

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

QUESTION BANK



I SEMESTER – M.E.

CP3163 - NETWORK TECHNOLOGIES

Regulation – 2023

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Prepared by

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SUBJECT : CP3163 - NETWORK TECHNOLOGIES

SEM / YEAR : I Sem / I Year (M.E)

UNIT I - NETWORK ARCHITECTURE AND QoS

Overview of TCP/IP Network Architecture - Integrated Services Architecture - Approach - Components - Services - Queuing Discipline - FQ - PS - BRfq - GPS - WFQ - Random Early Detection – Differentiated Services

Q.No.	Question	Level	Competence
1	List the four layers of the TCP/IP network architecture.	BTL1	Remember
2	Define Integrated Services (IntServ).	BTL1	Remember
3	What is the purpose of the RSVP protocol in IntServ?	BTL1	Remember
4	Write the expansion of WFQ and GPS.	BTL1	Remember
5	What is the function of the DSCP field in the IP header?	BTL1	Remember
6	Define Random Early Detection (RED).	BTL1	Remember
7	Differentiate between best-effort service and guaranteed service in TCP/IP networks.	BTL2	Understand
8	Explain why IntServ is not scalable for the Internet backbone.	BTL2	Understand
9	Describe the role of admission control in Integrated Services.	BTL2	Understand
10	What is the difference between Expedited Forwarding (EF) and Assured Forwarding (AF) in DiffServ?	BTL2	Understand
11	Why is RED preferred over simple tail-drop queue management?	BTL2	Understand
12	Explain how WFQ provides fairness among flows.	BTL2	Understand
13	A VoIP application requires low latency. Which QoS model (IntServ or DiffServ) would you recommend? Justify briefly.	BTL1	Remember
14	Apply the concept of WFQ: If Flow A has weight 2 and Flow B has weight 1, how is bandwidth shared?	BTL2	Remember

15	In DiffServ, how would an ISP ensure video traffic has higher priority than email traffic?	BTL2	Understand
16	Identify which queuing discipline best approximates Processor Sharing.	BTL1	Remember
17	Compare FQ and WFQ in terms of bandwidth allocation.	BTL1	Remember
18	Write the difference in scalability between IntServ and DiffServ.	BTL1	Remember
19	How does RED prevent global synchronization in TCP flows?	BTL2	Understand
20	Compare GPS with BRFQ in terms of implementation complexity.	BTL1	Remember
21	Evaluate the strengths and weaknesses of IntServ in supporting real-time applications.	BTL1	Remember
22	Check whether DiffServ alone is sufficient for end-to-end QoS in modern networks.	BTL2	Understand
23	Propose a hybrid approach combining IntServ and DiffServ for enterprise networks.	BTL1	Remember
24	Design a simple queuing strategy for an ISP handling VoIP, video streaming, and email traffic.	BTL1	Remember

PART-B

Q.No.	Question	Marks	Level	Competence
1	Explain the layers of TCP/IP network architecture with a neat diagram.	16	BTL1	Remember
2	Describe the Integrated Services (IntServ) architecture, its approach, and major components.	16	BTL2	Understand
3	Discuss the different types of services offered by IntServ (Guaranteed Service & Controlled Load Service).	16	BTL2	Understand
4	Explain Differentiated Services (DiffServ) with architecture, DSCP, and Per-Hop Behaviors.	16	BTL2	Understand
5	Apply IntServ principles: How would RSVP reserve resources for a video conferencing application?	16	BTL3	Apply
6	Demonstrate how WFQ works using an example with three flows of different weights.	16	BTL3	Apply
7	Apply the concept of RED to show how early packet dropping reduces congestion in TCP traffic.	16	BTL3	Apply

