V.S.B. College of Engineering Technical Campus, Coimbatore
Department of Electronics and Communication Engineering

SUBJECT NAME: EC6801 WIRELESS COMMUNICATION

2 MARKS & 16 MARK QUESTIONS WITH ASSIGNMENT QUESTIONS

UNIT I WIRELESS CHANNELS

1. What are the propagation mechanisms of EM waves?
2. What is the significance of propagation model?
3. What do you mean by small scale fading?
4. What are the factors influencing small scale fading?
5. When does large scale propagation occur?
6. Define Doppler shift.
7. Differentiate time selective and frequency selective channel.
8. Define coherence time and coherence bandwidth.
9. Define radar cross section.
10. What is free space propagation model?
11. Define EIRP.
12. What is scattering?
13. Name some of the outdoor propagation models?
14. What are merits and demerits of Okumara's model?
15. List the advantages and disadvantages of Hata model?
16. What is the necessity of link budget?
17. Differentiate the propagation effects with mobile radio.
18. Explain path loss.
19. Mention some indoor propagation models?

16 MARK

1. What you mean by path loss model? Explain large scale path loss
2. Define propagation model and, explain the two types of propagation model
3. Explain the free space path loss model, and describe the following
    a. log-distance path loss model
    b. log-normal shading path loss model
    c. determination of percentage of coverage area
4. Explain following
    a. Friis free space equation.
    b. d-4 law
    c. Path loss equation for a free space propagation model.
5. Derive the expression for electric field, path loss and received power for a Two Ray model.
6. Explain small scale fading and, what are the factors affecting the small scale fading.
7. Explain the following
    a. Doppler shift
    b. Doppler spread
    c. Coherence time
8. Explain fading due to multipath delay spread.
9. Explain fading due to Doppler spread and coherence time.

UNIT II CELLULAR ARCHITECTURE

1. State the principles of CDMA.
2. How the capacity can be increased in CDMA?

3. Write short notes on OFDM.
4. List the advantages and disadvantages of FH-SS.
5. List the types of FH-SS.
6. Compare slow and fast FH-SS.
7. What is hand off?
8. Define dwell time.
9. What is soft handoff?
10. What is co channel interference?
11. Define co-channel reuse ratio.
12. Define adjacent channel interference.
13. Define Grade of service.
14. Define cell splitting.
15. What is sectoring?
16. What is channel assignment? What are the types?
17. What is fixed channel assignment?
18. What is dynamic channel assignment?
19. What is the function of control channel? What are the types?
20. Define cell

16 MARK

1. Compare FDMA, TDMA &CDMA.
2. Briefly explain the principle of cellular networks.
3. Write short notes on frequency reuse & channel assignment strategies.
4. Explain Handoff and interference systems.
5. Explain the Multiple Access methods with neat diagrams.
6. Explain Grade of service, blocked calls cleared, blocked calls delay.
7. Write detail about trunking and grade of service of cell system

UNIT III DIGITAL SIGNALING FOR FADING CHANNELS

1. List the advantages of digital modulation techniques.
2. What are the factors that influence the choice of digital modulation?
3. Define power efficiency and bandwidth efficiency.
4. What is QPSK?
5. Define offset QPSK and $\pi/4$ differential QPSK.
6. What is meant by MSK?
7. List the salient features of MSK scheme.
8. Why GMSK is preferred for multiuser, cellular communication?
9. How can we improve the performance of digital modulation under fading channels?
10. Write the advantages of MSK over QPSK.
11. Define M-ary transmission system?
12. What is Quadrature modulation?
13. What is QAM?
14. Define QPSK
15. What is linear modulation?
16. Define non linear modulation.
17. What is the need of Gaussian filter?
18. Mention some merits of MSK.
19. Give some examples of linear modulation.
20. Why cyclic prefix?

16 MARK

1. Discuss about QPSK transmitter and receiver with signal space diagram and give an expression for spatial effect
2. Explain pi/4 QPSK transmitter and receiver with signal space diagram and give an Expression for spectral efficiency.
3. Explain windowing techniques in OFDM systems.
4. Explain cyclic prefixing in OFDM system
5. Explain orthogonal frequency division multiplexing with diagram
6. Discuss about the performance of digital modulation in frequency selective fading channels
7. Explain about the performance of digital modulation in flat fading channel
8. Explain GMSK transmitter and receiver with signal spacing diagram and give an expression for spectral efficiency
9. Briefly explain Peak Average Power Ratio(PAPR) in OFDM
10. What is MSK, explain with transmitter and receiver diagram .Explain the various types of demodulation of MSK.

