

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF INFORMATION TECHNOLOGY

QUESTION BANK



VI SEMESTER

PIT206 – SOFTWARE DEFINED NETWORKING

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Prepared by

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SUBJECT : PIT206 – SOFTWARE DEFINED NETWORKING

YEAR /SEM : IV / VI

UNIT-I: SDN: INTRODUCTION

Elements of Modern Networking - History of Software Defined Networking (SDN) – The SDN Approach – SDN architecture - Evolution of SDN - SDN Data Plane, Control plane and Application Plane – SDN Applications.

PART – A

Q. No.	Questions	BT Level	Competence
1	Define Software Defined Networking.	BTL1	Remembering
2	What is meant by control plane?	BTL1	Remembering
3	State the function of data plane in networking?	BTL1	Remembering
4	Mention the need for SDN.	BTL1	Remembering
5	What is a traditional switch architecture?	BTL1	Remembering
6	Define centralized control in SDN.	BTL1	Remembering
7	Infer distributed control plane.	BTL1	Remembering
8	What is meant by network programmability?	BTL1	Remembering
9	List any two limitations of traditional networks.	BTL1	Remembering
10	Define modern data center networking?	BTL1	Remembering
11	Differentiate control plane and data plane.	BTL2	Understanding
12	Why SDN separates control and data planes.	BTL2	Understanding
13	Assess the role of SDN in traffic management.	BTL2	Understanding
14	Interpret the concept of global network view in SDN.	BTL2	Understanding
15	Why is centralized control preferred in SDN?	BTL2	Understanding
16	Explain the working principle of SDN.	BTL2	Understanding
17	How does SDN improve network flexibility?	BTL2	Understanding
18	Recall the term SDN controller.	BTL1	Remembering
19	Why are legacy networks hard to manage?	BTL2	Understanding
20	Summarize the evolution of SDN in brief.	BTL2	Understanding
21	List two applications of SDN.	BTL2	Understanding
22	State two advantages of SDN.	BTL2	Understanding
23	Mention two southbound protocols used in SDN.	BTL1	Remembering
24	Why SDN is suitable for large-scale networks?	BTL2	Understanding

PART – B

Q. No.	Questions		BT Level	Competence
1	Explain the evolution of Software Defined Networks from traditional networks with a neat architecture diagram.	(13)	BTL3	Applying
2	Apply SDN concepts to compare traditional switch architecture with SDN-based switch architecture.	(13)	BTL3	Applying
3	Examine the working of SDN by separating control and data planes with suitable examples.	(13)	BTL4	Analyzing
4	Explain centralized control in SDN and analyze its advantages and limitations.	(13)	BTL4	Analyzing
5	Explain the communication between the application plane, control plane and data plane in SDN.	(13)	BTL3	Applying
6	Apply SDN principles to design a simple network with centralized control.	(13)	BTL3	Applying
7	Inspect the distributed control plane architecture and compare it with centralized SDN control.	(13)	BTL4	Analyzing
8	Discuss the role of northbound and southbound interfaces in SDN architecture.	(13)	BTL3	Applying
9	Explain how SDN improves network scalability, flexibility and security.	(13)	BTL4	Analyzing
10	Discuss the evolution of data plane operations in SDN-enabled networks.	(13)	BTL3	Applying
11	Discuss various real-time applications of SDN in cloud computing, data centers and enterprise networks.	(13)	BTL3	Applying
12	Explain the complete packet forwarding process in an SDN network.	(13)	BTL3	Applying
13	Describe the functional components of SDN with suitable diagrams	(13)	BTL3	Applying
14	Design an SDN architecture for a campus network and explain the functions of each layer.	(13)	BTL6	Create
15	Apply SDN concepts to implement traffic engineering in data centers.	(13)	BTL4	Analyzing
16	Describe the advantages, challenges and limitations of SDN.	(13)	BTL4	Analyzing
17	Assess the challenges faced during SDN adoption in traditional networks.	(13)	BTL4	Analyzing

UNIT-II: SDN DATA PLANE AND CONTROL PLANE

Data Plane functions and protocols – OpenFlow Protocol - Flow Table - Control Plane Functions - Southbound Interface, Northbound Interface – SDN Controllers - Ryu, OpenDaylight, ONOS - Distributed Controllers.