8	Compare IntServ and DiffServ in terms of scalability, complexity, and suitability for the Internet.	16	BTL4	Analyze
9	Analyze the differences between FQ, WFQ, and GPS scheduling disciplines.	16	BTL4	Analyze
10	Examine the impact of Random Early Detection (RED) versus Tail Drop in router buffer management.	16	BTL4	Analyze
11	Analyze the effectiveness of admission control in ensuring QoS in IntServ.	16	BTL4	Analyze
12	Evaluate the advantages and limitations of IntServ in providing end-to-end QoS for real-time applications.	16	BTL5	Evaluate
13	Critically evaluate the strengths of DiffServ in comparison to IntServ for backbone networks.	16	BTL5	Evaluate
14	Judge whether WFQ can guarantee fairness and QoS in high-speed networks with heterogeneous flows.	16	BTL5	Evaluate
15	Propose a hybrid QoS model that combines IntServ and DiffServ for a large-scale ISP network.	16	BTL6	Create
16	Design a router queuing strategy that ensures VoIP traffic receives priority while still serving bulk data transfers fairly.	16	BTL6	Create
17	Create a congestion management mechanism using RED + WFQ to support video streaming, web traffic, and background downloads.	16	BTL6	Create

UNIT II - WIRELESS NETWORKS

IEEE 802.16 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 - Bluetooth - LiFi -Protocol Stack - Security – Profiles

PART-A

Q.No.	Question	Level	Competence
1	What does WiMAX stand for?	BTL1	Remember
2	List any two security mechanisms used in IEEE 802.16.	BTL1	Remember
3	Expand the term PKM in WiMAX security.	BTL1	Remember
4	Name the QoS service classes supported in WiMAX.	BTL1	Remember

5	What is the main enhancement introduced in IEEE 802.16e?	BTL1	Remember
6	Define an Access Service Network (ASN) in WiMAX.	BTL1	Remember
7	Write the two modes of WLAN configuration.	BTL1	Remember
8	What is the role of an Access Point (AP) in WLAN?	BTL1	Remember
9	List the types of authentication supported in WLAN.	BTL1	Remember
10	Expand WMM and state its purpose.	BTL1	Remember
11	What are the four Access Categories in WMM?	BTL1	Remember
12	List any two differences between WLAN and UMTS.	BTL1	Remember
13	What frequency band is used by Bluetooth?	BTL1	Remember
14	Define a piconet in Bluetooth.	BTL1	Remember
15	Write any two Bluetooth profiles.	BTL1	Remember
16	Expand LiFi and state its transmission medium.	BTL1	Remember
17	Explain how PKM protocol ensures security in WiMAX.	BTL2	Understand
18	Differentiate between fixed WiMAX and mobile WiMAX.	BTL2	Understand
19	Describe the role of the Connectivity Service Network (CSN) in WiMAX.	BTL2	Understand
20	Explain the difference between Ad-hoc mode and Infrastructure mode in WLAN.	BTL2	Understand
21	Why was WPA/WPA2 introduced instead of WEP in WLAN?	BTL2	Understand
22	Describe how WMM prioritizes multimedia traffic.	BTL2	Understand
23	Compare WLAN and UMTS in terms of coverage and data rate.	BTL2	Understand
24	Explain why LiFi is considered more secure than Wi-Fi.	BTL2	Understand

PART-B

Q.No.	Question	Marks	Level	Competence
1	Explain the IEEE 802.16 (WiMAX) architecture with neat diagram.	16	BTL1	Remember
2	Describe the protocol stack of Bluetooth and its layers.	16	BTL1	Remember
3	Discuss the security features provided in IEEE 802.16 WiMAX networks.	16	BTL2	Understand
4	Explain the advanced functionalities of 802.16 including QoS service classes.	16	BTL2	Understand

5	Describe WLAN management operations such as authentication, association, and roaming.	16	BTL2	Understand
6	Explain IEEE 802.11e and Wireless Multimedia Extensions (WMM) for QoS support.	16	BTL2	Understand
7	Apply the concept of WiMAX mobility: Explain how 802.16e supports seamless handover for mobile users.	16	BTL3	Apply
8	Demonstrate how WMM prioritizes traffic for voice, video, and background applications with an example.	16	BTL3	Apply
9	Show how LiFi protocol stack supports IoT and indoor communication applications.	16	BTL3	Apply
10	Compare WLAN and UMTS in terms of coverage, QoS, mobility, and deployment cost.	16	BTL4	Analyze
11	Analyze the differences between fixed WiMAX (802.16d) and mobile WiMAX (802.16e).	16	BTL4	Analyze
12	Compare the security mechanisms of Bluetooth and WLAN.	16	BTL4	Analyze
13	Evaluate the effectiveness of WiMAX in providing broadband connectivity compared to WLAN.	16	BTL5	Evaluate
14	Critically evaluate the role of WPA2/WPA3 in improving WLAN security over WEP.	16	BTL5	Evaluate
15	Assess the strengths and limitations of LiFi as an alternative to Wi-Fi.	16	BTL5	Evaluate
16	Propose a hybrid wireless network model combining WLAN and UMTS for seamless connectivity.	16	BTL6	Create
17	Design a secure communication framework for smart homes using Bluetooth profiles and LiFi integration.	16	BTL6	Create