UNIT IV MULTIPATH MITIGATION TECHNIQUES

1. What is the need of equalization?
2. What is diversity?
3. Define spatial diversity.
4. Define STCM.
5. Define adaptive equalization?
6. Define training mode in an adaptive equalizer?
7. What is tracking mode in an adaptive equalizer?
8. Write a short note on linear equalizers and non linear equalizers?
9. Why non linear equalizers are preferred?
10. What is the nonlinear equalization methods used?
11. What are the factors used in adaptive algorithms?
12. Define diversity concept.
13. Differentiate selection diversity and combining diversity.
14. Write the advantages of LMS algorithm.
15. What is time division multiple access?
16. What is fast and slow frequency hopping?
17. Define capacity of cellular systems
18. Define forward channel interference
19. Define adaptive channel allocation
20. What are vocoders?
21. What is narrow band system?

16 MARK

1. Derive for the mean square error for linear equalizer during training adaptive equalizer
2. Explain the working principle of nonlinear equalizer based on decision feedback equalizer
3. Derive the expression for least mean square algorithm
4. Write different kind of performance of adaptive equalizer algorithm is determining the various factor and explain.
5. Explain the detail of maximum like hood sequence estimation (MLSE) of Nonlinear equalizer
6. Write detail operation of micro diversity in terms of Special, Temporal, Frequency, Angle polarization
7. What you mean by combining diversity and explain selective, switching combining diversity.
8. Explain the following
   a). Error probability in flat-fading channels

b).Symbol error rate in frequency selective fading channel
9. Write brief explanation of Rake receiver
10. Write combining techniques using combination of signal
   a. Maximum ratio combining
   b. Equal gain combining
   c. Optimum combining
   d. Hybrid selection -maximum ratio combining

UNIT V MULTIPLE ANTENNA TECHNIQUES

1. Write the two types of spread spectrum?
2. What do you mean by spread spectrum?
3. What is PN sequence?
4. When is the PN sequence called as maximal length sequence?
5. Write the properties which a PN sequence should have.
6. Define chip duration and chip rate.
7. What do you mean by processing gain of a spread spectrum?
8. List the advantages and disadvantages of DS-SS.
9. Define jamming and jamming margin.
10. What is meant by anti-jamming?
11. List the advantages and disadvantages of FH-SS.
12. List the types of FH-SS.
13. Compare slow and fast FH-SS.
14. Compare DS-SS and FH-SS.
15. Write the goals of GSM standard.
16. What are the services offered by GSM?
17. Define spatial diversity.
18. Define the bursts.
19. Why Dummy burst is used?
20. Define burst formatting in GSM.

16 MARK

1. With diagram explain the system model for MIMO systems.
2. Discuss about the operation of spatial multiplexing systems.
3. Explain the operation of transmit precoding and receiver precoding schemes.
4. Why beamforming is important for wireless systems? With illustration explain transmit beamforming, receive beamforming and opportunistic beamforming.
5. Using diagrams explain transmit diversity and receive diversity.
6. Derive the capacity of a fading channel for information transmitted from a wireless system.
7. Derive the capacity of a Non fading channel for information transmitted from a wireless system.
8. What is channel state information? Explain the different kinds of channel state information.
9. What are smart antennas? Why are they required for and what are the different approaches for capacity gains?
10. Compare the capacity of a fading and a non fading channel for information transmitted from a wireless system.

ASSIGNMENT QUESTIONS

1. Write an equation that relates the speed of light c, to carrier frequency f, and wavelength λ.
2. In your home, how many modern wireless communications networks are available to you? Identify the types of services, the types of technologies, the commercial names of the service

providers, and the commercial names of the equipment manufacturers that offer these wireless access capabilities.

3. Show that the frequency reuse factor for a cellular system is given by k/S, where k is the average number of channels per cell and S is the total number of channels available to the cellular service provider.

4. Find the far-field distance for an antenna with maximum dimension of 1m and operating frequency of 900 MHZ.

5. A Vehicle receives 900 MHZ transmission while traveling at a constant velocity for 10s. The average fade duration for signal level 10dB below the rms level is 1ms.How far does the vehicle travel during 10s interval? How many fades does the signal undergo at the rms threshold level during 10s interval? Assume that the local mean remains constant during travel.

