

## QUESTION BANK

**SUBJECT : EC8001 WIRELESS NETWORKS**

**SEM / YEAR: VI / III**

<b>UNIT I WIRELESS LAN</b>			
Introduction-WLAN technologies: Infrared, UHF narrowband, spread spectrum -IEEE802.11: System architecture, protocol architecture, physical layer, MAC layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband layer, Link manager Protocol, security - IEEE802.16-WIMAX: Physical layer, MAC, Spectrum allocation for WIMAX.			
<b>PART A</b>			
<b>Q. No</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>
1.	Write the principle of Infrared technology.	BTL 1	Remembering
2.	List the advantages of wireless LAN.	BTL 1	Remembering
3.	Discover the major issues in WLAN.	BTL 3	Applying
4.	Find the significance of radio transmission over infrared.	BTL 1	Remembering
5.	State the use of special control packets in IEEE 802.11.	BTL 1	Remembering
6.	Examine the typical frame format of Wireless ATM.	BTL 4	Analyzing
7.	Identify the need of WATM systems.	BTL 3	Applying
8.	How do you generate and exchange secret key in wireless networks?	BTL 4	Analyzing
9.	Evaluate the differences between different MAC layer mechanisms of IEEE 802.11.	BTL 5	Evaluating
10.	Define Link manager protocol.	BTL 1	Remembering
11.	Infer about the protocol stack involved for Bluetooth communication.	BTL 2	Understanding
12.	What is BRAN?	BTL 1	Remembering
13.	Compare the overhead of an IEEE802.11 frame with that of an ATM packet.	BTL 5	Evaluating
14.	Formulate piconet and scatter net.	BTL 6	Creating
15.	Interpret the functions of MAC layer in IEEE 802.11.	BTL 3	Applying
16.	Inspect the advantages of HiperLAN-2.	BTL 4	Analyzing
17.	Summarize the requirements of handover.	BTL 2	Understanding

18.	Express any three differences between HiperLAN-1 and HiperLAN-2.	BTL 2	Understanding
19.	Consider an OFDM system that uses 52 subcarriers out of which 48 are data sub-carriers and 4 are pilot sub carriers. System bandwidth is 20MHz and OFDM symbol duration including cyclic prefix with guard interval for ISI mitigation is 4 $\mu$ S. If code rate is $\frac{3}{4}$ and 64 QAM is used, what is the data rate?	BTL 6	Creating
20.	Outline the features of WiMAX.	BTL 2	Understanding
<b>PART – B</b>			
1.	(i)What are the requirements and applications of wireless LAN. (7) (ii)Explain the advantages and disadvantages of WLAN. (6)	BTL 1	Remembering
2.	(i)Compare Infrared Vs Radio transmission techniques. (7) (ii)Write brief note on WLAN Topologies. (6)	BTL 1	Remembering
3.	Demonstrate the following: (i) WLAN Technologies (7) (ii) Major challenges in the implementation of wireless LANs.(6)	BTL 3	Applying
4.	Interpret the two network architectures of WLAN. Discuss them briefly with diagrams. (13)	BTL 2	Understanding
5.	Analyze IEEE 802.11 MAC data frame format with relevant diagram. (13)	BTL 4	Analyzing
6.	Write short notes on the following IEEE 802.11 architecture: (i)System architecture (7) (ii) Protocol architecture (6)	BTL 1	Remembering
7.	Can you list the services provided by WATM and propose a generic WATM reference model. (13)	BTL 1	Remembering
8.	Inspect the types of network specified by BRAN and layered Model of BRAN wireless access network. (13)	BTL 5	Evaluating
9.	Organize the basic structure and handover scenarios of HiperLAN2. (13)	BTL 4	Analyzing
10.	Elaborate how would you form a piconet and scatternet in Bluetooth with architecture diagram. (13)	BTL 6	Creating
11.	Can you relate Radio layer and baseband layer in Bluetooth protocol stack? and also describe the frequency selection during transmission. (13)	BTL 3	Applying
12.	Identify the functions covered by the Link Manager Protocol and illustrate them with necessary diagrams. (13)	BTL 2	Understanding
13.	(i)Infer about Bluetooth security architecture. (7) (ii)Organize the several steps involved in the security architecture of Bluetooth. (6)	BTL 4	Analyzing
14.	Clarify the strategy of logical link control and adoption protocol (L2CAP) with an example. (13)	BTL 2	Understanding
<b>PART C</b>			