UNIT III - CELLULAR NETWORKS

GSM - Mobility Management and call control - GPRS - Network Elements - Radio Resource Management - Mobility Management and Session Management - Small Screen Web Browsing over GPRS and EDGE - MMS over GPRS - UMTS - Channel Structure on the Air Interface - UTRAN -Core and Radio Network Mobility Management - UMTS Security

PART-A

Q.No.	Question	Level	Competence
1	What does GSM stand for?	BTL1	Remember
2	Define Mobility Management in GSM.	BTL1	Remember
3	List the two main registers involved in GSM mobility management.	BTL1	Remember
4	What is the role of the MSC in GSM call control?	BTL1	Remember
5	Expand GPRS.	BTL1	Remember
6	Name the two main network elements introduced in GPRS.	BTL1	Remember
7	What is the function of the Packet Control Unit (PCU)?	BTL1	Remember
8	Define Radio Resource Management (RRM) in GPRS.	BTL1	Remember
9	Expand PDP in the context of GPRS session management.	BTL1	Remember
10	What is EDGE in mobile networks?	BTL1	Remember
11	What does MMS stand for?	BTL1	Remember
12	Expand UMTS.	BTL1	Remember
13	List the three types of channels in UMTS air interface.	BTL1	Remember
14	What is the function of Node B in UTRAN?	BTL1	Remember
15	Define RNC (Radio Network Controller).	BTL1	Remember
16	What does AKA stand for in UMTS security?	BTL1	Remember
17	Explain the purpose of Location Update in GSM mobility management.	BTL2	Understand
18	Differentiate between Attach and Detach procedures in GPRS.	BTL2	Understand
19	Describe the role of SGSN in GPRS.	BTL2	Understand
20	Explain how PDP context is used in GPRS session management.	BTL2	Understand
21	Why EDGE is considered an improvement over GPRS for browsing?	BTL2	Understand
22	Explain how MMS is transmitted using GPRS.	BTL2	Understand
23	Differentiate between logical channels and physical channels in UMTS.	BTL2	Understand
24	Explain how UMTS security improves over GSM security.	BTL2	Understand

PART-B

Q.No.	Question	Marks	Level	Competence
1	Explain GSM mobility management and call control with neat diagrams.	16	BTL1	Remember
2	Describe the channel structure of UMTS on the air interface.	16	BTL1	Remember
3	Discuss the network elements of GPRS and their functions.	16	BTL2	Understand
4	Explain Radio Resource Management (RRM) in GPRS.	16	BTL2	Understand
5	Describe the role of UTRAN in UMTS architecture.	16	BTL2	Understand
6	Explain UMTS security features with reference to Authentication and Key Agreement (AKA).	16	BTL2	Understand
7	Apply the concept of GSM call control to illustrate how a mobile-originated call is established.	16	BTL3	Apply
8	Demonstrate how PDP context activation enables Internet browsing over GPRS.	16	BTL3	Apply
9	Illustrate with an example how MMS is transmitted using GPRS.	16	BTL3	Apply
10	Compare GSM and GPRS mobility management mechanisms.	16	BTL4	Analyze
11	Analyze the differences between GPRS session management and GSM call control.	16	BTL4	Analyze
12	Examine the functions of Node B and RNC in UTRAN and their interworking.	16	BTL4	Analyze
13	Evaluate the effectiveness of EDGE in improving web browsing compared to GPRS.	16	BTL5	Evaluate
14	Critically evaluate UMTS security mechanisms over GSM in terms of strength and weaknesses.	16	BTL5	Evaluate
15	Assess the advantages and limitations of GPRS in supporting multimedia services like MMS.	16	BTL5	Evaluate
16	Propose a hybrid mobility management scheme that integrates GSM, GPRS, and UMTS.	16	BTL6	Create
17	Design an end-to-end call/session flow for a video call over UMTS, including mobility and security aspects.	16	BTL6	Create