SUBJECT NAME: EC 6802 WIRELESS NETWORKS

2 MARKS & 16 MARK QUESTIONS WITH ASSIGNMENT QUESTIONS

UNIT I WIRELESS LAN

1. List the advantages of ALOHA protocol.
2. List the disadvantages of ALOHA protocol.
3. What do you mean by slotted ALOHA?
4. List the groups made by random access methods for mobile data services?
5. What is R-ALOHA?
6. Define BTMA.
7. List the access methods for wireless LAN's.
8. What is non-persistent mechanism?
9. What is persistent mechanism?
10. Mention the problem in integrated services.
11. Define wireless voice quality.
12. What is RTS/CTS?
13. What are the Capture effect problems.
14. What is LBT?
15. What do you mean by Handoff?
16. List the parameters that influence the Handoff.
17. On what parameters Handoff depends on?
18. List the units of components that involved in setting up a call.
19. Give the classifications of Handoff.
20. How the hard Handoff is characterized?
21. What does Authentication of a subscriber implies?
22. List the services of security it can be classified.
23. List the categories of security mechanisms.
24. List the categories of attacks.
25. Define secure system.

16 MARK

1. Explain IEEE 802.16 with neat illustration.
2. What is Bluetooth? Explain its protocol model with its application.
3. What is LAN? Explain with neat diagrams of its general architecture.
4. Explain protocol model of IEEE 802.11 with physical and MAC layer.
5. Discuss about HIPERLAN 1 and compare it with HIPERLAN 2.
6. Write a detail note on various WLAN technologies.
7. Explain in detail about 802.11b and 802.11a with neat diagrams.
8. What is HIPERLAN? Draw the architecture of Bluetooth and explain its security.
9. Explain in detail about the physical layer and MAC of WIMAX.
10. Write a note on spectrum allocation for WIMAX.
11. Describe about WATM and BRAN in detail.

UNIT II MOBILE NETWORK LAYER

1. List the four layers involved in SMS?
2. Name the five major challenges for implementation of wireless LANs that existed from the beginning of this industry.
3. Is CDMA an access method or an air interface? Justify your answer.
4. What is meant by capacity on demand principle in GPRS networks?
5. What are VLR and HLR? Where they are physically located and why we need them?
6. What is AMPS?

7. List the AMPS parameters.
8. What do you mean by NAM?
9. for what purpose second generation systems have been developed?
10. List the mobile wireless TDMA design consideration requirements.
11. What do you mean by self-jamming?
12. List the components in Base Station Subsystem.
13. List the advantages of CDMA.
14. What is soft hand off?
15. What is near far problem?
16. List the capabilities of third generation systems.
17. Give the limitations of GPRS.
18. What is SMS?
19. What is GPRS?

16 MARK

1. Discuss briefly about agent discovery process in mobile IP.
2. Explain about registration process in mobile IP.
3. Discuss in detail about IPV6.
4. What are the solutions recommended for micro mobility support?
5. Discuss about DHCP in detail.
6. Explain briefly about SIP.
7. Explain with the example (i) DSR (ii) DSDV.
8. Write a detail note IP packet delivery and agent discovery.
9. Differentiate between tunneling and encapsulation with neat diagram. Explain reverse tunneling.
10. What is mobile adhoc network? State its routing.
11. Explain in detail about destination sequence distance vector algorithm.
12. Describe in detail about dynamic source routing.

UNIT III MOBILE TRANSPORT LAYER

1. What are the advantages of wireless LAN?
2. What are the properties of ISM band?
3. Mention the three basic rules (or) etiquette of spectrum.
4. State the features of wireless LAN.
5. Draw the frame format of IEEE 802.11 physical layer using FHSS.
6. Draw the frame format of IEEE 802.11 physical layer using DSSS.
7. List the type of architecture used in IEEE 802.11
8. What are the characteristics of DSSS?
9. What is the formula used in DSSS and FHSS to scramble the transmitted bits?
10. Draw the MAC layer frame format of IEEE 802.11.
11. Draw the MAC management frame format.
12. What is meant by wireless ATM?
13. Draw the packet frame format of WATM.
14. Draw the IEEE 802.11 MAC frame.
15. What are the possibilities of communication between mobile terminal and a fixed terminal?
16. What are the versions of HIPER LAN?
17. List the protocols used in HIPER LAN-2.
18. What is meant by data link layer?
19. What are the phases available in HIPER LAN-1 MAC layer?
20. List the services provided by IEEE 802.11.
21. Draw the frame control field of IEEE 802.11 MAC frame.
22. What are the differences between the 802.11a and HIPET LAN-2?