PART – A

Q. No.	Questions	BT Level	Competence
1.	Define OpenFlow protocol.	BTL1	Remembering
2.	Infer flow table.	BTL1	Remembering
3.	What is packet forwarding in SDN?	BTL1	Remembering
4.	Define southbound interface.	BTL1	Remembering
5.	Recall SDN controller.	BTL1	Remembering
6.	Name any two SDN controllers.	BTL1	Remembering
7.	What is meant by SDN via APIs?	BTL1	Remembering
8.	Differentiate between OpenDaylight and ONOS.	BTL2	Understanding
9.	What is meant by opening up the device in SDN?	BTL1	Remembering
10.	List two functions of an SDN controller.	BTL2	Understanding
11.	Mention the role of OpenFlow protocol.	BTL2	Understanding
12.	Illustrate match-action operation in OpenFlow.	BTL1	Remembering
13.	How does OpenFlow handle unknown packets?	BTL2	Understanding
14.	What is OpenDaylight (ODL)?	BTL1	Remembering
15.	Why is OpenFlow considered a southbound protocol?	BTL2	Understanding
16.	Why are SDN controllers required?	BTL2	Understanding
17.	State the drawbacks of OpenFlow.	BTL2	Understanding
18.	State ONOS.	BTL1	Remembering
19.	Differentiate SDN via OpenFlow and SDN via APIs.	BTL2	Understanding
20.	Why does scalability become an issue in SDN controllers?	BTL2	Understanding
21.	List two security issues in OpenFlow.	BTL1	Remembering
22.	Mention two advantages of SDN controllers.	BTL1	Remembering
23.	Compare centralized and distributed SDN controllers.	BTL2	Understanding
24.	Why are SDN controllers critical in SDN architecture?	BTL2	Understanding

PART – B

Q. No.	Questions		BT Level	Competence
1.	Describe the architecture and working of the OpenFlow protocol.	(13)	BTL 3	Applying
2.	Explain the structure and operation of an OpenFlow flow table with suitable examples.	(13)	BTL 3	Applying
3.	Evaluate the advantages and limitations of different SDN controllers.	(13)	BTL 4	Analyzing
4.	Discuss the functions of the SDN control plane in detail.	(13)	BTL 4	Analyzing
5.	Explain the communication between the SDN controller and switches using the southbound interface.	(13)	BTL 3	Applying
6.	Examine the concept of opening up the device in SDN.	(13)	BTL 4	Analyzing
7.	Explain the architecture of SDN controllers with examples.	(13)	BTL 3	Applying
8.	Discuss the architecture, features and applications of the Ryu controller.	(13)	BTL 3	Applying

9.	Apply OpenFlow rules to design a simple forwarding application.	(13)	BTL 3	Applying
10.	Explain the architecture, components and features of the OpenDaylight controller.	(13)	BTL 3	Applying
11.	Explain southbound interface using OpenFlow protocol.	(13)	BTL 3	Applying
12.	Investigate security issues in OpenFlow-based SDN.	(13)	BTL 4	Analyzing
13.	Compare centralized and distributed SDN controller architectures.	(13)	BTL 4	Analyzing
14.	Analyze the interaction between SDN controller and switches.	(13)	BTL 4	Analyzing
15.	Explain general concepts of SDN controllers with real-world examples.	(13)	BTL 3	Applying
16.	Explain the packet processing mechanism in an OpenFlow switch with a neat diagram.	(13)	BTL 3	Applying
17.	Describe SDN controller architecture in enterprise networks.	(13)	BTL4	Applying

UNIT-III: SDN APPLICATIONS

SDN Application Plane Architecture – Network Services Abstraction Layer – Traffic Engineering – Measurement and Monitoring – Cloud Data Scalability – Security – Data Center Networking – Mobile Virtual Machines.

