

Semester- III

Software Defined Networks			
Course Code	22SNI31	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:2	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • Explore the History and evolution of SDN, OF Switch, Control and Data Plane Separation • Gain the knowledge of Routing Control Platform and 4D Controllers (Open Daylight Controller (ODL), Open Network Operating System (ONOS)) • Able to Verify and perform Troubleshooting 			
Module-1			
Introduction, Centralized and Distributed Control and Data Planes, OpenFlow			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		
Module-2			
SDN Controllers, Network Programmability			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		
Module-3			
Data Center Concepts and Constructs, Network Function Virtualization			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		
Module-4			
Network Topology and Topological Information Abstraction, Building an SDN Framework			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		
Module-5			
Use Cases for Bandwidth Scheduling, Manipulation, and Calendaring, Use Cases for Input Traffic Monitoring, Classification, and Triggered Actions			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks**
- to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- ~~The students will have to answer five full questions, selecting one full question from each module~~

Suggested Learning Resources:

Text Books:

- SDN: Software Defined Networks, Ken Gray, Thomas D. Nadeau., O'Reilly. 2013.
- Software Defined Networks, Paul Goransson, Chuck Black Timothy Culver, Elsevier 2nd Edition, 2016.

Web links and Video Lectures (e-Resources):

- <https://www.coursera.org/learn/sdn>
- <https://www.udemy.com/course/sdn-made-simple/>

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Illustrate the concepts of controllers and network programmability	L2
CO2	Explain data centre and NFV	L1
CO3	Report use case	L2
CO4	Build an SDN framework	L3

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01		x		x								
C02	x						x					
C03					x	x						
C04			x									x

SNI 2022 Syllabus

Semester- III

Wireless Sensor Networks			
Course Code	22SNI321	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40 Hrs	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • Define WSN and Dynamic modulation scaling. • Explore working of the MAC protocols • Demonstrate Routing and Data gathering protocols • Illustrate working of Embedded OS. 			
Module-1			
CHARACTERISTICS OF WSN			
Characteristic requirements for WSN - Challenges for WSNs – WSN vs Adhoc Networks - Sensor node architecture – Commercially available sensor nodes – Imote, IRIS, Mica Mote, EYES nodes, BTnodes, TelosB, Sunspot -Physical layer and transceiver design considerations in WSNs, Energy usage profile, Choice of modulation scheme, Dynamic modulation scaling, Antenna considerations.			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study/Web links		
Module-2			
MEDIUM ACCESS CONTROL PROTOCOLS			
Fundamentals of MAC protocols - Low duty cycle protocols and wakeup concepts – Contention based protocols - Schedule-based protocols - SMAC - BMAC - Traffic-adaptive medium access protocol (TRAMA) - The IEEE 802.15.4 MAC protocol.			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study/Web links		
Module-3			
ROUTING AND DATA GATHERING PROTOCOLS			
Routing Challenges and Design Issues in Wireless Sensor Networks, Flooding and gossiping – Data centric Routing – SPIN – Directed Diffusion – Energy aware routing - Gradient-based routing - Rumor Routing – COUGAR – ACQUIRE – Hierarchical Routing - LEACH, PEGASIS – Location Based Routing – GF, GAF, GEAR, GPSR – Real Time routing Protocols – TEEN, APTEEN, SPEED, RAP - Data aggregation - data aggregation operations - Aggregate Queries in Sensor Networks - Aggregation Techniques – TAG, Tiny DB.			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study/Web links		
Module-4			
EMBEDDED OPERATING SYSTEMS			
Operating Systems for Wireless Sensor Networks – Introduction - Operating System Design Issues - Examples of Operating Systems – TinyOS – Mate – MagnetOS – MANTIS - OSPM - EYES OS – SenOS – EMERALDS – PicOS – Introduction to Tiny OS – NesC – Interfaces and Modules- Configurations and Wiring - Generic Components -Programming in Tiny OS using NesC, Emulator TOSSIM.			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study/Web links		
Module-5			