23. What do you mean by WPA?

16 MARK

1. Explain briefly about various algorithms to control the congestion in TCP.
2. What are the various schemes to improve the performance of TCP?
3. Compare various classical TCP improvement mechanisms.
4. Discuss about TCP over 3G wireless networks.
5. What are the parameters to adapt TCP to wireless environment?
6. Explain in detail about traditional TCP and its function.
7. Write a detail note on indirect TCP. State its various advantages and disadvantages.
8. Describe about snooping TCP and M TCP in detail.
9. Compare the different approaches for "mobile" TCP.
10. Explain the functions of Transport Layer in internet.

UNIT IV WIRELESS WIDE AREA NETWORK

1. Define MANET.
2. List the characteristics of MANETs
3. List the application of MANETs.
4. List the factors that involves in routing of a MANET.
5. List the major goals when selecting a routing protocol.
6. Give the classifications of routing protocol in MANET.
7. List the table driven protocols.
8. List the Source-initiated On-Demand Routing Protocols.
9. What do you mean by hybrid protocols?
10. List the hybrid protocols.
11. What do you mean by wireless sensor network?
12. List the advantages of wireless sensor network.
13. Give the classification of sensor networks.
14. List the two types of schemes available to allocate a single broadcast channel among competing nodes.
15. Compare hierarchical routing and flat routing in sensor networks.
16. State UMTS and its services.
17. Define UTRAN.
18. What is RNC in UTRAN?
19. What are the responsibilities of RNC?
20. What is mean by Firewall?

16 MARK

1. Explain the services of UMTS.
2. Describe in detail about logical interfaces of UTRAN.
3. Explain about LTE architecture and its protocol model.
4. Describe about UMTS core network architecture with neat illustrations.
5. With neat illustration explain about UMTS terrestrial radio access network.
6. What is UCN? Write a detail note on UCN architecture.
7. Write a detail note on high speed down link packet access.
8. Describe the various types of HSDPA channels in detail with neat sketch.
9. Explain LTE architecture in detail.
10. What is LTE protocol? With neat diagram explain the various protocol stacks in detail.
11. Write a detail note on LTE roaming architecture.
12. Discuss the responsibilities of RNC and node B in UMTS.
13. What are the entities of core network UMTS? Explain each one in detail.

UNIT V 4G NETWORKS

1. What is POS?
2. What is SWAP?
3. What is Bluetooth? Give its data rate.
4. What are the different sceneries of connection of Bluetooth?
5. What is random back off delay?
6. What is paging?
7. List the Bluetooth applications?
8. What is Pico net?
9. Write the advantages of Pico net /scatter net.
10. List the five types of logical channels in Bluetooth.
11. List the major states in the operation of Bluetooth.
12. List the sub states in the operation of Bluetooth.
13. List the logical channels provided by L2CAP.
14. What is WMAN?
15. Mention the role played by L2CAP Bluetooth networks.
16. What is Ricochet?
17. Compare IEEE 802.16 and Ricochet.
18. State the technologies used in 3G
19. State the various 4G Features.
20. What are the challenges of 4G?

16 MARK

1. Compare the key parameters of 3G and 4G.
2. Discuss about 4G vision, features and challenges of 4G with applications.
3. Write a detail note on applications of 4G.
4. Discuss about various technologies used in 4G.
5. What is cognitive radio? and explain it.
6. With a neat sketch, describe in detail about multi carrier modulation.
7. Write a detail note on smart antenna techniques.
8. Describe in detail note on OFDM –MIMO systems.
9. What is adaptive modulation and coding? Draw its graph.
10. Explain in detail about cognitive radio.

ASSIGNMENT QUESTIONS

1. Define BYOD (Bring Your Own Device). Explain the possible problems if we are implemented BYOD integration in Colleges, How do you rectify it? Give the solutions.

2. If a total of 33MHZ of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute no of channels available per cell if a system uses(a) 4-cell reuse,(b) 7-cell reuse (c) 12-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of three systems.

SUBJECT NAME: CS6003 AD HOC AND SENSOR NETWORKS

2 MARKS & 16 MARK QUESTIONS WITH ASSIGNMENT QUESTIONS

UNIT I INTRODUCTION

1. What is an adhoc network?
2. What is fading? List the different types of fading?
3. Why ad hoc networks are needed?
4. What are the challenging issues in ad hoc network maintenance?
5. What is hidden terminal problem?
6. Distinguish between shadowing and reflection of signal propagation
7. List the transmission impediments of wireless channel
8. State Shannon's theorem.
9. Differentiate an ad hoc network and a cellular network with respect to bandwidth usage and cost effectiveness
10. List the applications of ad hoc network.
11. Define path loss.
12. Write the equation for maximum data rate according to Shannon's theorem.
13. Give the difference between cellular networks and ad hoc wireless networks.
14. List the issues that affect the design deployment and performance of ad hoc wireless system.
15. How scalability improved in ad hoc wireless network?
16. List the benefits when deployment of a commercial ad hoc wireless networks compared to wired network.
17. List the propagation mechanism experienced by radio wave.
18. List the characteristics of wireless channel.
19. Define Nyquist theorem.
20. Define Doppler shift.
21. List the advantages of hybrid wireless networks.
22. Compare Ad-hoc Networks and Wireless LAN.
23. Define Scalability.

