

Course Code	18CSE453T	Course Name	NETWORK ROUTING ALGORITHMS	Course Category	E	Professional Elective	L	T	P	C
							3	0	0	3

Pre-requisite Courses	18CSC302J	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Science and Engineering	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):		The purpose of learning this course is to:		
CLR-1 :	Understand how addressing and routing are tied together and different architectural components are related to routing.			
CLR-2 :	Gain knowledge on the need for routers, its functionality and different architectures.			
CLR-3 :	Understand fundamental basis of various algorithms in centralized and distributed point of view.			
CLR-4 :	Apply the knowledge of IP addressing in various routing algorithms.			
CLR-5 :	Understand the various types of key routing protocols used in wireless networks.			
CLR-6 :	Gain knowledge on past experiences and prepare for next generation networks and routing			

Learning		
1	2	3
Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
H	M	-	-	L	-	-	-	-	M	-	H	-	-	-
H	H	M	M	L	-	-	-	-	L	H	-	-	-	-
H	H	L	M	M	-	-	-	M	-	L	H	-	-	-
H	H	H	H	H	L	-	M	M	-	-	H	-	-	-
H	H	H	H	M	-	-	M	-	-	H	-	-	-	-
H	H	H	M	M	L	-	-	-	-	H	-	-	-	-

Course Learning Outcomes (CLO):		At the end of this course, learners will be able to:		
CLO-1 :	Acquire the knowledge of how data transfer happens in conventional networks	2	80	85
CLO-2 :	Comprehend Router Architectures and IP Address Lookup Algorithms	2	75	80
CLO-3 :	Compare routing techniques and protocols	2	85	80
CLO-4 :	Examine how different dimensions of routing differ for different types of network	2	80	75
CLO-5 :	Apply various routing algorithms in wireless network scenario.	2	75	85
CLO-6 :	Understand various routing paradigms in next generation	2	80	85

Duration (hour)	8	9	9	9	10
S-1	SLO-1: Network Routing: An Introduction to Routing algorithms	Router Architectures: Basic Forwarding Functions	Bellman-Ford algorithm	Routers, Networks, and Routing Information: Some Basics	Routing in Wireless Networks: Internet based mobile ad-hoc networking
	SLO-2: Functions of Router	Routing table versus forwarding table	Distance Vector Approach	Routing Table, Communication of Routing Information	Classifications of routing protocols
S-2	SLO-1: IP addressing- Classful Addressing	Types of router	Dijkstra's Algorithm	Routing Information Protocol, Version 1 (RIPv1)	Table-Driven Routing Protocols: Destination Sequenced Distance-Vector Routing Protocol
	SLO-2: Classless Addressing	Elements of Router	Comparison of Bellman-Ford and Distance Vector Approach	Routing Information Protocol, Version 2 (RIPv2)	Cluster-Head Gateway Switch Routing Protocol
S-3	SLO-1: Protocol architecture stack – OSI Reference Model	Packet Flow	Shortest Path Computation with Candidate Path Caching	Interior Gateway Routing Protocol (IGRP)	On-Demand Routing Protocols: Dynamic Source Routing Protocol
	SLO-2: IP Protocol Stack Architecture	Packet Processing	Widest Path Computation with Candidate Path Caching	Enhanced Interior Gateway Routing Protocol (EIGRP), Route Redistribution	Ad Hoc On-Demand Distance-Vector Routing Protocol
S-4	SLO-1: Network Topology Architecture	Shared CPU architecture, Shared forwarding Engine Architecture	Widest Path Algorithm	OSPF: Protocol Features	Hybrid Routing Protocols: Core Extraction Distributed Ad Hoc Routing Protocol
	SLO-2: Network Management Architecture	Shared Nothing Architectures, Clustered Architectures	k-Shortest Paths Algorithm	OSPF Packet Format	Zone Routing Protocol
S-5	SLO-1: Public Switched Telephone Network	Impact of Addressing on lookup	Routing Protocol, Routing Algorithm, and Routing Table	Integrated IS-IS	Routing Protocols With Efficient Flooding Mechanisms: Preferred Link-Based Routing Protocols
		Longest Prefix Matching	Routing Information Representation and Protocol Messages	Similarities and Differences Between IS-IS and OSPF	Optimized Link State Routing
S-6	SLO-1: Communication Technologies	Naïve Algorithms, Binary Tries	Distance Vector Routing Protocol	IP Traffic Engineering: Traffic, Stochasticity, Delay, and	Hierarchical Routing Protocols

					Utilization	
					Applications' View	Power-Aware Routing Protocols
					Traffic Engineering: An Architectural Framework	Toward Next Generation Routing: Quality of Service Routing
					Traffic Engineering: A Four-Node Illustration	
					BGP Operations, configuration, faces of BGP	Multiprotocol Label Switching(MPLS)
					BGP Decision Process	Generalized MPLS
					Internal BGP Scalability	
					Protocol Message Format	Routing and Traffic Engineering with MPLS
						PTSN Call Routing Using the Internet

Learning Resources	<ol style="list-style-type: none"> 1. D.Medhi and K.Ramassamy, <i>Network Routing: Algorithms, Protocols and Architectures</i>, MorganKaufmann Publishers, First Edition 2007. 2. C.Siva Ram Murthy and B.S.Manoj, <i>Adhoc Wireless Networks</i>, Pearson Education, 2007. 3. D.Medhi and K.Ramassamy, <i>Network Routing: Algorithms, Protocols and Architectures</i>, Morgan Kaufmann Publishers, Second Edition 2017. 	<ol style="list-style-type: none"> 4. SteenStrubM, <i>Routing in Communication networks</i>, Prentice Hall International, 1995. 5. <i>Internetworking Technologies Handbook</i>, Inc. Cisco Systems, ILSCisco
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Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50%)								Final Examination (50% weightage)	
		CLA - 1 (10%)		CLA - 2 (15%)		CLA - 3 (15%)		CLA - 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40 %	-	30 %	-	30 %	-	30 %	-	30%	-
	Understand										
Level 2	Apply	40 %	-	40 %	-	40 %	-	40 %	-	40%	-
	Analyze										
Level 3	Evaluate	20 %	-	30 %	-	30 %	-	30 %	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA - 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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