitable diagram. **(16)**

4.   What is HAN? Explain about HAN technologies? **(16)**

5.What are the issues and deployment challenges in designing wireless sensor networks .Classify the wireless sensor MAC and routing protocols (16)April/May 2015,April/May 2014, April/May 2013.

6.Classify the wireless sensor MAC and routing protocols (10) April/May 2015.

7.Explain in detail about the source initiated routing protocols (AODV and DSDV) for adhoc networks (16)Nov/Dec 2012,Nov/Dec 2014,April/May 2015, April/May 2014.

8.Mention the MAC layer challenges in wireless sensor networks.With relevant examples explain any two MAC layer protocols of wireless sensor networks .(16) Nov/Dec 2014, Nov/Dec 2012

9.Explain flat routing and hierarchial routing protocols in WSN(16) April/May 2014.

10.Why do u need demand based routing protocol for wireless sensor networks.Explain about all the type of wireless routing protocols.(16)April/May 2013.

11.Explain in detail about the MAC protocols of wireless sensor networks.(16) April/May 2013.

12.Classify the wireless sensor networks.(8) Nov/Dec 2013.

13.How can range based localization algorithms used for localizing sensor networks with reference to nearby land marking.(8) Nov/Dec 2013.

14.State the importance of QOS in adhoc networks.Explain with example.(8) Nov/Dec 2013.

UNIT-V

1. What is POS?
Ans:

POS means personal operating space. It is a space about person object that can be extended upto 10 meters in all directions.

2. What is SWAP?
Ans:
SWAP means Shared Wireless Access Protocol.

3. What is Bluetooth? Give its data rate.
Ans:

Bluetooth is an open specification for short range wireless voice and data communications that was developed for cable replacement in PAN (Personal Area Network). The maximum data rate is 721 for asymmetric mode.

4. What are the different sceneries of connection of Bluetooth?
Ans:
☐ Wire replacement in Pc connection.
☐ Ad-hoc networks.
☐ Access Point in large networks.

5. What is random backoff delay?
Ans:

If two Bluetooth devices B1 and B2 are used which are in the same coverage. Then upon reception of inquiry B2 waits for a time which is known as random backoff delay.

6. What is paging?
Ans:
It is a procedure used to connect two Bluetooth devices.

7. List the Bluetooth applications?
Ans:
- ☐ Data and voice access points.
- ☐ Cable replacement.
- ☐ Adhoc networking.

8. What is piconet?
Ans:

Bluetooth is designed to operate in an environment of many users. Upon eight devices can communicate in a small network called piconet .

9. Write the advantages of piconet /scatternet.
Ans:

The advantage of the piconet / scatternet scheme is that it allows many device to share the same physical area and make efficient use of bandwidth.

10. List the five types of logical channels in Bluetooth.
Ans:
- ☐ Link Control (LC)
- ☐ Link Manager (LM)
- ☐ User Asynchronous (UA)
- ☐ User Isochronous (UI)
- ☐ User Synchronous (US)

11. List the major states in the operation of Bluetooth.
Ans:

Two major states are there. They are
- ☐ Standby state.
- ☐ Connection state.

12. List the sub states in the operation of Bluetooth.
Ans:
- ☐ Page
- ☐ Page scan
- ☐ Master response
- ☐ Slave response
- ☐ Inquiry
- ☐ Inquiry scan
- ☐ Inquiry response.

13. List the logical channels provided by L2CAP.
Ans:

L2CAP provides three types of logical channels. They are:
- ☐ Connectionless

☐   Connection oriented

☐   Signaling.

14. What is WMAN?
Ans:

WMAN-Wireless Metropolitan Area Network-IEEE standard for WMAN-IEEE 802.16.

15. Mention the role played by L2CAP Bluetooth networks.
Ans:

It provides connection oriented and connectionless data services to the upper layer protocols.

16. What is Ricochet?
Ans:

Ricochet provides mobile access outside the office and is more of a WMAN service that a WLAN service than a WLAN as the typical coverage is of an entire city.

The Ricochet service was introduced by Metricom, a commercial Internet Service Provider and was available primarily at airports and some selected areas.

