SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRMNagar,Kattankulathur– 603203

DEPARTMENT OF
COMPUTER SCIENCE AND ENGINEERING

QUESTIONBANK

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1912201-Network Design and Technologies

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DEARTMENTOFCOMPUTER SCIENCE AND ENGINEERING

QUESTION BANK

SUBJECT : 1912201 NETWORK DESIGN AND TECHNOLOGIES

SEM / YEAR: II/I

UNIT I -NETWORK DESIGN			
OFDM – Basic Principles of OFDM – OFDM Demodulation – OFDM implementation using IFFT/FFT processing – Cyclic-Prefix Insertion - Frequency-Domain Model Of OFDM Transmission- Channel Estimation And Reference Symbols-Frequency Diversity With OFDM: Importance Of Channel Coding- Selection Of Basic OFDM Parameters- Multi-Cell Broadcast/Multicast Transmission And OFDM			
PART A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	**Define** OFDM.	BTL1	Remember
2.	**Identify** the characteristics of OFDM transmission.	BTL1	Remember
3.	**Differentiate** FFT and IFFT in OFDM.	BTL2	Understand
4.	**List** the benefits of cyclic prefix insertion.	BTL1	Remember
5.	**Point out** the features of reference symbols in OFDM.	BTL4	Analyze
6.	**Give** the schematic diagram of basic OFDM demodulation.	BTL2	Understand
7.	**What** is the need of subcarrier spacing?	BTL1	Remember
8.	**List** the channel estimation techniques.	BTL1	Remember
9.	**Compare** and contrast the methods used to reduce transmission power in OFDM signals.	BTL4	Analyze
10.	**Define** Channel estimation.	BTL1	Remember
11.	**Illustrate** the OFDM demodulation scheme using FFT processing.	BTL3	Apply
12.	**Classify** the types of subcarrier spacing.	BTL4	Analyze
13.	**Distinguish** between multi cell broadcast and multicast transmission.	BTL2	Understand
14.	**Express** the importance of channel coding in OFDM transmission.	BTL2	Understand
15.	**Examine** the advantages of multiple access schemes.	BTL3	Apply
16.	**Integrate** user multiplexing and multiple access schemes.	BTL6	Create
17.	**Compose** a role which is played by multiplexing in communication.	BTL6	Create
18.	**Assess** the features of frequency domain model of OFDM transmission.	BTL5	Evaluate
19.	**Discover** the equivalence between simulcast transmission and multipath propagation.	BTL3	Apply
20.	**Recommend** multi-cell broadcast for OFDM transmission.	BTL5	Evaluate
PART – B			
1.	**Analyze** the basic principles of OFDM transmission.(13)	BTL4	Analyze
2.	**Describe** in detail about the demodulation of OFDM. (13)	BTL2	Understand

3.	(i)**Compare** and contrast FFT and IFFT. (7) (ii)**Explain** the OFDM demodulation by means of FFT processing.(6)	BTL4	Analyze
4.	**Examine** the cyclic prefix insertion technologies.(13)	BTL3	Apply
5.	**(i)Describe** the channel estimation process in detail.(8) (ii)**Examine** the time frequency grid with reference symbols (5)	BTL1	Remember
6.	**Describe** the frequency domain model of OFDM transmission.	BTL1	Remember
7.	**Discuss** about importance of channel coding.(13)	BTL2	Understand
8.	(i) **Classify** the OFDM subcarrier spacing.(7) (ii) **Examine** how basic OFDM parameters are selected?(6)	BTL3	Apply
9.	**Generalize** the role of multiplexing in OFDM. Integrate user multiplexing and multiple access schemes.(13)	BTL6	Create
10.	(i)**Examine** the characteristics of Reference symbols(6) (ii)**Describe** in detail about frequency diversity with OFDM. (7)	BTL1	Remember
11.	**Explain** the techniques for selecting basic OFDM parameters.(13)	BTL4	Analyze
12.	**Discuss:** (i)Cyclic prefix length(7) (ii) Number of subcarriers for OFDM.(6)	BLT2	Understand
13.	**What** is OFDM? Explain in detail. (13)	BTL1	Remember
14.	(i) **Summarize** the functions of multi cell broadcast.(7) (ii) **Explain** multicast transmission and OFDM.(6)	BTL5	Evaluate
	PART -C		
1.	**Evaluate** OFDM implementation with respect to FFT and IFFT processing. (15)	BTL5	Evaluate
2.	**Formulate** a reason why multiplexing is mandatory in OFDM transmission? Explain user multiplexing and multiple access schemes. (15)	BTL6	Create
3.	**Analyze** the importance of channel coding. Explain how channel encoding is done with frequency domain interleaving to provide frequency diversity. (15)	BTL4	Analyze
4.	**Evaluate** the advantages of multicasting. Highlight the features of multicast transmission and multi-cell broadcast transmission in OFDM.(15)	BTL4	Analyze
	UNIT II -WIRELESS NETWORKS		
	IEEE802.16 and WiMAX – Security – Advanced 802.16 Functionalities – Mobile WiMAX - 802.16e – Network Infrastructure – WLAN – Configuration – Management Operation – Security – IEEE 802.11e and WMM – QoS – Comparison of WLAN and UMTS.		
	PART – A		
1.	**Define** Best effort service.	BTL1	Remember
2.	**What** are the steps required for a SS to connect to the network	BTL1	Remember
3.	**Express** the idea of physical layer framing.	BTL2	Understand
4.	**Why** does the 802.16 support both FDD and TDD mode of operation?	BTL1	Remember
5.	**Interpret** the theoretical and practical bandwidths offered by an 802.16 systems when used for connecting end users to the Internet.	BTL2	Understand
6.	**Differentiate** between the coordination scheme used in WLAN (802.11) and the one used in 802.16 systems?	BTL2	Understand