APPLICATIONS OF WSN WSN	
Applications - Home Control - Building Automation - Industrial Automation - Medical Applications - Reconfigurable Sensor Networks - Highway Monitoring - Military Applications - Civil and Environmental Engineering Applications - Wildfire Instrumentation - Habitat Monitoring - Nanoscopic Sensor Applications – Case Study: IEEE 802.15.4 LR-WPANs Standard - Target detection and tracking - Contour/edge detection - Field sampling.	
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study/Web links/network Database like https://crawdad.org/
Assessment Details (both CIE and SEE)	
The weight age of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.	
Continuous Internal Evaluation:	
<ul style="list-style-type: none"> • Three Unit Tests each of 20 Marks • Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs 	
The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks	
CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.	
Semester End Examination:	
<ul style="list-style-type: none"> • The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50. • The question paper will have ten full questions carrying equal marks. • Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module. • Each full question will have a sub-question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module 	
Suggested Learning Resources:	
Text Books	
<ul style="list-style-type: none"> • Wireless Sensor Networks Technology, Protocols, and Applications, KazemS ohraby, Daniel Minoli and TaiebZnati, John Wiley & Sons, 2007 • Protocols and Architectures for Wireless Sensor Network, Holger Karl and Andreas Willig , John Wiley & Sons, Ltd ,2005 	
Reference Books:	
<ul style="list-style-type: none"> • A survey of routing protocols in wireless sensor networks , K. Akkaya and M. Younis, Elsevier Ad Hoc Network Journal, Vol. 3, no. 3, pp. 325--349 • <i>TinyOS Programming</i> , Philip Levis • <i>Wireless Sensor Network Designs</i> , Anna Ha'c , John Wiley & Sons Ltd 	
Web links and Video Lectures (e-Resources):	
<ol style="list-style-type: none"> https://youtu.be/5ZFfqhdf0QI http://www.digimat.in/nptel/courses/video/106105160/L21.html 	
Skill Development Activities Suggested	
The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.	

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
C01	Know the basics , characteristics and challenges of Wireless Sensor Network	L2
C02	Apply the knowledge to identify appropriate physical and MAC layer protocol (can be attained through assignment or CIE)	L3
C03	Apply the knowledge to identify the suitable routing algorithm based on the network and user requirement (can be attained through assignment or CIE)	L3
C04	Analysis the OS used in Wireless Sensor Networks and build basic modules	L3

Mapping of COS and POs

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01			X			X						
C02		X										X
C03				X						X		
C04								X				X

Semester- III

Wireless Networks & Mobile Computing			
Course Code	22SNI322	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • Define the Mobile computing technologies, GPRS Network Architecture. • Interpret Spread Spectrum technology • Define Mobile OS. • Build Wireless Internet Applications 			
Module-1			
<p>Mobile Computing Architecture: Architecture for Mobile Computing, 3-tier Architecture, Design Considerations for Mobile Computing. Emerging Technologies: Wireless broadband (WiMAX), Mobile IP: Introduction, discovery, Registration, Tunneling, Cellular IP, Mobile IP with IPv6. Wireless Networks : Global Systems for Mobile Communication (GSM): GSM Architecture, Entities, Call routing in GSM, PLMN Interface, GSM Addresses and Identities, Network Aspects in GSM, Mobility Management, GSM Frequency allocation. Short Service Messages (SMS): Introduction to SMS, SMS Architecture, SMMT, SMMO, SMS as Information bearer, applications, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Billing and Charging in GPRS.</p>			
Teaching-Learning Process	Chalk and talk/PPT/case study		
Module-2			
<p>Spread Spectrum technology, IS-95, CDMA versus GSM, Wireless Data, Third Generation Networks, Applications on 3G, Mobile Client: Moving beyond desktop, Mobile handset overview, Mobile phones and their features, PDA, Design Constraints in applications for handheld devices.</p>			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		
Module-3			
<p>Mobile OS and Computing Environment: Smart Client Architecture, The Client: User Interface, Data Storage, Performance, Data Synchronization, Messaging. The Server: Data Synchronization, Enterprise Data Source, Messaging. Mobile Operating Systems: WinCE, Palm OS, Symbian OS, Linux, Proprietary OS Client Development: The development process, Need analysis phase, Design phase, Implementation and Testing phase, Deployment phase, Development Tools, Device Emulators.</p>			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		
Module-4			
<p>Building Wireless Internet Applications: Thin client overview: Architecture, the client, Middleware, messaging Servers, Processing a Wireless request, Wireless Applications Protocol (WAP) Overview, Wireless Languages: Markup Languages, HDML, WML, HTML, cHTML, XHTML, VoiceXML.</p>			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content		