1.	Illustrate the characteristics and services offered by physical layer of IEEE 802.11 wireless LAN. (15)	BTL 5	Evaluating
2.	Assess the importance of user scenario architecture and protocol stack of Bluetooth technology. (15)	BTL 5	Evaluating

**UNIT II - MOBILE NETWORK  
LAYER**

Introduction - Mobile IP: IP packet delivery, Agent discovery, tunneling and encapsulation, IPV6- Network layer in the internet- Mobile IP session initiation protocol - mobile ad-hoc network: Routing, Destination Sequence distance vector, Dynamic source routing.

**PART – A**

<b>Q. No</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>
1.	Define the term Care-of address in Mobile IP.	BTL 1	Remembering
2.	Interpret the importance of tunneling.	BTL 3	Applying
3.	What are the advantages and disadvantages of Hawaii architecture?	BTL 1	Remembering
4.	How does Foreign Agent help MN during its visit to foreign network?	BTL 2	Understanding
5.	Examine the encapsulation in Mobile – IP.	BTL 4	Analyzing
6.	Inspect the frame format for registration request.	BTL 4	Analyzing
7.	Draw the basic architecture of cellular IP.	BTL 1	Remembering
8.	Write the process of IP packet delivery.	BTL 1	Remembering
9.	Analyze the process of registration of mobile nodes with HA.	BTL 4	Analyzing
10.	Identify the use of generic routing encapsulation.	BTL 3	Applying
11.	Differentiate an adhoc network and a cellular network with respect to a) Bandwidth usage b) Cost effectiveness	BTL 2	Understanding
12.	State Cluster head-Gateway Switch Routing	BTL 2	Understanding
13.	How is routing divided in DSR?	BTL 1	Remembering
14.	Outline the functions of SIP.	BTL 2	Understanding
15.	Differentiate proactive and reactive routing protocols. Write examples for each.	BTL 3	Applying
16.	Can you describe about flat ad-hoc routing?	BTL 1	Remembering
17.	Illustrate the basic purpose of ad-hoc routing protocols?	BTL 5	Evaluating