17. Compare IEEE 802.16 and Ricochet.
Ans:

Technology	Wireless MAN	
	IEEE 802.16	Ricochet

	IEEE 802.16	Ricochet
operational spectrum	10-66 GHZ, LOS required, 20/25/28 MHZ channels.	900 MHZ.
Physical Layer	TDMA-based uplink, QPSK, 16-QAM, 64-QAM.	FHSS
Interference	Present but limited	present
Channel access	TDD and FDD variants	CSMA

PART –B

1. Explain in detail about geolocation standards for E.911 services **(16)**

2. What are the technologies available for wireless geo location? And explain **(16)**

3. What is geolocation? And give the architecture of geolocation. **(16)**

4. Explain about protocol architecture physical and MAC layers of bluetooth technology.In what way connection management is achieved **(16)Nov/Dec 2013, Nov/Dec 2013,April/May 2014,Nov/Dec 2012, Nov/Dec 2014.**

5. Explain in detail about interface between Bluetooth and 802.11. **(16) May/June 2013.**

6. Explain about IEEE 802.5 WPAN and home RF. **(16) Nov/Dec 2013,May/June 2013.**

7.Compare Wi-Fi,Wimax,optical fiber and 3G technologies.(6) April/May 2015.

8.Enumerate the difference between physical layer architecture of fixed WiMax and mobile WiMax.(16) April/May 2015, April/May 2014.

9.What is the need of WMAN with schematic explain MAC layer details of WIMAX (10)April/May 2015,Nov/Dec 2014

10.Explain in detail the physical and MAC layer of WIMAX network(16) April/May 2014.

11.Explain in detail about the following for Bluetooth i)MAC management ii)Connection Management(16) Nov/Dec 2012.

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EC 2051
WIRELESS SENSOR NETWORKS

SEMESTER - VIII

EC2051   WIRELESS SENSOR NETWORKS   3 0 0 3

1.   **OVERVIEW OF WIRELESS SENSOR NETWORKS   8**

Challenges for Wireless Sensor Networks, Enabling Technologies For Wireless Sensor Networks.

2.   **ARCHITECTURES   9**

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes , Operating Systems and Execution Environments, Network Architecture - Sensor Network Scenarios,   Optimization Goals and Figures of Merit, Gateway Concepts.

3.   **NETWORKING SENSORS   10**

Physical Layer and Transceiver Design Considerations, MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - S-MAC , The Mediation Device Protocol,   Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols- Energy-Efficient Routing, Geographic Routing.

4.   **INFRASTRUCTURE ESTABLISHMENT   9**

Topology Control , Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control.

5.   **SENSOR NETWORK PLATFORMS AND TOOLS   9**

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

                                                              TOTAL : 45

TEXT BOOKS:

1. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.

REFERENCES :

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, And Applications", John Wiley, 2007.
2. Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2003.

EC2051 – WIRELESS SENSOR NETWORKS – QUESTION BANK(R2008)

UNIT-I-OVERVIEW OF WIRELESS SENSOR NETWORKS

PART-A

1. What is WSN?(APR 2013)

   A Wireless sensor network consists of three main components: Nodes, gateways and Software. It is a spatially distributed network. Monitor environmental quantities.

2. What is Data-Centric Network?

   In WSN the nodes are typically deployed to protect against node failure or to compensate to the low quality of a single node sensing equipment. The data centric approach is closely related to query concepts known from databases.

3. List out the different types of interaction pattern between sources and sinks in WSN.(NOV2013)

   1.Single Hop Communication

   2.Multi Hop Communication

4. Why multihop wireless communication is required for WSN?

   While wireless communication will be a core technique, a direct communication between a sender and the receiver faced with limitations. So long distance communication is only possible with multi hop communication using intermediate nodes as relays.Thus multihop communication is required for communication

5. How are sensor nodes are deployed in environment?(NOV 2014)

   1.Random Deployment-Dropped from aircraft

   2.Regualr deployment-Well Planned

   3.Mobile sensor nodes

6. Differentiate between active and passive sensors.(APR2013)

   Active sensor- Radar and Sonar

   Passive Sensor-Light,Heat,chemical

7. List out the requirements of WSN

   1.Type of service

2.QoS

3.Fault Tolerance

4.Lifetime

5.Scalability

6.Programmability

8. Give two applications of sensor network.(APR 2013/2014)

1.Disaster Management

2.Envioronmental control

3.building automation

4.medicine and health care, Logistics,telematics

9.List any two examples of commercial sensor node?(APR2013)

1.Mica and Tiny Node

10.Compare Adhoc and WSN. (APR/MAY/2015)

1.MANET cannot interact with environment and its address centric

2.WSN can interact with environment and its data centric

11.Explain the term auto configuration in WSN.(APR2014)

A node should be able to determine their geographical positions only using other nodes of the other   network so called self location .Also the network should able to tolerate failing nodes or to integrate new nodes.

