

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV B.E. Information Technology (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
<b>ITR7E2</b> <b>Foundation of Modern Networking</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>
<b>Duration of Theory Paper: 3 Hours</b>							

### Learning Objectives:

- To understand that traditional network architectures are inadequate for modern networking needs.
- To understand key requirements for an SDN architecture.
- To understand the work being done on SDN and NFV standardization by various organizations.

### COURSE OF CONTENTS

#### UNIT-I

The Networking Ecosystem, Network Architectures ,Network Hierarchy, Ethernet, Wi-Fi, 4G/5G ,Cloud Computing Concepts, Cloud Networking, Internet of Things, Layers of the Internet of Things, Types of Network and Internet Traffic, Quality of Service, Quality of Experience, Routing, Packet Forwarding, Routing Protocols, Congestion Control Techniques, Modern Networking Elements.

#### Unit-II

Software Defined Network Functions, SDN-Background and Motivation, The SDN Approach, Requirements, SDN Architecture, SDN Data Plane and Open Flow, Open Flow Logical Network Device, Open Flow Protocol, ITU-T Model, OpenDaylight, OpenDaylight Architecture, REST, REST Constraints, Centralized Versus Distributed Controllers, High-Availability Clusters, Federated SDN Networks, Border Gateway Protocol, Routing and QoS Between Domains,IETFSDNi, OpenDaylightSNDi,SDN Application Plane, Network Services Abstraction Layer, Traffic Engineering, OpenDaylight DDoS Application, Data Center Networking,Mobility and Wireless, Information-Centric Networking.

#### Unit-III

Network Functions Virtualization: Concepts and Architecture, Virtual Machines, The Virtual ,NFV Concepts, NFV Benefits and Requirements, NFV Reference Architecture, NFV Functionality-NFV Infrastructure, Virtualized Network Functions, Network Virtualization-Virtual LANs, The Use of Virtual LANs, OpenFlow VLAN Support, Virtual Private Networks, IPsec VPNs, MPLS VPNs, Network Virtualization, Network Virtualization Architecture, Benefits of Network Virtualization, OpenDaylight's Virtual Tenant Network.

#### Unit-IV

Quality of Service-Background, QoS Architectural Framework, Integrated Services Architecture, ISA Approach, Differentiated Services, Service Level Agreements, IP Performance Metrics, QoE-Related Standardization Projects, QoE/QoS Layered Model, Summarizing and Merging the QoE/QoS Layers, Applications of QoE, Network Design Implications of QoS and QoE-Classification of QoE/QoS Mapping Models, Actionable QoE over IP-Based Networks, The System-Oriented Actionable QoE Solution, QoE Versus QoS Service Monitoring.

## **Unit-V**

Cloud Computing-Basic Concepts, Cloud Services, Cloud Deployment Models, Public Cloud, Private Cloud, Community Cloud, Hybrid Cloud, Cloud Architecture, SDN and NFV, The Internet of Things: Components, The Scope of the Internet of Things, Components of IoT-Enabled Things, Sensors, Actuators, Microcontrollers, Transceivers, The Internet of Things: Architecture and Implementation-IoT Architecture, ITU-T IoT Reference Model, IoT World Forum Reference Model, IoT Implementation, IoTivity, Cisco IoT System, ioBridge.

### **Learning Outcomes:**

- This course teaches students the building blocks of modern network design including the many different types of networks, networking concepts, network architecture, network communications and network design.

### **REFERENCE BOOKS**

- Foundation of Modern Networking, by William Stallings.
- Software defined networks:A Comprehensive Approach, by Paul Goransson, Chuck Black, Timothy Culver