18.	Assess the importance of DSDV to Distance vector routing algorithm	BTL 5	Evaluating
19.	Justify the need for special protocols to support micro mobility on the network layer.	BTL 6	Creating
20.	Propose the main differences between multi-hop ad-hoc networks and IEEE 802.11 networks. What advantages do these ad-hoc networks offer?	BTL 6	Creating
<b>PART – B</b>			
1.	What is Mobile IP? Describe the Mobile IP protocol. Explain with a diagram, how IP packets are transmitter between nodes. Also explain how packet delivery mechanism in the Mobile IP protocol differs from IP protocol? (13)	BTL 1	Remembering
2.	(i) Write the advantages and disadvantages of Mobile IP using IP-IP, minimal, and generic routing encapsulation, respectively. (7) (ii) Show the method by which MN registers with HA. (6)	BTL 1	Remembering
3.	Inspect about the architecture of hierarchical mobile IPV6. (13)	BTL 4	Analyzing
4.	(i) What are the terminologies used in Mobile IP with tunneling? (3) (ii) Enumerate the three prominent approaches to address micro-mobility problems. (10)	BTL 3	Applying
5.	(i) What is the basic purpose of DHCP? Name the entities of DHCP. (7) (ii) Write about Mobile IP encapsulation. (6)	BTL 1	Remembering
6.	How does IP packet delivery to and from mobile node with a neat diagram? (13)	BTL 2	Understanding
7.	What is the main idea of optimization and reverse tunneling? (13)	BTL 1	Remembering
8.	(i)Assess the difference between mobile adhoc network and IEEE802.11 standard. (7) (ii) Explain DSDV algorithm with an example. (6)	BTL 5	Evaluating
9.	(i)Justify How would you solve the problem of triangular routing? (7) (ii) Elucidate the benefits of Mobile ad-hoc networks. (6)	BTL 4	Analyzing
10.	Why is routing in multi-hop ad-hoc networks complicated, what are the special challenges? (13)	BTL 3	Applying
11.	Explain the mobile session initiation protocol (SIP) for IP packet delivery in mobile IP networks. (13)	BTL 2	Understanding
12.	Demonstrate the motivation behind dynamic source and how does dynamic source routing handle routing? (13)	BTL 2	Understanding
13.	(i) Discuss about the challenges present in an ad-hoc network. (7) (ii) Discuss any one on demand routing protocol used for routing in an adhoc network. (6)	BTL 6	Creating
14.	Analyze How Dynamic source routing eases traffic explain with an example? (13)	BTL 4	Analyzing
<b>PART-C</b>			
1.	Imagine the following scenario. A Japanese and a German meet at a conference on Hawali. Both want to use their laptops for exchanging	BTL 6	Creating

	data, both run mobile IP for mobility support. Explain the optimizations used in the mobile IP networks. (15)		
2.	Propose the working mechanisms of DSDV and DSR when applied to mobile adhoc network scenario. (15)	BTL 6	Creating

### UNIT III - MOBILE TRANSPORT LAYER

TCP enhancements for wireless protocols - Traditional TCP: Congestion control, fast retransmit/fast recovery, Implications of mobility - Classical TCP improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission, Transaction oriented TCP - TCP over 3G wireless networks

#### PART – A

Q.No	Questions	BT Level	Competence
1.	What is meant by slow start and time-out freezing?	BTL 1	Remembering
2.	Propose a method by which TCP can reduce the number of packets	BTL 6	Creating
3.	Identify the characteristics to be considered when deploying applications over 3G.	BTL 3	Applying
4.	Examine the configuration parameters to adapt TCP to wireless environments.	BTL 4	Analyzing
5.	Justify the need for fast retransmit and recovery.	BTL 5	Evaluating
6.	Mention the functions of mobile transport layer.	BTL 1	Remembering
7.	Write the working of destination correspondent host.	BTL 1	Remembering
8.	Illustrate the classical approaches for TCP improvement.	BTL 2	Understanding
9.	How does indirect TCP differ from traditional TCP?	BTL 3	Applying
10.	State the working principle of selective retransmission.	BTL 1	Remembering
11.	List the advantages of MTCP.	BTL 4	Analyzing
12.	Outline the reaction of standard TCP in case of packet loss.	BTL 2	Understanding
13.	Identify the advantages and disadvantages of snooping TCP.	BTL 3	Applying
14.	Define snooping TCP?	BTL 1	Remembering
15.	Compare the advantage and disadvantages of Mobile TCP.	BTL 4	Analyzing
16.	Illustrate about mobile TCP.	BTL 2	Understanding
17.	Name the congestion control techniques.	BTL 1	Remembering
18.	Demonstrate the advantage and disadvantages of selective retransmission.	BTL 2	Understanding
19.	Assess why Congestion occurs in a network.	BTL 5	Evaluating
20.	Develop a solution to reduce the congestion in a mobile network.	BTL 6	Creating