7.	**Prepare** the reasons why do 802.11g networks use the RTS/CTS mechanism?	BTL6	Create
8.	**Show** how a mesh network can extend the range of a base station.	BTL3	Apply
9.	**What** is fast base station switching?	BTL1	Remember
10.	**Illustrate** the 2x2 MIMO transmission.	BTL3	Apply
11.	**Differentiate** 'ad hoc' and 'BSS' modes of a WLAN?	BTL2	Understand
12.	**Analyze** why are acknowledgment frames used in a WLAN?	BTL4	Analyze
13.	**Compare** and contrast wireless LAN and UMTS.	BTL4	Analyze
14.	**Develop** a solution to solve the security holes exist in the wired equivalent privacy.	BTL6	Create
15.	**Assess** the tasks of link manager.	BTL5	Evaluate
16.	**Compare** and contrast authentication and authorization.	BTL4	Analyze
17.	**Analyze** why is the MAC address of a device not used in the header of a MAC packet	BTL5	Evaluate
18.	**List** the advantages of WEP.	BTL1	Remember
19.	**Demonstrate** the WMM priority classes with example.	BTL3	Apply
20.	**What** is optimized handover?	BTL1	Remember
PART-B			
1.	**Examine** the following frame structures. (i) FDD uplink frame structure.(7) (ii) TDD frame structure.(6)	BTL1	Remember
2.	**Describe** the following terms in detail: (i) Connecting to the Network(7) (ii) Dynamic Frequency Selection.(6)	BTL1	Remember
3.	**Explain** the architecture of WiMax with a neat diagram.(13)	BTL1	Remember
4.	**Demonstrate** the principle of MAC management of user data.(13)	BTL3	Apply
5.	**Summarize** following the key mechanisms in 802.16e (i) Handover(7) (ii) Idle state. (6)	BTL2	Understand
6.	With a neat diagram **explain** mobile WiMAX Network Infrastructure.(13)	BTL4	Analyze
7.	(i)**Examine** the functionalities of a multipurpose WiMAX router device.(7) (ii) **Examine** the adaptive antenna systems in detail.(6)	BTL3	Apply
8.	**Explain** the management operations of WLAN.(13)	BTL4	Analyze
9.	**Summarize** i) WPA and WPA Personal Mode Authentication.(7) ii)WPA and WPA2 Enterprise Mode Authentication.(6)	BTL2	Understand
10.	**Integrate** the EAP –SIM authentication of WLAN(13)	BTL6	Create
11.	**Describe** VMM priority classes in detail.(13)	BTL1	Remember
12.	**Discuss:** (i)Ad hoc, BSS, ESS and wireless bridging(7) (ii) SSID and frequency selection(6)	BTL2	Understand
13.	**Analyze** the ways of ensuring Quality of Service(13)	BTL4	Analyze
14.	**Compar**e Wireless LAN and UMTS.(13)	BTL5	Evaluate
PART-C			