Process	
Module-5	
J2ME: Introduction, CDC, CLDC, MIDP; Programming for CLDC, MIDlet model, Provisioning, MIDlet life cycle, Creating new application, MIDlet event handling, GUI in MIDP, Low level GUI Components, Multimedia APIs; Communication in MIDP, Security Considerations in MIDP.	
Teaching-Learning Process	Chalk and talk/PPT
<p>Assessment Details (both CIE and SEE)</p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • Three Unit Tests each of 20 Marks • Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</p> <p>Semester End Examination:</p> <ul style="list-style-type: none"> • The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50. • The question paper will have ten full questions carrying equal marks. • Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module. • Each full question will have a sub-question covering all the topics under a module. • <u>The students will have to answer five full questions, selecting one full question from each module</u> <p>Suggested Learning Resources:</p> <p>Text Books:</p> <ul style="list-style-type: none"> • Mobile Computing, Technology, Applications and Service Creation , Ashok Talukder, Roopa Yavagal, Hasan Ahmed, Tata McGraw Hill, 2nd Edition, 2010 • Mobile and Wireless Design Essentials, Martyn Mallik, Wiley India, 2003 <p>Reference Books:</p> <ul style="list-style-type: none"> • Mobile Computing, Raj kamal, Oxford University Press, 2007 • Wireless Communications and Networks, 3G and Beyond, ItiSahaMisra, Tata McGraw Hill, 2009 <p>Web links and Video Lectures (e-Resources):</p> <p>https://www.digimat.in/nptel/courses/video/106106147/L01.html</p>	

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
C01	Explain state of art techniques in wireless communication	L2
C02	Discover CDMA, GSM. Mobile IP, WiMAX	L2
C03	Demonstrate program for CLDC, MIDP let model and security concerns	L2

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01		x		x								x
C02		x	x									x
C03				x	x							x

Semester- III

SOCIAL NETWORK ANALYSIS			
Course Code	22SNI323	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • Illustrate the knowledge on various secure mechanisms through set of protocols. • Efficiently design new set of protocols. • Define the Security issues and overcome means with protocols. 			
Module-1			
Introduction to social network analysis and Descriptive network analysis: Introduction to new science of networks. Networks examples. Graph theory basics. Statistical network properties. Degree distribution, clustering coefficient. Frequent patterns. Network motifs. Cliques and k-cores			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study		
Module-2			
Network structure, Node centralities and ranking on network: Nodes and edges, network diameter and average path length. Node centrality metrics: degree, closeness and betweenness centrality. Eigenvector centrality and PageRank. Algorithm HITS.			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study		
Module-3			
Network communities and Affiliation networks: Networks communities. Graph partitioning and cut metrics. Edge betweenness. Modularity clustering. Affiliation network and bipartite graphs. 1-mode projections. Recommendation systems			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study /Simulation		
Module-4			
Information and influence propagation on networks and Network visualization: Social Diffusion. Basic cascade model. Influence maximization. Most influential nodes in network. Network visualization and graph layouts. Graph sampling. Low -dimensional projections			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/Case study		
Module-5			
Social media mining and SNA in real world: FB/VK and Twitter analysis: Natural language processing and sentiment mining. Properties of large social networks: friends, connections, likes, retweets.			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/Simulation		