#### PART – B

1.	Propose an algorithm for slow start and fast retransmit/fast recovery mechanisms in TCP. (13)	BTL 6	Creating
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2.	Identify the main function of snooping TCP and explain how it overcomes the drawback of I-TCP. (13)	BTL 2	Understanding
3.	(i) Write brief note on Mobile TCP. (7) (ii) List out the advantages and disadvantages of M-TCP. (6)	BTL 1	Remembering
4.	(i) Why is timeout freezing required in case of mobile nodes? What are the modifications done in TCP layer to enforce timeout freezing? (7) (ii) Describe transaction-oriented TCP. How does the integration of connection establishment, data transmission and connection termination functions help for TCP communications? (6)	BTL 2	Understanding
5.	(i) Interpret the motive behind selective Retransmission in TCP. (7) (ii) Distinguish Indirect TCP and Mobile TCP with appropriate diagrams. (6)	BTL2	Understanding
6.	(i) Differentiate traditional TCP with Mobile TCP. (7) (ii) Examine the advantages and disadvantages of snooping TCP. (6)	BTL 4	Analyzing
7.	(i) Inspect M-TCP approach of extending TCP to work efficiently in mobile wireless networks. (7) (ii) How does M-TCP maintain end to end semantics? (6)	BTL 4	Analyzing
8.	Describe about the transmission mechanism of Indirect TCP and Snooping TCP. (13)	BTL 1	Remembering
9.	Evaluate the enhancements of TCP over wireless protocols and traditional TCP. (13)	BTL 5	Evaluating
10.	Analyze split-connection and end-to-end implementation in TCP for a wireless environment. (13)	BTL 4	Analyzing
11.	Write short notes on (i) ARQ techniques (7) (ii) Fast retransmit/fast recovery (6)	BTL 1	Remembering
12.	Explain the issues and characteristics to be considered when deploying applications over 2.5G/3G. (13)	BTL 1	Remembering
13.	Demonstrate on transaction oriented TCP with an example TCP connection setup overhead. (13)	BTL3	Applying
14.	Infer about the configuration parameters to adapt TCP to wireless environments. (13)	BTL3	Applying
<b>PART-C</b>			
1.	Elaborate how does an indirect TCP segment a TCP connection into two parts and explain its advantages and disadvantages. (15)	BTL6	Creating
2.	Assess about Congestion control, fast retransmit/fast recovery and implications of mobility in wireless networks. (15)	BTL5	Evaluating
3.	Illustrate an overview of classical enhancements to TCP for Mobility with necessary diagrams. (15)	BTL5	Evaluating
4.	Formulate the need for TCP over 3G wireless networks. (15)	BTL6	Creating

**UNIT IV WIRELESS WIDE AREA NETWORK**

Overview of UMTS Terrestrial Radio access network-UMTS Core network Architecture: 3G-MSC, 3GSGSN, 3G-GGSN, SMS-GMSC/SMS-IW MSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA)- LTE network architecture and protocol.

**PART A**

<b>Q.No</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>
1.	Name the components of UTRAN.	BTL1	Remembering
2.	Generalize the features of UMTS? Mention the layers of UMTS.	BTL 6	Creating
3.	Identify how isolation between users in the downlink accomplished in a WCDMA system?	BTL 3	Applying
4.	State the vision of 3G mobile communication systems.	BTL1	Remembering
5.	Enumerate the functions of Radio Network Control (RNC).	BTL1	Remembering
6.	Give the data requirements for various services.	BTL2	Understanding
7.	What is meant by UCN network?	BTL 1	Remembering
8.	Formulate the difference between LTE FDD and LTE TDD.	BTL 6	Creating
9.	Point out the logical channels of GPRS.	BTL 2	Understanding
10.	Indicate how UMTS provides backward compatibility with GSM?	BTL 2	Understanding
11.	Evaluate the role of SMS-GMSC in UMTS network.	BTL 5	Evaluating
12.	Inspect the significance of Link adaptation scheme.	BTL 4	Analyzing
13.	Write the functions supported by 3G-MSC.	BTL 1	Remembering
14.	Classify the channels used in HSDPA.	BTL 4	Analyzing
15.	List the 3G radio access schemes identified to support different spectrum scenarios.	BTL 1	Remembering