1.	**Evaluate** why fragmentation and packing is used for transmitting IP packets over the 802.16 air interface? Explain the air interface in detail.(15)	BTL5	Evaluate
2.	What is the basic architectural difference between a WiMAX radio network and other radio networks? **Rewrite** the features of WiMax. (15)	BTL6	Create
3.	**Evaluate** how DCF method is used for telephony and video streaming applications? What are the challenges and disadvantages? (15)	BTL5	Evaluate
4.	**Analyze** the security holes exist in the wired equivalent privacy (WEP) procedures and how are they solved by WPA and WPA2? (15)	BTL4	Analyze

UNIT III -CELLULAR NETWORKS

Global System for Mobile Communications(GSM)- The GSM Subsystems-The Network Subsystem Mobility Management and Call Control-General Packet Radio Service(GPRS) and EDGEGSM – Small Screen Web Browsing over GPRS and EDGE – MMS over GPRS – UMTS – Channel Structure on the Air Interface – Introduction to Universal Mobile Telecommunications Systems (UMTS) and High-Speed Packet Access (HSPA)

PART – A

1.	**Define** GSM.	BTL1	Remember
2.	**Name** the most important components of the GSM Network	BTL1	Remember
3.	**Show** how is a subscriber authenticated in the GSM network? Why is an authentication necessary?	BTL3	Apply
4.	**Evaluate** in what ways the mobility is managed in GSM	BTL5	Evaluate
5.	List the GSM services.	BTL1	Remember
6.	**Classify** the functions of HLR and VLR.	BTL3	Apply
7.	**Differentiate** between circuit-switched and packet-switched data transmission?	BTL2	Understand
8.	**Give** the responsibilities of new network elements that have been introduced with GPRS.s?	BTL2	Understand
9.	**Define** temporary block flow.	BTL1	Remember
10.	**Discuss** about the different parts of MMS message.	BTL2	Understand
11.	**Give** the advantages of UMTS radio network.	BTL2	Understand
12.	**Analyze** the purpose compressed code.	BTL4	Analyze
13.	**List** the protocols that are used in WAP gateway.	BTL1	Remember
14.	**Point out** the actions performed during an inter-SGSN routing area	BTL4	Analyze
15.	**Generalize** the tasks performed by the RISC processor and which tasks are performed by the DSP in a mobile device?	BTL6	Create
16.	**Discriminate** between GPRS ready state and the GPRS standby state?	BTL5	Evaluate
17.	**Show** the Cell-DCH and the Cell-FACH RRC states?	BTL3	Apply
18.	**Point out** the advantages of the Enhanced-DCH (E-DCH) concept?	BTL4	Analyze
19.	**Generalize w**hich options does the Node-B have to schedule the uplink traffic of different E-DCH mobile devices in a cell?	BTL6	Create
20.	**What** is HSPA?	BTL1	Remember

PART – B

1.	(i) **Explain** about GSM services.(7) (ii) **Explain** mobility management in GSM.(6)	BTL5	Evaluate