Q. No.	Questions	BT Level	Competence
1.	Define northbound interface.	BTL 1	Remembering
2.	Outline the southbound interface.	BTL 1	Remembering
3.	What is meant by abstraction in SDN?	BTL 1	Remembering
4.	What is the purpose of the Network Services Abstraction Layer?	BTL 2	Understanding
5.	Infer network programmability.	BTL 1	Remembering
6.	What is meant by SDN deep dive?	BTL 1	Remembering
7.	Define cloud data scalability.	BTL 1	Remembering
8.	What is control plane abstraction.	BTL 1	Remembering
9.	Define data plane abstraction.	BTL 1	Remembering
10.	List two challenges of SDN.	BTL 2	Understanding
11.	State Data Center Networking (DCN).	BTL 1	Remembering
12.	Briefly the importance of abstraction in SDN.	BTL 1	Remembering
13.	How does SDN enable network automation?	BTL 2	Understanding
14.	Mention the working principle of SDN control logic.	BTL 1	Remembering
15.	Why is separation of planes important in SDN?	BTL 2	Understanding
16.	Define a virtual machine (VM).	BTL 1	Remembering
17.	Outline SDN deployment challenges.	BTL 1	Remembering
18.	How does SDN improve network visibility?	BTL 2	Understanding
19.	Mention the role of APIs in SDN.	BTL 2	Understanding
20.	Why is SDN suitable for dynamic networks?	BTL 2	Understanding
21.	List two benefits of SDN abstraction.	BTL 2	Understanding
22.	Categorize the two OpenFlow challenges.	BTL 2	Understanding
23.	Why does SDN face scalability issues?	BTL 2	Understanding
24.	Differentiate between network measurement and monitoring.	BTL 2	Understanding

PART – B				
Q. No.	Questions		BT Level	Competence
1.	Explain northbound and southbound interfaces with examples.	(13)	BTL 3	Applying
2.	Discuss SDN abstraction concepts to simplify network management.	(13)	BTL 3	Applying
3.	Discuss the Network Services Abstraction Layer (NSAL) and its functions in SDN.	(13)	BTL 4	Analyzing
4.	Explain the concept of traffic engineering in SDN with suitable examples.	(13)	BTL 3	Applying
5.	Explain how SDN supports cloud data scalability in cloud computing environments.	(13)	BTL 3	Applying
6.	With help of SDN architecture, implement QoS mechanisms.	(13)	BTL 3	Applying
7.	Discuss the security architecture of SDN and the security challenges involved.	(13)	BTL 4	Analyzing
8.	Explain the concept of Mobile Virtual Machines and VM migration in SDN.	(13)	BTL 3	Applying
9.	Compare traditional traffic engineering and SDN-based traffic engineering.	(13)	BTL 4	Analyzing
10.	Analyze the importance of network measurement and monitoring in SDN performance optimization.	(13)	BTL 4	Analyzing
11.	Analyze the role of SDN in improving cloud scalability, flexibility and resource utilization.	(13)	BTL 4	Analyzing
12.	Explore the challenges of SDN scalability.	(13)	BTL 4	Analyzing
13.	Analyze the advantages and challenges of Mobile Virtual Machine migration in SDN-enabled cloud environments.	(13)	BTL 4	Analyzing
14.	Design an SDN application for intelligent traffic engineering and explain its workflow using a suitable diagram.	(13)	BTL 4	Analyzing
15.	Analyze SDN challenges in real-time applications.	(13)	BTL 4	Analyzing
16.	Explain the role of SDN in Data Center Networking (DCN).	(13)	BTL 3	Applying
17.	Discuss about SDN prospects and limitations.	(13)	BTL 4	Analyzing