16.	Interpret the supplementary services supported by 3G system.	BTL 3	Applying
17.	Examine the changes required in UMTS channel card to support HSDPA.	BTL 5	Evaluating
18.	Illustrate the significance of 3GPP standard.	BTL 2	Understanding
19.	How would you achieve address translation using DNS in IP network?	BTL 3	Applying
20.	Analyze the purpose of firewall used in UMTS network.	BTL 4	Analyzing

**PART –B**

1.	(i) Name the various domains and reference points of 3G –UMTS architecture. (3) (ii) What are the functions of UMTS domains? Explain in detail? (10)	BTL 1	Remembering
2.	(i) Draw the OSI model of UTRAN. (3) (ii) State the functions of different layers involved in UTRAN. (10)	BTL 1	Remembering
3.	Analyze the three main entities of the UMTS network. Discuss their functions? (13)	BTL 4	Analyzing
4.	(i) Outline the logical architecture UTRAN. (3) (ii) Discover the responsibilities of DNS and DHCP. (10)	BTL 4	Analyzing
5.	Explain spreading and scrambling of UMTS network. (13)	BTL 2	Understanding
6.	Analyze the distribution of UTRAN functions. (13)	BTL 4	Analyzing
7.	Summarize the functionalities provided by SGSN and GGSN in 3G mobile communication systems. (13)	BTL 2	Understanding
8.	Discuss two evolution paths for the GSM to offer 3G networks. (13)	BTL 2	Understanding
9.	Examine the rule of the Access Link Control Application Part (ALCAP) in the UMTS. (13)	BTL 1	Remembering
10.	(i) Describe about firewall. (7) (ii) Illustrate the UMTS network architecture with GSM, 3G and also explain the reference architecture. (6)	BTL 3	Applying
11.	Demonstrate in detail about LTE Wireless Systems. (13)	BTL 3	Applying
12.	How does IWMSC perform short message services in 3G system? (13)	BTL 1	Remembering
13.	(i) Demonstrate the types of channels introduced in HSDPA. (10) (ii) Generalize the principles and modulation schemes in HSDPA. (3)	BTL 6	Creating
14.	(i) Assess the LTE Protocol structure & Specifications. (7) (ii) Inspect the functional elements of LTE network architecture. (6)	BTL 5	Evaluating

**PART-C**

1.	Elaborate the overview of UTMMS Terrestrial Radio access network-UMTS Core network Architecture. (15)	BTL 6	Creating
2.	Validate the LTE network architecture and protocol. (15)	BTL 5	Evaluating
3.	Compare the following components in wireless network technologies 3G-MSC, 3GSGSN, 3G-GGSN. (15)	BTL 6	Creating



4.	Discuss about SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High speed Downlink packet access (HSDPA). (15)	BTL 5	Evaluating
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**UNIT V 4G NETWORKS**

Introduction – 4G vision – 4G features and challenges - Applications of 4G – 4G Technologies: Multicarrier Modulation, Smart antenna techniques, OFDM-MIMO systems, Adaptive Modulation and coding with time slot scheduler, Cognitive Radio