16 MARK

1. What are the characteristics and features of ad hoc networks?
2. Explain path loss and fading in detail.
3. Explain the two main forms of interference, Doppler shift and Nyquist theorem.
4. Explain the applications areas of ad hoc networks.
5. Explain the characteristics of wireless channels.
6. Explain the design issues in adhoc network?
7. Differentiate between cellular network and AdHoc Network.

UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

1. List the design goals of MAC protocol for ad- hoc networks.
2. List the issues of designing a MAC protocol for ad hoc networks.
3. What are the classifications of MAC protocol
4. What are the effects of exposed terminal problem in wireless networks?
5. What are the advantages of directional antennas of MMAC over MACAW?
6. What are the mechanisms used in MAC layer?
7. What are the differences between HRMA and SRMA?
8. List the five phases of FPRP.
9. List any two needs of real- time MAC protocol.
10. Compare the efficiency of the packet queuing mechanism adopted in MACA and MACAW

11. What do you mean by contention based protocols?
12. Give the classification of contention based protocol
13. Give the classifications of MAC protocols.
14. List the main issues in designing a MAC protocol for ad hoc wireless networks.
15. What do you mean by FAMA?
16. What do you mean by contention based protocols with reservation mechanism?
17. What do you mean by contention based protocols with scheduling mechanism?
18. What do you mean by D- PRMA?
19. What are the disadvantages of the binary exponential back off mechanism used in MACA? How are they overcome in MACAW?
20. What do you mean by BTMA?
21. On what basis MACAW protocol is designed?
22. What are the issues to be considered while designing a MAC protocol for Ad-Hoc Networks?

16 MARK

1. Explain MACAW protocol in detail.
2. Explain the contention based protocols with scheduling and reservation in detail.
3. List and explain the issues in designing a MAC protocol for ad hoc wireless networks.
4. List the important goals of designing a MAC protocol for ad hoc wireless networks.
5. Illustrate various steps involved in five phase reservation protocol with its frame format.
6. How is scheduling mechanism achieved in distributed wireless ordering protocol? Explain in Detail how Information symmetry and perceived collisions handled are.
7. What are the advantages of reservation based MAC protocol over contention based MAC Protocol?

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS

1. What are the responsibilities of routing protocol?
2. What are the major challenges in designing routing protocols?
3. Differentiate proactive and reactive protocols. Write examples for each.
4. List the characteristics of a routing protocol for ad hoc wireless networks.
5. What is the approach used to find link stability in ABR ?
6. List the major classification of routing protocol for ad hoc wireless network.
7. Based on routing information update mechanism how the routing protocols are classified?
8. How does energy aware routing work? (May/ June 2012)
9. List the classification of routing protocols based on the routing information update mechanism.
10. List the approaches for power aware routing protocol.
11. Based on the use of temporal information for routing, how the routing protocols are classified?
12. Based on the routing topology how the routing protocols are classified?
13. What is the need for power management in ad hoc network?
14. List some examples of table driven routing protocols.
15. List the advantages and disadvantages of DSDV routing protocols.
16. What is hybrid routing protocol?
17. Mobility of nodes in a sparsely populated mobile ad ho network is less. What is the choice between proactive routing protocol and reactive routing protocol?
18. List the types of on-demand routing protocols.
19. List the types of hybrid routing protocols.
20. How on-demand routing protocols differ from on-demand routing protocols?
21. What are the advantages and disadvantages of dynamic source routing protocol?(DSRP)
22. What are the pros and cons of tree based and mesh based routing?
23. What is call routing?
24. Mention any four qualities of service metrics that are used to evaluate the performance of the

network?
25. Where is network layer solution used for quality of service?
26. Is hop - length always the best metric for choosing paths in MANETs? Defend your answer.
27. State any four reasons that lead to the quick power drain of nodes in mobile ad hoc network.
28. AMRIS may to exhibit high packet delivery ratio even when all nodes restrict their mobility to a small region. Why?
29. Give the difference between Ad hoc on demand Distance vector routing protocol (AODV) and dynamic sequence routing protocol (DSRP)
30. Differentiate proactive and reactive protocol.
31. What are the advantages of hierarchical routing protocol?