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**
CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:**Text Books**

- Networks, Crowds, and Markets: Reasoning About a Highly Connected World, David Easley and
- John Kleinberg, Cambridge University Press,2010
- Statistical Analysis of Network Data with R, Eric Kolaczyk, Gabor Csardi, Springer,2014
- Social Network Analysis. Methods and Applications, Stanley Wasserman and Katherine Faust, Cambridge University Press,1994

Reference Books

Social Networks and the Semantic Web,Peter Mike, Springer,2007

Web links and Video Lectures (e-Resources):

- <https://youtu.be/v3JaWbAdTTg>

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Define notation and terminology used in network science (can be attained through assignment or CIE)	L3
CO2	Demonstrate, summarize and compare networks	L2
CO3	Explain basic principles behind network analysis algorithms. (can be attained through assignment or CIE)	L3

Mapping of COS and POs												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01			X					X				
C02	X											X
C03			X		X			X				

SNI 2022 Syllabus

Semester- II

Cloud Security			
Course Code	22SNI324	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> ● Understand the basics of Cloud computing. ● Learn the compliance and auditing of cloud. ● Learn the traditional security ,RTOs ● Learn Data Center Operations ● Understand the authentication and confidentiality in Cloud 			
Module-1			
Cloud Computing Architectural Framework: Cloud Benefits, Business scenarios, Cloud Computing Evolution, cloud vocabulary, Essential Characteristics of Cloud Computing, Cloud deployment models, Cloud Service Models, Multi- Tenancy, Approaches to create a barrier between the Tenants, cloud computing vendors, Cloud Computing threats, Cloud Reference Model, The Cloud Cube Model, Security for Cloud Computing, How Security Gets Integrated.			
Teaching-Learning Process	Chalk and talk/PowerPoint presentation.		
Module-2			
Compliance and Audit: Cloud customer responsibilities, Compliance and Audit Security Recommendations. Portability and Interoperability: Changing providers reasons, Changing providers expectations, Recommendations all cloud solutions, IaaS Cloud Solutions, PaaS Cloud Solutions, SaaS Cloud Solutions.			
Teaching-Learning Process	Chalk and talk/PowerPoint presentation.		
Module-3			
Traditional Security, Business Continuity, Disaster Recovery, Risk of insider abuse, Security baseline, Customers actions, Contract, Documentation, Recovery Time Objectives (RTOs), Customers responsibility, Vendor Security Process (VSP).			
Teaching-Learning Process	Chalk and talk/PowerPoint presentation.		
Module-4			
Data Center Operations: Data Center Operations, Security challenge, Implement Five Principal Characteristics of Cloud Computing, Data center Security Recommendations. Encryption and Key Management: Encryption for Confidentiality and Integrity, Encrypting data at rest, Key Management Lifecycle, Cloud Encryption Standards, Recommendations.			
Teaching-Learning Process	Chalk and talk/PowerPoint presentation.		
Module-5			

Identity and Access Management: Identity and Access Management in the cloud, Identity and Access Management functions, Identity and Access Management (IAM) Model, Identity Federation, Identity Provisioning Recommendations, Authentication for SaaS and Paas customers, Authentication for IaaS customers, Introducing Identity Services, Enterprise Architecture with IDaaS , IDaaS Security Recommendations. Virtualization: Hardware Virtualization, Software Virtualization, Memory Virtualization, Storage Virtualization, Data Virtualization, Network Virtualization, Virtualization Security Recommendations.	
Teaching-Learning Process	Chalk and talk/PowerPoint presentation.
<p>Assessment Details (both CIE and SEE)</p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • Three Unit Tests each of 20 Marks • Two assignments each of 20 Marks or one Skill Development Activity of 40 marks • to attain the COs and POs <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</p> <p>Semester End Examination:</p> <ul style="list-style-type: none"> • The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50. • The question paper will have ten full questions carrying equal marks. • Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module. • Each full question will have a sub-question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module 	
<p>Suggested Learning Resources:</p> <p>Books</p> <ul style="list-style-type: none"> • Cloud Security and Privacy, An Enterprise Perspective on Risks and Compliance Tim Mather, SubraKumaraswamy , ShahedLatif Oreilly Media 2009 <p>Reference Book</p> <ol style="list-style-type: none"> 1. Securing the Cloud, Cloud Computer Security Techniques and Tactics Vic (J.R.) Winkler Syngress 2011 	
<p>Web links and Video Lectures (e-Resources):</p> <p>https://youtu.be/ZHCtVZ6cjdg</p>	