12. What is meant by energy scanvenging in WSN?APR/MAY/2015

Ideally sensor node also has adevice called for energy scavenging,recharging the battery with energy gathered from the environment from solar cells are vibration based power generationare conceivable options.such a concept requires the battery tobe efficiently chargeable with small amounts of current.

13,Bring out the differences between mobile ad-hoc networks and WSN.

1.MANET cannot interact with environment and its address centric

2.WSN can interact with environment and its data centric

14. What is collaborative innetwork processing ?

   In some applications a single swensor is not able to decide whether an event has happened but several sensors have to collaborate to detect an event and only the joint data of many sensors provide enough information

15. What are the characteristics requirements of wsn?

Multihop wireless communication,energy efficient operation,auto configuration,collaborative innetwork processing data centric locality.

PART-B

1a) (i) Discuss the characteristic requirements of WSN.   (8)

   (ii) Explain the innovative mechanisms to realize the characteristic requirements of WSN.(8)NOV/APR/2015

   (b) Discuss the potential applications of WSN.NOV 2013/APR 2015   16)

2. a) Explain the various challenges of wireless sensor networks.   (16)

   b) i) Briefly discuss about the applications of WSNs.

     ii) Compare MANET and WSN.NOV 2013

3. What are the enabling technologies for WSN.(APR 2014)   (8)

4. Elaborate on the energy scavenging techniques for sensor nodes. (NOV 2014) (6)

UNIT –II-ARCHITECTURE

PART-A

1. List out the major sensor node hardware components

     1.Microcontroller 2.Memory 3.Sensors and Actuators and Tranceivers

2. Why microcontroller is used in wsn?

    1.Internally built memory

2.Capable of going into sleep states thereby reducing energy consumption

3.List out Microcontrollers used in WSN

    1.INTEL STRONG ARM

    2.TEXAS INSTRUMENTS

4. What are different operational states of sensor nodes?

    1.Tranmit

    2.Receive

    3.Idle

    4.Sleep

5. What is WAKEup RADIO Receiver?

    It is a radio receiver circuit to inform the main receiver about the arrival of a packet

Their only purpose is to wake up the main receiver without needing power to do

6. What are the different types of mobility?

  (i) Node mobility

  (ii) Sink mobility

  (iii) Event mobility

7. What are sensors and actuators?

    Sensor is used to measure physical quantity at the point of the sensor node without actually manipulating the environment by active probing. Some the sensors are actually self powered in the sense that they obtain the energy that need from the environment.

8. What are active and passive sensors?

    Active sensors actively probes the environment for example sonar or radar or some type of seismic sensors which generate shockwaves by small explosions

    Passive are narrow beam sensors has well defined notion of direction of measurement ex:cameras

9. What are varios sensor network scenarios?

(i) Single hop

(ii) Multi hop

(iii) Multiple sinks and sources

10. Define source and sink.

A source is any entity in the network that can provide information that is typically a sensor node: it could be also an actuator node that provides an feedback about an operation

A sink is an entity where information is required there are essentially three options of a sink it could be a sensor network such as sensor or actuators, PDA and gateways

11. What are gateway concepts?(APR2015)

The network has to be able to interact with other information device to exchange data to the mobile device or some sort of gateway which provide physical connection to the internet.

12. What are optimization goal of WSN? ?(APR2015)

(i)Quality of service

(ii) Event detection, Event classification, Event detection delay, Missing reports, Aproximation accuracy

13. What is wsn tunneling?

The method building a larger virtual WSN out of separate parts transparently tunneling all protocol messages between these two networks and simply using the internet as a transport network.