16 MARK

1. With suitable trace, explain the route establishment in location aided routing.
2. Device a pseudo code that present various steps involved in neighbour Degree- Based preferred link algorithm.
3. How is routing table constructed in fisheye state routing protocol? Explain in detail.
4. Discuss table driven protocols with examples.
5. Explain multicast routing algorithms in detail.
6. How routing table is constructed in fisheye state routing protocol? Explain in detail.
7. List the characteristics of ideal routing protocol for ad hoc wireless network.
8. Classify and explain adhoc wireless network based on routing topology.
9. Explain the types of ad hoc network routing protocols based on routing information update mechanism.
10. Explain on demand routing protocol in detail.
11. Explain the major challenges that a routing protocol designed for adhoc wireless networks face.
12. Describe how the packets are transmitted in multiple access collision avoidance protocol.
13. Explain the scheduling table updates mechanism in distributed priority scheduling.

UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS

1. What is wireless sensor network?
2. What are the components of WSN?
3. Write short notes on memory devices in WSN
4. Define: transceivers in WSN
5. Define: noise figure
6. Write short note on different operational states of transceiver in WSN
7. What are wakeup receivers?
8. Write short notes on traditional concurrency process
9. Draw the structure of layered architecture
10. Define: LEACH
11. What is the MAC protocols used in sensor network?

16 MARK

1. Explain about the hardware components of sensor nodes
2. Explain about the software components of sensor nodes
3. With a neat diagram, Explain the sensor network architecture
4. Write notes on Dynamic Energy and power management
5. Explain in detail about aggregation as an optimization problem.
6. Explain about the MAC protocol in WSN.
7. Write in detail about the IEEE 802.15.4

UNIT V WSN ROUTING, LOCALIZATION & QOS

1. How the sensor application data models can be arise?
2. Define: OLSR.
3. What are the advantages of the OLSR protocol?
4. Write short notes on localization.
5. What is called beacons?
6. How the indoor localization works?
7. Define: Lateration.
8. Define: Angulation.
9. How to determine the distance in triangulation?
10. Define: Physical time
11. Define: Synchronous agreement
12. What is the two domain classification in Qos?
13. What are the challenges in Qos?
14. What is energy efficient design?
15. Write short notes on design factor of transport protocol?

16 MARK

1. Briefly explain the issues in WSN routing
2. What is meant by OLSR and explain about OLSR routing protocol-
3. Explain about the absolute and relative localization
4. Write notes on triangulation
5. Explain about the QOS in WSN
6. Explain about the Synchronization in WSN

ASSIGNMENT QUESTIONS

1. Draw and explain the architecture of wireless sensor networks.
2. With neat diagram explain the various types of MAC reservation protocols.
3. Explain the hybrid routing protocol with an example.
4. Describe about the CSMA based MAC protocol for wireless sensor networks.
5. What is triangulation? Explain how it is efficient than other localization techniques.

SUBJECT NAME: EC6019 DATA CONVERTERS

2 MARKS & 16 MARK QUESTIONS WITH ASSIGNMENT QUESTIONS

UNIT I SAMPLE AND HOLD CIRCUITS

1. What do you mean by data conversion?
2. Specify the applications of Data Converter.
3. What are the advantages and disadvantages of sampling switches?
4. Define settling time.
5. What is a zero order hold?
6. What is a holding circuit interlock?
7. What is a peak detector circuit?
8. What is the purpose of Sample and Hold Circuit?
9. Define D/A and A/D converter.
10. Specify 3 mechanisms in MOS transistor operation and introduces an error.
11. Define Static Error.
12. List 4 types of Static Error.
13. What is sampling speed?
14. Define sampling rate.
15. What is offset error and how it affects?
16. Define gain error. How do you measure gain point in ADC and DAC circuit?
17. What is differential nonlinearity error?
18. Define integral nonlinearity error or linearity error.
19. What is Aperture error?
20. What are the uses of sampling circuits?
21. Give 3 sampling techniques.
22. Define acquisition time.
23. What is droop rate?
24. Define SNDR.
25. How do you determine the acquisition time?
26. Define dynamic range.
27. Write the equation for on-resistance as per square law NMOS device.
28. Specify the limitations of sampling switches.
29. Write the 2 types of sampling switches.
30. Compare MOS and Diode switches.
31. Compare open loop and closed loop architecture.

