

		National Institute of Technology Meghalaya An Institute of National Importance											CURRICULUM					
Programme		Bachelor of Technology in Computer Science & Engineering										Academic Year of Regulation			2018-19			
Department		Computer Science & Engineering										Semester			VII			
Course Code	Course Name	Credit Structure												Marks Distribution				
		L	T	P	C	INT	MID	END	Total									
CS 427	Software Defined Networking	3	0	0	3	50	50	100	200									
Course Objectives	COB1: To develop students' ability to understand the concepts of traditional networks with its limitations and the need to move to Software Defined Networks.	Course Outcomes	CO1	Able to Understand the design principles and performance enhancement strategies that adopted in performance evolution of different network components.														
	COB2: To develop the students' ability to understand the fundamentals of SDN, its planar architecture and to understand the flexibility of multilevel pipeline processing.			CO2	Able to Solve the performance related problems of SDN, including those in routing, optimizing traffic engineering.													
	COB3: To provide the students with knowledge of the working of SDN between the controller and data plane and emphasis on the table matching.				CO3	Able to Analyze the performance of routing, optimizing traffic engineering using SDN.												
	COB4: To create switches and designing networks by manually adding/deleting flow entries inside the table and learning to dissect the packets.																	
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No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs				
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3		
1	CO1	3	1	1	-	-	-	-	1	1	-	-	2	-	1	-		
2	CO2	3	3	2	2	2	-	-	1	1	-	-	2	1	1	-		
3	CO3	3	3	3	2	2	-	-	2	2	-	-	2	2	2	-		
SYLLABUS																		
No.	Content													Hours	COs			
I	Introduction to Traditional networks: Traditional networks, Control Plane, Data Plane and Management Plane, Flow table, Limitations of traditional networks- Need for simplification, Lowering operating costs, Single flow table, Flexibility issues, Proprietary protocols and Destination based forwarding, ForCES.													8	CO 1, 2 & 3			
II	Introduction to SDN: Software defined networks, SDN Planes-Dataplane, Control Plane, Application Plane, OpenFlow, Open Network Foundation, Protocol-Encryption, Northbound & Southbound-API, Multi-level flow table and pipeline processing, Group table, Meter table-Meter bands, OpenFlow version- 1.0,1.1,1.2,1.3													8	CO 1 & 2			
III	SDN Messages and Table matching: Messages-Controller-Switch, Symmetric & Asynchronous messages Counters, OpenFlow Ports, Table matching in SDN, Network Automation and Virtualization.													8	CO 1, 2 & 3			
IV	Mininet Emulator: Introduction to Mininet, Custom topologies of OpenFlow and Legacy Networks, Flow table manipulation-Adding & Deleting Flow entries, Packet Dissection via Wireshark													8	CO 1 & 2			
V	SDN Applications and UseCases: SDN Controllers-Ryu, POX, Floodlight, SDN Applications, SDN-UseCases, SDN in the DataCenter and WAN, SDN-OpenSource and its Features													4	CO 1, 2 & 3			
Total Hours												36						
Essential Readings																		
1. Nadeau, Thomas D., and Ken Gray. <i>SDN: Software Defined Networks: an authoritative review of network programmability technologies</i> . " O'Reilly Media, Inc.", 2013.																		
2. Chuck Black and Paul Goransson, " Software Defined Networks: A Comprehensive Approach", Morgan Kaufman.																		
3. Coker, Oswald, and Siamak Azodolmolky. <i>Software-defined Networking with OpenFlow: Deliver Innovative Business Solutions</i> . Packt Publishing Ltd, 2017.																		
Supplementary Readings																		
1. https://www.opennetworking.org/wp-content/uploads/2014/10/openflow-spec-v1.3.0.pdf (OpenFlow version 1.3)																		
2. http://mininet.org/ (Mininet Network Emulator).																		
3. Kreutz, D., Ramos, F. M., Verissimo, P. E., Rothenberg, C. E., Azodolmolky, S., & Uhlig, S. (2014). Software-defined networking: A comprehensive survey. <i>Proceedings of the IEEE</i> , 103(1), 14-76.																		
4. https://www.opennetworking.org/ (Open Network Foundation)																		