**PART A**

<b>Q.No</b>	<b>Questions</b>	<b>BT Level</b>	<b>Competence</b>
1.	Enumerate about 4G system.	BTL 1	Remembering
2.	Formulate the techniques to improve network survivability in different layers and name the challenges faced by 4G.	BTL 6	Creating
3.	Identify the technologies used in 4G services.	BTL 3	Applying
4.	Is it possible to get 4G services on the 3G phone? Justify your answer.	BTL 2	Understanding
5.	Outline the vision of 4G system.	BTL 1	Remembering
6.	Review the term “MAGIC” in 4G.	BTL 2	Understanding
7.	Compare the key parameters of 4G with 3G system.	BTL 4	Analyzing
8.	State the design challenges of 4G system.	BTL 1	Remembering
9.	Analyze how 4G network is said to be an all-IP network?	BTL 4	Analyzing
10.	List some of the applications of 4G system.	BTL 2	Understanding
11.	What is meant by virtual presence and virtual navigation?	BTL 1	Remembering
12.	Devise the role of MCM in 4G system. Mention its merits and demerits of MCM over single carrier schemes.	BTL 6	Creating
13.	Obtain the technological solutions offered by 4G.	BTL 4	Analyzing
14.	Point out the key features of 4G networks.	BTL 2	Understanding
15.	Validate the need of multiple antenna in MIMO system.	BTL 5	Evaluating
16.	Distinguish between MC-CDMA and OFDM.	BTL 3	Applying
17.	Write about Cognitive radio and summarize the goals of CR system.	BTL 1	Remembering
18.	Evaluate the channel capacity of MIMO system.	BTL 5	Evaluating
19.	Name different antenna techniques used for input and output systems.	BTL 1	Remembering
20.	How do you apply OFDM technique to improve spectral efficiency?	BTL 3	Applying

PART –B

1.	(i) Write short notes about the evolution of 4G system. (3) (ii) Describe the concept of “seamless connectivity” in 4G system and explain with suitable diagrams. (10)	BTL 1	Remembering
2.	(i) Express the vision of 4G system. (3) (ii) Tabulate the key parameters of 4G system. (10)	BTL 2	Understanding
3.	Explain the basic concepts of Adaptive Modulation and coding with Time Slot Schedule along with cognitive radio concept. (13)	BTL 2	Understanding
4.	(i) Compare the performance of MC-CDMA with OFDM-TDMA. (10) (ii) List the different types of MCM techniques. (3)	BTL 4	Analyzing
5.	(i) Define 4G and compare the key parameters of 4G with 3G. (10) (ii) Enumerate the characteristics of Cognitive Radio. (3)	BTL 1	Remembering
6.	Propose the solutions to overcome the design challenges and issues of 4G mobile networks. (13)	BTL 6	Creating
7.	Discover the multiplexing technique for MIMO system to provide tradeoff between performance and complexity. (13)	BTL 4	Analyzing
8.	Discuss the behavior of smart antenna techniques. (13)	BTL2	Understanding
9.	(i) State the significance of adaptive modulation techniques. (3) (ii) Give the Concepts of CR and SDR and explain the relation between them. (10)	BTL 1	Remembering
10.	Assess the structure of SISO, SIMO, MISO and MIMO systems. (13)	BTL 5	Evaluating
11.	(i) Examine the channel capacity for different types of channels used in 4G system. (ii) Write short notes on BLAST system. (7)	BTL 4	Analyzing
12.	Show that how adaptive modulation and coding techniques improve the spectral efficiency in future mobile networks. (13)	BTL 3	Applying
13.	(i) Sketch the concept of carrier migration from 3.5G to 4G. (7) (ii) Discuss about OFDM and explain OFDM transmitter and receiver with block diagram. (6)	BTL 1	Remembering
14.	(i) Develop the role of time slot scheduler in all IP network. (7) (ii) Apply the concept of ZF algorithm to enhance the spectral efficiency in 4G mobile communication system. (6)	BTL 3	Applying

PART-C

1.	Mention the vision and features of 4G along with challenges and emerging applications of 4G technologies. (15)	BTL 6	Creating
2.	Estimate the techniques behind Smart antenna and orthogonal frequency-division multiplexing Multiple-input, multiple-output. (15)	BTL 6	Creating
3.	Assess Multicarrier modulation and Adaptive Modulation in fourth (15) generation wireless networks.	BTL 5	Evaluating
4.	Validate the need for cognitive radio and 4G technologies in next generation wireless networks. (15)	BTL 5	Evaluating