16 MARK

1. Explain the following sample and hold circuit architectures:
   Closed Loop
   Open loop architecture with miller capacitance
2. State and explain Miller effect.
3. Explain the principle of sample and hold circuit with neat diagram.
4. Explain the switched capacitor architecture with a neat diagram.
5. Discuss the concept of MOS switch circuits in mode field through circuits.
6. Describe the conventional architecture with pedestal cancellation method.
7. Write technical notes on (i) Recycling Architecture and (ii) Switched Capacitor Architecture.
8. Explain the operation of multiplexed input architecture with neat diagrams.
9. Differentiate Diode switch and MOS switch.
10. Explain in detail about multiplexed input architecture with necessary diagram.
11. Give the features of MOS switches.

12. Elaborate diode switches using modified circuit with clamp diodes and also specifies the advantages.
13. Discuss sampling bridge with bootstrapped clamp voltage with diagram.
14. What are the factors degrading the phase margin and specify the drawbacks.
15. Compare open and closed loop architecture, multiplexed input architectures, recycling architectures and switched capacitor architecture with proper circuit diagram.

UNIT II SWITCH CAPACITOR CIRCUITS AND COMPARATORS

1. What is switched capacitor?
2. What is an op-amp?
3. Mention applications of op-amp.
4. What are the characteristics of ideal op-amp?
5. What is the usage of op-amp?
6. Define linear op-amp circuit.
7. Define nonlinear op-amp circuit.
8. Give the applications of integrator.
9. Draw the switched capacitor integrator.
10. Specify the effects of parasitic capacitor.
11. Define op-amp comparator.
12. What is voltage comparator?
13. Mention the importance of open loop cascade amplifier offset voltage.
14. Draw latched comparators circuit.
15. Draw architecture of CMOS based latched comparators.
16. Mention the advantages and disadvantage of offset and output cancellation method.
17. Mention the importance of single stage amplifier based on comparators.
18. Give some applications of Comparators.
19. Define response time.
20. What is meant by Clock Bootstrapping?
21. Define slew rate.
22. What is input offset in comparator?
23. What are the drawbacks of switched capacitor integrator?

16 MARK

1. Explain the principle of cascaded switched capacitor amplifier stages with neat diagrams
2. Explain the operation of switched capacitor amplifier with a circuit diagrams.
3. Give an account on applications of Switched capacitor integrator.
4. Explain the working of single stage switched capacitor amplifier.
5. Discuss in detail about switched capacitor common mode feedback amplifier.
6. Explain the concept of switched capacitor integrator with neat diagrams.
7. Explain in detail about latched comparators.
8. Briefly explain the working principle of cascaded amplifier stage as comparator.
9. Explain in detail about the architecture which employs a binary search algorithm in a feedback Loop including a 1- bit A/D converter.
10. Compare single stage amplifier as comparator, cascaded amplifier stages as comparator and latched comparators.
11. Discuss precision multiply-by-two circuit and explain their operation in sampling mode and amplification mode.
12. Specify the design issues while designing the comparator circuit and also explain the performance characteristics.
13. Explain about offset cancellation and specify their different types of techniques.

UNIT III DIGITAL TO ANALOG CONVERSION

1. What are the applications of DAC Architectures?
2. Define latency.
3. How to minimize the glitch impulse in DAC Circuits?
4. Define glitch energy.
5. List the drawbacks of binary weighted resistor technique of D/A conversion.
6. The basic step of a 9 bit DAC is 10.3 mV. If 000000000 represents 0Volts, what is the output for an input of 101101111?
7. What are the advantages and disadvantages of R-2R ladder DAC?
8. What are the specifications of D/A converter?
9. What is meant by linearity?
10. Define Monotonicity.
11. Draw the architecture of R-2R Ladder.
12. Draw the graph to measure the gain error in DAC circuits.
13. What are the advantages of intermeshed ladder over single ladder architectures?
14. Why high speed D/A converters are based on current steering architectures?
15. What is the function of timing skews in DAC architectures?
16. Draw the architecture of Voltage Division and its specification.
17. What is meant by Capacitor mismatching DAC circuits?
18. Convert binary to thermo meter DAC circuits with an example.
19. Sketch the architecture of Binary weighting using R-2R networks.
20. What is the use of Clocks circuits in DACs?

16 MARK

1. Explain the concept of a simple DAC with a diagram.
2. Describe the switching and logic functions in DAC.
3. Explain how switching functions are realized in resistor–ladder DAC.
4. Explain the segmented architecture of current steering DAC.
5. Explain in detail the current steering DAC architecture with a neat diagram.
6. Explain the concept of intermeshed ladder architecture in detail.
7. Explain the principle of reference multiplication and division in detail.
8. What is reference multiplication? Explain how it is performed in DAC circuits using a suitable example.
9. Explain in detail about the binary to thermometer code conversion.
10. Write short notes on (i) voltage division (ii) current division (iii) charge division
11. Specify the drawbacks of uniform current division and binary current division. Explain about segmented array and binary array with necessary diagram.
12. Draw I-V characteristics of MOS and Bipolar and explain in detail.