14. What are the different types of gateways? ?(APR2015)

(i) WSN to internet communication

(ii) Internet communication to WSN

(iii) WSN tunneling

15. Define QOS in WSN. ?(APR2015)

QOS is one of the performance parameters of wsn. It differs from other communication network mainly with the type of service they afford. The high level QOS attributes in wsn highly dependent on the application.

PART-B

1. a) Explain about energy consumption of sensor nodes in detail.(NOV 2014)   (16)

   b) Write in detail about the communication device in a WSN.   (16)

2.(a) Discuss in detail the Transceiver characteristics and structure. (APR2015)   (16)

  (b) (i) Define the types of Sensors.   (6)

    (ii) Write about the operational states of a sensor node.   (4)

3. (a) Write notes on   (NOV 2014)

    (i). Dynamic Energy and power management   (6)

    (ii). TinyOS and nesC   (4)

    (iii). Programming Models in WSN   (6)

  (b) Discuss in detail the design principles for WSN.(NOV2013)   (16)

4.Explain in detail operating system and execution environments in WSN.(APR 2013) (16)

5. Explain in detail optimization goal and figure of merit in WSN.(APR2015) (16)

6. Explain in detail the gateway concept. (APR2015) (16)

7.a)i) What are the different programming models and indicate which model is best

    suited for WSN?_.(APR 2013)

   ii) Write about the structure of OS and protocol stack in a WSN.   (8+8)

UNIT III-NETWORKING SENSORS

1. List out the factors influencing the PHY layer design in WSN

Low power consumption, small transmit power, small transmit range, dynamic voltage scaling.

Low implementation complexity and cost, low degree of mobility

2. What is MAC protocol?

It is the sub layer which provides addressing and channel access control mechanism that make it

possible for several terminals or network nodes to communicate .the most important requirements for Mac

protocols are throughput ,efficiency,scalability,fairness,low access delays well as low overhead delay.

3. What are the important classes of MAC protocols?

Fixed assignment protocols, Demand assignment protocols, Random access protocols.

4. What are the energy problems on the MAC layer.

Collisions,overhearing,protocol overhead,idle listening

5.What are low duty cycle protocols and wake up concepts?

Low duty cycle protocols try to avoidspending much time in idle state and ro reduce the communication

activities of a sensor node to a minimum.In an ideal case the sleep state is left idle only when a node is about to

transmit receive packets.

6.What is STEM protocol? ?(APR2015)

Stem protocol targets networks that are deployed to wait for and report on the behavior of a certain event .stem

protocol tries to eliminate idle listening in the monitor state and to provide a fast transition into the transfer state.

7.Define S-MAC

smac Provides mechanisn to circumvent idle listening collision and over hearing.It does not require two different channels.S-MAC adopts a periodic wake up scheme that is each node alternates between a fixed length listen period and a fixed length sleep period accrding to its schedule.

8.What are the various phases of smac protocol.

Wake up period,listen period and sleep period

9.what is mediation dcevice protocol ?

Thuis allows each node in a wsn to go into sleep mode periodically and to wake up only for short times to receive packets from neighbor nodes.

10..List MAC protocols for sensor networks.(APR2015)

      Sensor MAC, Berkeley MAC, Predictive Wake Up MAC, Power Aware MAC, DATA   Gathering, Priority based MAC

11. What are contention based protocol.In contention based protocol a given transmit opportunity toward a receiver node can in principle be taken by any of its neighbourb.the two important contention based protocol are ALOHA and CSMA.

11.What are schedule based protocol?

Schedule based protocol do not explicitly address idle listening avoidance but do so implicitely by employing TDMA protocol.

12.What is LEACH protocol? .(APR2015)

LEACH partions the nodes into clusters and in each cluster a dedicated node the clusterhead is responsible for creating and maintaining a tdma schedule all other nodes of a cluster are member nodes.to all member nodes.To all member nodes tdma slots are assigned which can be used to exchange data between the member node and the cluster head.

13.What is TDMA based MAC?

        1.Traffic adaptive MAC

        2.Self Organising MAC

14.What are fundamentals of address and names in sensor networks? .(APR2015)

Unique node identifier,MAC address ,network address,network identifier,resource identifier

15.what is address and name management in wsn? .(APR2015)

MAC address need to be globally or network wide unique,this requirement ensures that no two neighbour of a selected node have the same mac address.locally unique address potentially are short but need an address assignment protocol,.