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
C01	Demonstrate the growth of Cloud computing, architecture and different modules of implementation.	L3
C02	Evaluate the different types of cloud solutions among IaaS, PaaS, SaaS.	L3
C03	Access the security implementation flow, actions and responsibilities of stake holders.	L2
Co4	Generalize the Data Centre operations, encryption methods and deployment details.	L2
C05	Provide recommendations for using and managing the customer's identity and choose the type of virtualization to be used.	L2

Mapping of COS and POs

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P01 0	P01 1	P01 2
C01	X			X								X
C02		X				X	X			X		X
C03			X		X			X			X	
C04			X						X			X
C05				X		X				X	X	

Semester-III

NETWORK ROUTING ALGORITHM			
Course Code	22SNI325	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • Illustrate the basic foundation of network routings. • Explain different routing in IP Network • Illustrate the Routing Architecture 			
Module-1			
<p>NETWORK ROUTING: BASICS AND FOUNDATIONS: Networking and Network Routing: An Introduction: Addressing and Internet Service: An Overview, Network Routing: An Overview, IP Addressing, On Architectures, Service Architecture, Protocol Stack Architecture, Router Architecture, Network Topology Architecture, Network Management Architecture, Public Switched Telephone Network, Communication Technologies, Standards Committees, Last Two Bits. Routing Algorithms: Shortest Path and Widest Path: Bellman–Ford Algorithm and the Distance Vector Approach, Dijkstra’s Algorithm, Comparison of the Bellman–Ford Algorithm and Dijkstra’s Algorithm, Shortest Path Computation with Candidate Path Caching, Widest Path Computation with Candidate Path Caching, Widest Path Algorithm, k-Shortest Paths Algorithm Routing Protocols: Framework and Principles: Routing Protocol, Routing Algorithm, and Routing Table, Routing Information Representation and Protocol Messages, Distance Vector Routing Protocol, Link State Routing Protocol, Path Vector Routing Protocol, Link Cost</p>			
Teaching-Learning Process	Chalk and Talk method /PPT/ Case study/Web contents		
Module-2			
<p>ROUTING IN IP NETWORKS: IP Routing and Distance Vector Protocol Family : Routers, Networks, and Routing Information: Some Basics, Static Routes, Routing Information Protocol, Version 1 (RIPv1), Routing Information Protocol, Version 2 (RIPv2), Interior Gateway Routing Protocol (IGRP), Enhanced Interior Gateway Routing Protocol (EIGRP), Route Redistribution OSPF and Integrated IS-IS: From a Protocol Family to an instance of a Protocol, OSPF: Protocol Features, OSPF Packet Format, Examples of Router LSAs and Network LSAs, Integrated IS-IS, Similarities and Differences Between IS-IS and OSPF Internet Routing Architectures: Internet Routing Evolution, Addressing and Routing: Illustrations, Current Architectural View of the Internet, Allocation of IP Prefixes and AS Number, Policy-Based Routing, Point of Presence, Traffic Engineering Implications, Internet Routing Instability</p>			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/ Case study		
Module-3			
<p>Router Architectures: Functions of a Router, Types of Routers, Elements of a Router, Packet Flow, Packet Processing: Fast Path versus Slow Path, Router Architectures. IP Address Lookup Algorithms: Impact of Addressing on Lookup, Longest Prefix Matching, Naïve Algorithms, Binary Tries, Multibit Tries, Compressing Multibit Tries, Search by Length Algorithms, Search by Value Approaches, Hardware Algorithms, Comparing Different Approaches. IP Packet Filtering and Classification: Importance of Packet Classification, Packet Classification Problem, Packet Classification Algorithms, Naïve Solutions, Two-Dimensional Solutions, Approaches for Dimensions, Extending</p>			