2.	**Describe** the GSM architecture in detail**.**(13)	BTL1	Remember
3.	**Examine** the Network Subsystem in detail.(13)	BTL3	Apply
4.	(i)**Demonstrate** briefly about GSM air interface.(7) (ii)Show the structure of GSM burst.(6)	BTL3	Apply
5.	**Generalize** the process of handover in GSM network(13)	BTL6	Create
6.	**Describe** in details bout (i) Call Reselection and Location area Update(7) (ii) The Mobile-Terminated Call(6)	BTL1	Remember
7.	Classify the GPRS network elements.(13)	BTL4	Analyze
8.	(i)**Discuss** about GPRS state model(7) (ii)**Interpret** the functions of HLR and VLR in call routing and roaming?(6)	BTL2	Understand
9.	**Describe** the GPRS interfaces.(13)	BTL1	Remember
10.	**Summarize** the Multimedia Messaging Service (MMS) over GPRS.(13)	BTL2	Understand
11.	(i)**Describe** WAP 2.0 in detail.(7) (ii)**Examine** Small Screen Web Browsing with Network Side Compression.(6)	BTL1	Remember
12.	**Summarize** the Mobility Management Tasks and session management tasks of GPRS.(13)	BTL2	Understand
13.	**Discuss** about UMTS with its interfaces.(13)	BTL4	Analyze
14.	**Explain:** (i) HSDPA channels(7) (ii) UMTS channel structure(6)	BTL4	Analyze
	PART-C		
1.	(i)S**ummarize** how a subscriber is authenticated in the GSM network? Why is an authentication necessary?(15)	BTL5	Evaluate
2.	**Develop** a network with all the advanced features of UMTS, GPRS and GSM. What are the advantages of the UMTS Radio Network Compared to GSM? (15)	BTL6	Create
3.	**Analyze** why is it not necessary to change any settings on the mobile device for GPRS when roamingabroad? (15)	BTL4	Analyze
4.	**Analyze** Which options does the Node-B have to schedule the uplink traffic of different E-DCH mobile devices in a cell? (15)	BTL4	Analyze
	UNIT IV -4G NETWORKS		
	Evolution of Mobile Systems before LTE- Drivers for LTE-Standardization of LTE-The 3GPP Process-The 3G Evolution to 4G-LTE Introduction-Network Architecture- Air Interface and Radio Networks-Basic Procedure-Summary and Comparison with HSPA-LTE-Advanced-Channel Modeling for 4G – Introduction to 5G.		
	PART – A		
1.	**Wha**t is LTE Driver?	BTL1	Remember
2.	**Examine** the standardization process of LTE.	BTL3	Apply
3.	**Evaluate** how testing and validation process is done?	BTL5	Evaluate
4.	**Discover** the 3G evolution to 4G.	BTL3	Apply
5.	**Define**3GPP.	BTL1	Remember
6.	**Classify** the 3GPP organization.	BTL4	Analyze
7.	**Develop** the overview of LTE network.	BTL6	Create

8.	**Give the** purpose of s1 and X2 interface in eNode-B	BTL5	Evaluate
9.	**Analyze** Internet-based voice services and network operator-based voice services.	BTL4	Analyze
10.	**Differentiate** S1 and an X2 handover.	BTL2	Understand
11.	**Distinguish** Attach and Default Bearer Activation	BTL2	Understand
12.	**List** the activity states of mobility management:	BTL1	Remember
13.	**Differentiate** ARQ and HARQ?	BTL4	Analyze
14.	**List** the physical parameters for LTE subcarriers.	BTL1	Remember
15.	**Design** a schematic model of LTE Network.	BTL6	Create
16.	**Give** the importance of Composite radio.	BTL2	Understand
17.	**Tabulate** the channel modeling schemes for 4G.	BTL1	Remember
18.	**Identify** the issues that are addressed 5G wireless networks.	BTL1	Remember
19.	**Interpret** protocol boosters	BTL2	Understand
20.	**Show** the differences between the tasks for the MME and the tasks of the Serving Gateway.	BTL3	Apply
	PART – B		
1.	**Discuss** about LTE Network Architecture and Interfaces(13)	BTL2	Understand
2.	(i)**Illustrate** LTE international roaming with home routing(7) (ii)**Demonstrate** MIMO Transmission(6)	BTL3	Apply
3.	**Demonstrate** how OFDMA used for Downlink transmission .(13)	BTL3	Apply
4.	**Integrate** s1 and x2 handover scenarios. Why x2 handover is not suitable in all situations?(13)	BTL6	Create
5.	**Summarize**: (i) The protocol for one-hop direct transmission (7) (ii) Protocols for two-hop direct-transmission mode(6)	BTL5	Evaluate
6.	**Discuss** about the scheduling schemes in LTE.(13)	BTL2	Understand
7.	(i)**Describe** about Composite Radio Environment .(8) (ii) **Examine** Protocol Boosters in detail(5)	BTL1	Remember
8.	**Describe** the Mobility Management and Power Optimization.(13)	BTL1	Remember
9.	Compare and contrast the MIMO Channels in Micro- and Pico Cell Environment(13)	BTL4	Analyze
10.	**Write** short notes on: (i) LTE Security Architecture.(7) (ii) Mobility Management in Idle State.(6)	BTL1	Remember
11.	**Explain** the basic procedures for LTE (13)	BTL1	Remember
12.	(i)**Express** the idea of Voice and SMS over LTE.(7) (ii)**Discuss** about Backhaul Considerations(6)	BTL2	Understand
13.	**Explain** 5G Wireless Networks in detail.(13)	BTL4	Analyze
14.	**Pointout** the factors that are required for Modeling the channel for 4G (13)	BTL4	Analyze
	PART-C		
1.	**Analyze** how the problem of BS failure can be solved? How the communication is carried out after BS failure. (15)	BTL4	Analyze
2.	**Assess** the salient features of 4G and 5G. (15)	BTL5	Evaluate
3.	**Create** the Hybrid 4G wireless network protocols that can be suitable for 4G and 5G. (15)	BTL6	Create
4.	**Evaluate** the various releases of LTE-Advanced. Which one is better in terms of latency reduction? (15)	BTL5	Evaluate