PART-B

1. (i) Elaborate on the requirements of MAC protocols for WSNs.   (8)

  (ii) Discuss the PAMAS protocol in detail.   (8)

2.a)Explain the design approaches and performance of S-MAC protocol. (16)

 b)i) Describe the Low Energy Adaptive Clustering Hierarchy.

 ii) Explain the important classes of MAC protocols.   (8+8)

3. (a)(i) Explain the concept of TRAMA protocol.   (8)

  (ii) Discuss the distributed assignment of network wide unique MAC address for

 WSN   (8)

 (b) (i) Elaborate on the concepts of Energy Efficient Unicast Routing Protocol. (8)

  (ii)Discuss the basics of Position Based Routing Protocol for WSN. (8)

 4. a)i) Discuss about content-based addressing in detail.

  ii) Explain briefly the address assignment algorithm. (8+8)

  b) Describe in detail about SMACS.   (16)

5. (a)Discuss the principle of S-MAC protocol and mediation device protocol with a neat sketch. (16)

 (b)Describe in detail the geographic routing with and without positions. (APR 2015) (16)

6. Describe the physical layer and transceiver design consideration in WSN (APR 2014) (16)

7. (i)Define low duty cycle protocols and explain the concept of S-MAC in detail with relevant diagram(8)

 (ii)Write a note of wakeup radio concept. (8)(APR 2013)

8. Write short notes on assignment of MAC address.(8) (NOV 2013)

UNIT –IV-INFRASTRUCTURE ENVIRONMENT

1. Define clustering. (APR2015)

       The process of organizing nodes into groups

2. What is the role of cluster heads?

       Energy consuming, transmitting data between source and sink

3.List out types of node level software platform used in wsn

       TINYOS and TIN GALS

4.What are the two types of components in nesC?

       Modules and Configurations

5.What are the different protocol in topology?

       COMPOW,K-NEIGH

6.What is LEACH Protocol?(APR2015)

       LEACH is a Schedule based protocol where the packets are transmitted using TDMA slots

7.What are the aspects of Topology control algorithm?

       Connectivity,Stretch Factor,Graph Metrics,Throughput,Robustness to mobility

8.Define triangulation and trilateration

       Triangulation means working with angles and Trilateration means working with distances.

9.Give the requirement of time synchronization algorithm

    Large Mulithop networks, precision ranging from Microseconds to seconds,use of extra hardware,no

bounce for packet delivery and delay.

10.What are the different protocols for time syncronisation

       Light weight time synchronization Pairwise

      Networkwide synchronization

11.What are the properties of localization and positioning ?

Physical position versus symbolic location,absolute versus relative co ordinates,localized versus centralized computation,accuracy and precision scale,costs.

12.What is active badge ?

The Active badge location system is the first system design and buit for locating simple portable devices badges within a building.it uses diffused infrared as transmission medium and exploits the natural limitations of infrared waves by wals as a delimeter for its location granularity.

13.what are the aspects of topology control algorithms.

Connectivity,stretch factor,graph metrics,throughput,robustness to mobility,algorithim overhead.

14.what are multicast protocols?

One tree per source shared tree and mesh protocols.the shared tree can be classified to single core and multiple core.

15.what is geocasting?(APR2015)

Geocasting sending data to a subset of nodes that are located in an indicated region is evidentily an example of multicasting and thus would not require any further attention .

PART-B

1. Write down the need of time synchronization for sensor nodes and explain the reference broadcast synchronization with relevant diagram.(16)(APR 2013)

2. (i)Explain the range based localization in detail.(8) (APR2015)

     (ii)Discuss about the sensor tasking with an emphasis on the role of sensor nodes and utilities(8)

3.(i)Discuss any two energy optimal localization algorithm adopted in WSN.(8)

   (ii)Explain any two time synchronization algorithm in WSN.(8)(NOV 2014)

4. Explain the following (8+8) (APR 2014)

   (i)Efficiency by in network processing

   (ii)Geographical forwarding

5. Discuss on Angle of Arrival (AOA) and Time Difference of Arrival (TDOA) based tracking mechanism.

6. (i) Explain how the nodes in a sensor network are time synchronized foe temporal reasoning.(8)

(ii)Discuss in detail about localization algorithm with neat sketch.(8)   (APR2015)

7. Discuss in detail about Information based sensor tracking.(16) (APR2015)

8. Discuss in detail about various clustering protocols.(16) (NOV 2014)

9. Discuss in detail about topology control in WSN. (16) (NOV 2013)

UNIT V-SENSOR NETWORK PLATFORMS AND TOOLS

1.What are the different tyupes of execution modes?