UNIT IV - 4G NETWORKS

LTE - Network Architecture and Interfaces - FDD Air Interface and Radio Networks – Scheduling - Mobility Management and Power Optimization - LTE Security Architecture – Interconnection with UMTS and GSM - LTE Advanced (3GPP Release 10) - 4G Networks and Composite Radio Environment - Protocol Boosters - Hybrid 4G Wireless Networks Protocols - Green Wireless Networks - Physical Layer and Multiple Access - Channel Modelling for 4G - Introduction to 5G & XG networks.

PART-A

Q.No.	Question	Level	Competence
1	What does LTE stand for?	BTL 1	Remember
2	List the core network entities in LTE.	BTL 1	Remember
3	Expand EPC and eNodeB.	BTL 1	Remember
4	Define Frequency Division Duplex (FDD).	BTL 1	Remember
5	What is the function of the X2 interface in LTE?	BTL 1	Remember
6	State the multiple access techniques used in LTE uplink and downlink.	BTL 1	Remember
7	Expand EPS-AKA in LTE security.	BTL 1	Remember
8	What does CoMP stand for in LTE-Advanced?	BTL 1	Remember
9	Define Carrier Aggregation in LTE-Advanced.	BTL 1	Remember
10	List the three main goals of 5G.	BTL 1	Remember
11	Expand URLLC and mMTC in 5G.	BTL 1	Remember
12	What is meant by “Green Wireless Networks”?	BTL 1	Remember
13	Explain the role of the Mobility Management Entity (MME) in LTE.	BTL2	Understand
14	Differentiate between OFDMA and SC-FDMA.	BTL2	Understand
15	Describe how scheduling is done in LTE by the eNodeB.	BTL2	Understand
16	Explain the need for interconnection of LTE with UMTS/GSM.	BTL2	Understand
17	Describe how LTE security ensures mutual authentication.	BTL2	Understand
18	Explain the importance of Carrier Aggregation in LTE-Advanced.	BTL2	Understand
19	Differentiate between 4G and LTE-Advanced in terms of performance.	BTL2	Understand
20	Describe what is meant by Composite Radio Environment in 4G.	BTL2	Understand
21	Explain the role of Protocol Boosters in heterogeneous networks.	BTL2	Understand

22	Why is SC-FDMA preferred over OFDMA in uplink?	BTL2	Understand
23	Explain the concept of Network Slicing in 5G.	BTL2	Understand
24	Describe the significance of channel modelling in 4G networks.	BTL2	Understand

PART-B

Q.No.	Questions	Marks	Level	Competence
1	Explain the LTE network architecture with a neat diagram.	16	BTL 1	Remember
2	Describe the FDD air interface and radio network operation in LTE.	16	BTL 1	Remember
3	Discuss the scheduling mechanism in LTE and its role in QoS support.	16	BTL2	Understand
4	Explain mobility management in LTE and compare it with GSM/UMTS mobility handling.	16	BTL2	Understand
5	Describe the LTE security architecture and highlight its main features.	16	BTL2	Understand
6	Apply the concept of power optimization in LTE to illustrate how battery life of mobile devices can be improved.	16	BTL3	Apply
7	Demonstrate how LTE interconnects with UMTS and GSM for seamless mobility.	16	BTL3	Apply
8	Show with an example how Carrier Aggregation in LTE-Advanced increases user throughput.	16	BTL3	Apply
9	Analyze the role of EPC components (MME, SGW, PGW) in LTE and their interworking.	16	BTL4	Analyze
10	Compare OFDMA (downlink) and SC-FDMA (uplink) in LTE in terms of efficiency and complexity.	16	BTL4	Analyze
11	Analyze the challenges and opportunities in building Green Wireless Networks.	16	BTL4	Analyze
12	Evaluate the effectiveness of LTE-Advanced (3GPP Release 10) in meeting IMT-Advanced requirements.	16	BTL4	Analyze
13	Critically evaluate the performance of Composite Radio Environment in 4G systems.	16	BTL5	Evaluate
14	Assess the advantages and limitations of Hybrid 4G Wireless Network Protocols.	16	BTL5	Evaluate
15	Judge the importance of Protocol Boosters in heterogeneous wireless environments.	16	BTL5	Evaluate