UNIT V SOFTWARE DEFINED NETWORKS

Introduction – Centralized and Distributed Control and Data Planes – Open Flow – SDN Controllers – General Concepts – VLANs – NVGRE – Open Flow – Network Overlays – Types – Virtualization – Data Plane – I/O – Design of SDN Framework

1.	**Define** SDN.	BTL1	Remember
2.	**Give** the benefits of open flow based SDN.	BTL2	Understand
3.	**Differentiate** data plane and control plane.	BTL2	Understand
4.	**Illustrate** the schematic diagram of SDN.	BTL3	Apply
5.	**Define** SDN data path.	BTL1	Remember
6.	**Assess** the advantages of VLANs.	BTL5	Evaluate
7.	**What** is Inter-Switch Link?	BTL1	Remember
8.	**Assess** the key roles played by SDN controllers.	BTL5	Evaluate
9.	**Express** the idea ofSoftware-defined mobile networking	BTL2	Understand
10.	**Define** network overlays.	BTL1	Remember
11.	**Illustrate** the procedure of removing an individual VLAN.	BTL3	Apply
12.	**List** the different configurations of VLAN membership.	BTL1	Remember
13.	**Point out** the deployment considerations of VLAN.	BTL4	Analyze
14.	**Analyze** the types of network overlays.	BTL4	Analyze
15.	**Describe** NVGRE.	BTL3	Apply
16.	**Create** a VLAN by default.	BTL6	Create
17.	**Describe** the features of virtualization.	BTL2	Understand
18.	**Differentiate** access ports and trunk ports.	BTL4	Analyze
19.	**Design** aSDN framework by using SDN controllers.	BTL6	Create
20.	**Differentiate** between centralized and distributed data planes.	BTL1	Remember

PART – B

1.	**Explain** the Software-Defined Network Architecture.(13)	BTL5	Evaluate
2.	i) **Discuss** about the OpenFlow-Based Software-Defined Networks.(6) ii) **Give** the structure of hybrid control environment for a transport network that includes Open Flow control.(7)	BTL2	Understand
3.	**Compare** and contrast the central and distributed dataplanes.(13)	BTL4	Analyze
4.	**Summarize** the creation and deletion of VLANs. (13)	BTL2	Understand
5	(i) **List** and explain the components of openflow controller.(8) (ii) **Write** short notes on SDN controllers(5)	BTL1	Remember
6.	(i) **Illustrate** the Idealized controller framework(7) (ii) **Examine** SDN Control to Data-Plane Interface (.(6)	BTL3	Apply
7.	**Demonstrate** the centralized and distributed control of SDN.(13)	BTL3	Apply
8.	**Describe** in detail about the SDN framework.(13)	BTL1	Remember
9.	**Examine** the network overlays in detail.	BTL1	Remember
10.	**Generalize** the functions of (i) Frame Tagging Protocols (7) (ii) VLAN Ports. (6)	BTL6	Create
11.	(i)I**dentify** the properties of mobile payment system.(7) (ii) **Describe** about mobile payment solutions(6)	BTL1	Remember
12.	**Discuss** about the NVGRE framework in detail.(13)	BTL2	Understand
13.	(i) **Analyze** how the tunnels terminated at the vSwitch for a multitier network. (7) (ii) What do you understand by layer2 overlays? (6)	BTL4	Analyze

14.	**Analyze** the types of network overlays.(13)	BTL4	Analyze
	PART-C		
1.	(i)**Assess** the special features required to design a Software Defined Network. (ii)**Compare** centralized and distributed data planes.	BTL5	Evaluate
2.	**Analyze** the principle functions of virtualization and explain the NVGRE overlay networks that enabling network scalability for a cloud infrastructure.(15)	BTL4	Analyze
3.	**Evaluate** the overlay tunnels terminated at the vSwitch for a multitier network and Overlay tunnels terminated at the vSwitch for a single tier network.(15)	BTL 5	Evaluate
4.	**Design** a VLAN by default and static methods.	BTL 6	Create