Cycle driven,discrete event simulation

2.List the family of Berkeley motes

WeC,ReneRene2,Mica,Mica 2,Mica 2 DOT

3.What are the features of TOSSIM Simulator

It operates in Tiny OS mote, Scalable to thousands of motes ,Compiles directly from

source,simulates network at bit level.

4. What is node level simulator?

TinyOS, nesC, and TinyGALS, as examples of node-level operating systems and programming   languages based on

the Berkeley

mote hardware

5. What are roles of sensor?

Sensor in a network may take on different roles Ex: monitoring toxicity levels in an area around a

chemical plant. The role are (i) sensing

(ii) Sensing and routing

(iii) Routing

(iv) Idle

6. What is state centric programming?

State-centric programming is aimed at providing domain-specific programming models for information processing applications in sensor networks

7. What are the different types of node level software platforms?

    (i)   Tiny OS

    (ii)   Tiny GALS

    (iii)   Mate

    (iv)   TOSSIM

    (v)   WING NG

8. What are Berkeley motes?

The Berkeley motes are a family of embedded sensor nodes sharing roughly the same architecture as of MICA mote.

9. What are categories of sensor node hardware?

  (i) Augmented general-purpose computers

  (ii) Dedicated embedded sensor nodes

  (iii) System-on-chip (SoC) nodes

10. What are the Sensor Network Programming Challenges?

Traditional programming technologies rely on operating systems to provide abstraction for processing, I/O, networking, and user interaction hardware.When applying such a model to programming networked embedded systems, such as sensor networks, the application programmers need to explicitly deal with message passing, event synchronization, interrupt handing, and sensor reading. As a result, an application is typically implemented as a finite state machine (FSM) that covers all extreme cases: unreliable communication channels, long delays, irregular arrival of messages, simultaneous events, and so on.

11.What are the types of programming in sensor networks?

There are two types of programming for sensor networks, those carried out by end users and those performed by application developers.

An end user may view a sensor network as a pool of data and *interact* with the network via queries. An application developer must provide end users of a sensor network with the capabilities of data acquisition,processing, and storage.

12.What are collaboration groups in state centric programming?

A collaboration group is a set of entities that contribute to a state update. These entities can be physical sensor nodes, or they can bemore abstract system components such as virtual sensors or mobile

agents hopping among sensors. In this context, they are all referredto as *agents*.

13. Name the components present in node level simulators.

(i)Sensor node model

(ii) Communication model

(iii)Physical environment model

(iv)Statistics and visualization

14. What are the types of execution models?

(i) Cycle-driven simulation

(ii)Discrete-event simulation

15. Define: Cycle-driven simulation

A cycle-driven (CD) simulation discretizes the continuous notion of real time into (typically regularly spaced) ticks and simulates the system behavior at these ticks. At each tick, the physical phenomena are first simulated,and then all nodes are checked to see if they have anything to sense, process, or communicate.

16. Define: Discrete-event simulation

A discrete-event (DE) simulator assumes that the time is continuous and an event may occur at any time. An event is a 2-tuple with a value and a time stamp indicating when the event is supposed to be handled.

PART-B

1.Discuss sensor node hardware and describe the architecture of MICA mote architecture with a neat diagram.(16)(APR 2015)

2.(i)Discuss the various programming challenges inWSN.(8+8) (APR 2015)

  (ii)Explain state centric design framework for embedded systems.

3.Write detailed notes on any one node level software platform.(16)(NOV2014)

4.(i)List the factor that makes the use of innovative devopment modules.(8)(APR2015)

  (ii)Explain the system architecture of canonical wireless sensor node(8)

5.List out the difference between Zigbee and Bluetooth(8)(NOV2013)

6.Explain the concept of state centric programming in target tracking application carried out using WSN.