UNIT IV ANALOG TO DIGITAL CONVERSION

1. Define SNR.
2. What is meant by kickback noise?
3. Define metastability.
4. How the interleaved architectures suffered from sampling circuits?
5. What is the function of successive approximation register in ADC?
6. Define charge redistribution principle.
7. How to avoid the long settling time in successive approximation register?
8. Mention the concept of pipelining.
9. What is the function of grey encoding in Flash architecture?
10. Define clock jitter.
11. Mention the different types of Flash architectures.

12. Define Sparkles code.
13. Distinguish between Flash vs Pipelined ADCs.
14. Define Quantization error.
15. How the dynamic range has specified in SNR?
16. What is the advantage and disadvantages of flash type ADC?
17. Define conversion time.
18. Which is the fastest ADC and why?
19. Compare various ADC types with their parameters.
20. Give the disadvantages of flash type A/D converter.

16 MARK

1. Explain the pipelined architecture of ADC and discuss its merits and demerits.
2. Explain the flash ADC architecture and its features in detail.
3. Explain the successive approximation architecture in detail with a neat diagram.
4. Describe in detail about the principle of interleaved architecture.
5. Explain in detail about how gray coding technique is used in ADC.
6. Compare SAR architecture and interleaved architecture.
7. Write detailed notes on

8. Briefly explain about range overlap and digital correction.
9. Elaborate interpolation and folding architectures and also note the two observations when combining folding and interpolation.
10. How pipelined architecture used in analog circuits to achieve high speed.
11. Explain charge redistribution principle with the help of successive approximation converters.
12. Discuss about two step architectures and specify the timing issues in the absence of front-end SHA and also compare timing in flash architecture.

UNIT V PRECISION TECHNIQUES

1. Mention the techniques used to cancel the offset.
2. What is the need for offset cancellation techniques?
3. List out the various types of offset cancellation techniques.
4. Define calibration technique.
5. Define digital calibration technique.
6. Define Input Offset Storage (IOS).
7. What are the drawbacks of Input Offset Storage?
8. Define Output Offset Storage (OOS).
9. Mention the advantages of OOS over IOS?
10. Specify the uses of Op amp Offset cancellation technique.
11. Write the primary feature of DAC Calibration technique algorithm.
12. Mention the concept of Dynamic element matching.
13. What is the advantage of using capacitor error averaging technique?
14. Mention the advantage of half flash architecture method.
15. What are the methods available in ADC calibration Techniques?
16. Define settling time.
17. Mention the importance of MDAC, CDAC and SDAC.
18. Mention the importance of Multistage offset storage.
19. Define Capacitor error averaging.
20. What is the purpose of using capacitor DACs in DAC circuits?

16 MARK

1. Write technical notes on
   a. Calibration techniques.
   b. Comparator offset cancellation
2. Discuss the concept of comparator offset cancellation in detail with neat block diagram.
3. Discuss a technique to cancel offset in comparator as well as in op-amp.
4. Explain any two calibration techniques of DAC.
5. Explain in detail about the architecture which employs a 10 bit A/D converter using a resistor Ladder DAC.
6. Describe in detail about the two step sub ranging architecture.
7. Explain in detail about residue generation in 10 bit two steps A/D converter.
8. Describe about comparator using offset canceled latches technique.
9. Elaborate OOS and specify their drawbacks. Compare IOS and OOS with necessary diagrams.
10. Discuss in detail about multistage offset storage and how to design multistage offset cancellation circuit using CMOS inverters.
11. Explain the operation of OP AMP offset cancellation circuit using auxiliary amplifier.
12. Compare stating and dynamic testing with examples.
13. Write short notes on
    i. Stating testing
    ii. Direct ADC-DAC test
    iii. Beat frequency and envelope test
    iv. Code density test
    v. FFT test
    vi. Sine fitting test

ASSIGNMENT QUESTIONS

1. Design a sample and hold amplifier for High speed low voltage A/D converters.
2. Explain in detail about the architecture which employs a binary search algorithm in a feedback loop.
3. With necessary illustrations, explain the test Setup for measuring DAC distortion and Noise.
4. Describe in detail about ADC Code transitions measuring techniques.
5. Discuss in detail about residue generation in 10 bit two steps A/D converter.