



# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India  
(Autonomous Institute Affiliated to University of Mumbai)

Course Code	Course Name	Teaching Scheme (Hrs/week)			Credits Assigned			
		L	T	P	L	T	P	Total
CE921	Network Analysis and Design (NDA)	4	--	--	4	--	--	4
		Examination Scheme						
		ISE		MSE		ESE		
		10		30		100 (60% Weightage)		

Pre-requisite Course Codes	Computer Networks
At the end of successful completion of the course, students will be able to	
<b>Course Outcomes</b>	CO1   Understand the theoretical issues in protocol design and apply it to Quality of service in networks
	CO2   Understand issues in the design of network processors and apply them to design network systems
	CO3   Simulate working of wired and wireless networks to understand networking concepts
	CO4   Develop solutions by applying knowledge of mathematics, probability, and statistics to network design problems.
	CO5   Understand the basics of software defined networking and explore research problems in that area.

Module No.	Unit No.	Topics	Ref.	Hrs.
<b>Internetworking</b>	<b>1.1</b>	Congestion control and Resource allocation: Issues of Resource Allocation, Queuing Disciplines: FIFO, Fair Queuing, TCP Congestion Control: Additive Increase/Multiplicative Decrease, Slow Start, Fast Retransmit and Fast Recovery.	1,2	05
	<b>1.2</b>	Congestion-Avoidance Mechanisms: DECbit, Random Early Detection (RED), Source-Based Congestion Avoidance, Quality of Service: Application Requirements, Integrated Services (RSVP), Differentiated Services (EF, AF)	1,2	05
<b>Routing</b>	<b>2.1</b>	IPv4 Routing Principles, Routing Information Protocol (RIP), IGRP and EIGRP, OSPF for IPv4 and IPv6, Border Gateway Protocol (BGP), EIGRP, High Availability Routing	2,3	08
<b>IPv6</b>	<b>3.1</b>	IPv4 deficiencies, patching work done with IPv4, IPv6 addressing, multicast, Anycast, ICMPv6, Neighbour Discovery, Routing, Resource Reservation, IPv6 protocols		08
<b>Network Design</b>	<b>4.1</b>	Designing the network topology and solutions-Top down Approach: PPDIIOO – Network Design Layers - Access Layer, Distribution Layer, Core/Backbone Layer, Access Layer Design,	1,2	14



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		Backbone Network Design, Enterprise LAN Design: Ethernet Design Rules and Campus Design best practices, Virtualization and Data Center Design, Wireless LAN Design, WAN Design: Traditional WAN Technologies, VPN Design.		
<b>Ad Hoc Wireless Networks</b>	<b>5.1</b>	MAC Protocols for Ad Hoc Wireless Networks: MACA/W, MACA-BI, DPRMA, MACA/PR. Routing Protocols for Ad Hoc Wireless Networks: DSDV, DSR, AODV, ZRP. Transport Layer: ATCP.	4,5	08
<b>Software Defined Networking and OpenFlow</b>	<b>5.2</b>	Introduction to Software Defined Networking, Control and Data Planes, SDN Controllers, Introduction to Openflow Protocol, Network Function Virtualization-Concepts.	5,6	04
			<b>Total</b>	<b>52</b>

**In-Semester Examination (ISE):** The assessment includes the submission of a term paper by each student on the contemporary work related to Network Analysis and Design.

## References:

- [1] Larry L. Peterson and Bruce S. Davie, Computer Networks: A Systems Approach, Elsevier, Fourth Edition.
  - [2] Philip M. Miller, TCP / IP: The Ultimate Protocol Guide Applications, Access and Data Security - Vol 2, Wiley.
  - [3] Pete Loshin, IPv6: Theory, Protocols and Practice, Morgan Kaufmann, 2nd Edition, 2004.
  - [4] C. Siva Ram Murthy, B.S. Manoj, Ad Hoc Wireless Networks: Architectures and, Prentice Hall, 2004.
  - [5] Thomas D Nadeau and Ken Grey, Software Defined Networking, O'Reilly, 2013.
- William Stallings, High-Speed Networks and Internets, Pearson Education, 2nd Edition, 2002.