UNIT-IV: NETWORK FUNCTION VIRTUALIZATION			
Network Virtualization - Virtual LANs – OpenFlow VLAN Support – Virtual Private Networks - NFV Concepts – Benefits and Requirements – OpenDaylight’s Virtual Tenant Network – Software Defined Infrastructure.			
Q. No.	Questions	BT Level	Competence
1.	Define Network Function Virtualization (NFV).	BTL 1	Remembering
2.	State the objectives of Network Virtualization.	BTL 1	Remembering
3.	State NFV architecture.	BTL 1	Remembering
4.	What is meant by NFV-MANO?	BTL 1	Remembering
5.	Define packet processing.	BTL 1	Remembering
6.	List two objectives of NFV.	BTL 1	Remembering
7.	State Virtual LAN (VLAN).	BTL 1	Remembering
8.	What is VLAN tagging?	BTL 1	Remembering

9.	Assess virtualization in networking.	BTL 1	Remembering
10.	List two examples of VNFs.	BTL 2	Understanding
11.	Why is NFV required?	BTL 2	Understanding
12.	What are the key components of NFV Reference Architecture?	BTL 1	Remembering
13.	In what ways does NFV reduce hardware dependency?	BTL 2	Understanding
14.	Name the layer in the NFV architecture that provides the physical and virtual resources	BTL 1	Remembering
15.	Differentiate NFV and traditional networking.	BTL 2	Understanding
16.	What is OpenDaylight Virtual Tenant Network (VTN)?	BTL 1	Remembering
17.	What is tenant isolation in virtual networks?	BTL 1	Remembering
18.	Outline the challenges in NFV deployment.	BTL 2	Understanding
19.	How does NFV improve service agility?	BTL 2	Understanding
20.	What are the mechanisms and methods for scaling network functions within an NFV environment?	BTL 2	Understanding
21.	Differentiate between VLAN and VPN.	BTL 2	Understanding
22.	Specify the benefits of NFV.	BTL 2	Understanding
23.	Distinguish the relationship between NFV and SDN.	BTL 2	Understanding
24.	Why is NFV suitable for telecom networks?	BTL 2	Understanding

PART – B				
Q. No.	Questions		BT Level	Competence
1.	Explain NFV architecture and framework with diagrams.	(13)	BTL 3	Applying
2.	Discuss the concept of Network Functions Virtualization (NFV) and its impact on networking	(13)	BTL 3	Applying
3.	Explore key challenges in NFV implementation.	(13)	BTL 4	Analyzing
4.	Describe the working principle, advantages and applications of Virtual LANs (VLANs).	(13)	BTL 3	Applying
5.	Justify how NFV improves network flexibility and scalability	(13)	BTL 4	Analyzing
6.	Explain the architecture and features of OpenDaylight Virtual Tenant Network (VTN).	(13)	BTL 3	Applying
7.	Explain OpenFlow VLAN support and packet processing using suitable examples.	(13)	BTL 3	Applying
8.	Differentiate between NFV and SDN.	(13)	BTL 3	Applying
9.	Elaborate NFV benefits in cloud environments.	(13)	BTL 3	Applying
10.	Apply NFV concepts to firewall virtualization.	(13)	BTL 3	Applying
11.	Analyze NFV deployment challenges.	(13)	BTL 4	Analyzing
12.	Explain virtual network functions (VNFs).	(13)	BTL 3	Applying
13.	IDifferentiate between VLAN, VPN and Network Virtualization.	(13)	BTL 4	Analyzing
14.	Discuss the future trends and applications of NFV in cloud computing	(13)	BTL 3	Applying
15.	Explain how OpenDaylight Virtual Tenant Network provides tenant isolation and network management.	(13)	BTL 4	Analyzing

16.	Describe the components that support NFV framework.	(13)	BTL 3	Applying
17.	Compare and contrast SDN and NFV in terms of functionality and use cases	(13)	BTL 4	Analyzing

UNIT-V: NFV FUNCTIONALITY				
NFV Concepts – NFV Benefits and Requirements - NFV Infrastructure – Virtualized Network Functions – NFV Management and Orchestration – NFV Use cases – SDN and NFV.				