16	Propose a channel model for 4G including fading, shadowing, and Doppler effects.	16	BTL6	Create
17	Design a next-generation (XG) framework that integrates 5G with IoT and satellite networks.	16	BTL6	Create

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

PART-A

Q.No.	Question	Level	Competence
1	Define Software Defined Networking (SDN).	BTL 1	Remember
2	What is the function of a control plane in networking?	BTL 1	Remember
3	List two differences between centralized and distributed control planes.	BTL 1	Remember
4	Expand NVGRE.	BTL 1	Remember
5	What does OpenFlow protocol provide?	BTL 1	Remember
6	Define VLAN.	BTL 1	Remember
7	What is meant by network overlay?	BTL 1	Remember
8	List any two SDN controllers.	BTL 1	Remember
9	Define data plane in SDN.	BTL 1	Remember
10	What is tunneling in network virtualization?	BTL 1	Remember
11	Expand I/O in networking context.	BTL 1	Remember
12	What is the role of APIs in SDN?	BTL 1	Remember
13	Explain why SDN separates control plane and data plane.	BTL 2	Understand
14	Describe the importance of OpenFlow in SDN.	BTL 2	Understand
15	Explain the difference between VLANs and NVGRE.	BTL 2	Understand
16	Summarize the advantages of centralized SDN controllers.	BTL 2	Understand
17	Explain why overlays are important in large-scale networks.	BTL 2	Understand
18	Differentiate between physical networks and virtual networks.	BTL 2	Understand
19	Describe the function of the data plane in SDN.	BTL 2	Understand

20	Why is I/O virtualization necessary in modern data centers?	BTL 2	Understand
21	Explain how network overlays simplify cloud deployments.	BTL 2	Understand
22	Describe any two challenges in designing SDN frameworks.	BTL 2	Understand
23	Differentiate between static VLANs and dynamic VLANs.	BTL 2	Understand
24	Explain how SDN improves programmability of networks.	BTL 2	Understand

PART-B

Q.No.	Question	Marks	Level	Competence
1	Define SDN and explain the need for separating control and data planes.	16	BTL 1	Remember
2	Describe the key features of OpenFlow protocol with a neat diagram.	16	BTL 1	Remember
3	Explain the architecture of an SDN controller and its functions in the network.	16	BTL 2	Understand
4	Discuss the role of VLANs in network segmentation with suitable examples.	16	BTL 2	Understand
5	Summarize the working of NVGRE and its applications in cloud environments.	16	BTL 2	Understand
6	Apply the concepts of centralized vs. distributed control planes to a real-world data center scenario.	16	BTL3	Apply
7	Demonstrate how network overlays improve scalability in multi-tenant cloud deployments.	16	BTL3	Apply
8	Illustrate with an example how I/O virtualization enhances performance in SDN-enabled data centres.	16	BTL3	Apply
9	Analyze the differences between traditional networking and SDN frameworks in terms of programmability and management.	16	BTL4	Analyze
10	Compare VLANs and NVGRE for network virtualization in enterprise networks.	16	BTL4	Analyze
11	Analyze the design challenges of SDN frameworks when scaling to carrier-grade networks.	16	BTL4	Analyze
12	Evaluate the strengths and weaknesses of Open Flow-based forwarding compared to traditional IP routing.	16	BTL5	Evaluate

13	Critically evaluate the effectiveness of network overlays in ensuring security and performance in cloud environments.	16	BTL5	Evaluate
14	Assess the role of SDN controllers in enabling Quality of Service (QoS) in modern networks.	16	BTL5	Evaluate
15	Propose a virtualized SDN framework to integrate data plane and I/O virtualization.	16	BTL 6	Create
16	Design a hybrid virtualization approach combining VLANs, NVGRE, and overlays for large-scale cloud providers.	16	BTL 6	Create
17	Create an end-to-end SDN-based secure architecture for enterprise networking.	16	BTL 6	Create