Q. No.	Questions	BT Level	Competence
1.	What is data center networking.	BTL 1	Remembering
2.	Define a data center.	BTL 1	Remembering
3.	State the objective of NFV.	BTL 1	Remembering
4.	What does "network telemetry" mean?	BTL 1	Remembering
5.	List the major components of NFV architecture.	BTL 1	Remembering
6.	Define content distribution network (CDN).	BTL 1	Remembering
7.	Define Information-Centric Networking (ICN).	BTL 1	Remembering
8.	What is meant by Named Data Networking (NDN)?	BTL 1	Remembering
9.	What is NFV Management and Orchestration (MANO)?	BTL 1	Remembering
10.	State the role of the NFV Orchestrator (NFVO).	BTL 2	Understanding
11.	Specify traffic patterns in data centers.	BTL 2	Understanding
12.	Why is SDN required in data centers?	BTL 2	Understanding
13.	How does NFV reduce operational cost?	BTL 2	Understanding
14.	Briefly outline the key protocol advancements observed in modern data centers.	BTL 2	Understanding
15.	Mention any four applications (use cases) of NFV.	BTL 1	Remembering
16.	Mention the benefits of serverless computing.	BTL 2	Understanding
17.	How does SDN improve data center efficiency?	BTL 2	Understanding
18.	State any two advantages of Virtualized Network Functions (VNFs).	BTL 2	Understanding
19.	Outline content distribution in IP networks.	BTL 1	Remembering
20.	Why are large-scale data centers challenging to manage?	BTL 2	Understanding
21.	Give the importance of NFV in cloud computing.	BTL 1	Remembering
22.	Mention two benefits of ICN.	BTL 2	Understanding
23.	What are future trends in data center networking.	BTL 1	Remembering
24.	Why is data center networking complex?	BTL 2	Understanding
24.	Why is data center networking complex?	BTL 2	Understanding

PART – B

Q. No.	Questions		BT Level	Competence
1.	Explain the concepts and architecture of Network Function Virtualization (NFV) with a neat diagram.	(13)	BTL 3	Applying
2.	Discuss the benefits and requirements of NFV in modern communication networks.	(13)	BTL 4	Analyzing
3.	Describe the concept, lifecycle and advantages of Virtualized Network Functions (VNFs).	(13)	BTL 3	Applying
4.	Explain the NFV Management and Orchestration (MANO) framework with a neat diagram.	(13)	BTL 3	Applying
5.	Discuss the roles and responsibilities of NFVO, VNFM and VIM in	(13)	BTL 3	Applying

	the MANO framework.			
6.	Explain various NFV use cases in cloud computing, enterprise networks and telecommunication networks.	(13)	BTL 3	Applying
7.	Compare SDN and NFV with respect to architecture, functionality and applications.	(13)	BTL 4	Analyzing
8.	Explain how NFV improves network scalability, flexibility and service deployment.	(13)	BTL 4	Analyzing
9.	Compare and contrast the benefits of Information-Centric Networking (ICN) with those of traditional IP-based networks	(13)	BTL 4	Analyzing
10.	Analyze the relationship and integration of SDN and NFV in next-generation networks.	(13)	BTL 4	Analyzing
11.	Evaluate the role of NFV in supporting cloud computing and 5G network services.	(13)	BTL 5	Evaluate.
12.	Discuss the key problems and issues associated with managing large data center facilities	(13)	BTL 4	Analyzing
13.	Evaluate the effectiveness of telemetry-based monitoring systems.	(13)	BTL 4	Analyzing
14.	Analyze the integration of SDN and NFV in data center networking.	(13)	BTL 4	Analyzing
15.	Design an integrated SDN-NFV architecture for a cloud data center and explain its operation.	(13)	BTL 6	Design
16.	Explore the future trends in data center networking.	(13)	BTL 4	Analyzing
17.	Develop a suitable NFV deployment model for a telecom service provider and justify the selection of MANO components.	(13)	BTL 6	Design