TwoDimensional Solutions, Divide and Conquer Approaches, Tuple Space Approaches, Decision Tree Approaches, Hardware-Based Solutions	
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/ Case study
Module-4	
ADVANCED ROUTING PROTOCOLS FOR WIRELESS NETWORKS: Wireless networking basic aspects, Basic routing concepts, AD hoc routing, Mesh routing, Vehicular routing, Sensor routing.	
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/ Case study
Module-5	
TOWARD NEXT GENERATION ROUTING: Quality of Service Routing: QoS Attributes, Adapting Shortest Path and Widest Path Routing: A Basic Framework, Update Frequency, Information Inaccuracy, and Impact on Routing, Lessons from Dynamic Call Routing in the Telephone Network, Heterogeneous Service, Single-Link Case, A General Framework for Source-Based QoS Routing with Path Caching, Routing Protocols for QoS Routing MPLS and GMPLS: Traffic Engineering Extension to Routing Protocols, Multiprotocol Label Switching, Generalized MPLS, MPLS Virtual Private Networks. Routing and Traffic Engineering with MPLS: Traffic Engineering of IP/MPLS Networks, VPN Traffic Engineering, Routing/Traffic Engineering for Voice Over MPLS. VoIP Routing: Interoperability through IP and PSTN : PSTN Call Routing Using the Internet, PSTN Call Routing: Managed IP Approach, IP-PSTN Interworking for VoIP, IP Multimedia Subsystem, Multiple Heterogeneous Providers Environment and All-IP Environment of VoIP Services.	
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/ Case study
Assessment Details (both CIE and SEE)	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • Three Unit Tests each of 20 Marks • Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</p> <p>Semester End Examination:</p> <ul style="list-style-type: none"> • The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50. • The question paper will have ten full questions carrying equal marks. • Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module. • Each full question will have a sub-question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module 	
Suggested Learning Resources:	
Test Books	

- Network Routing: Algorithms, Protocols, and Architectures, DeepankarMedhiand Karthikeyan Ramasa my , Elsevier,2007
- Advanced Routing Protocols for Wireless Networks, Miguel Elias M. Campista and Marcelo G. Rubinstein , John Wiley & Sons, Inc 2014

Reference Books:

- High speed networks and Internets Performance and Quality of Service”, 2nd Edition, Reprint India, William Stallings, Pearson Education Asia.2002
- Routing in Communication network, M. Steen Strub, Prentice –Hall International,1995
- Network Analysis, Architecture, and Design, James D. McCabe, Elsevier Inc, 3 rd 2007

Web links and Video Lectures (e-Resources):

- https://youtu.be/CaukSKg_sl0

Skill Development Activities Suggested

The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Explore the architecture of Network Routing	L3
CO2	Interpret Routing in IP Network	L2
CO3	Analyze routing protocol for Wireless network	L2

Mapping of COs and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				X				X				X
CO2		X										X
CO3									X			

Semester- III

Cryptography and Network Security			
Course Code	22SNI331	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	04	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • Define the basics of Cryptography and Network Security • Demonstrate how to secure a message over insecure channel by various means. • Apply how to maintain the Confidentiality, Integrity and Availability of a data. • Explain various protocols for network security to protect against the threats in the networks. 			
Module-1			
Attacks on Computers and Computer Security: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.			
Teaching-Learning Process	Chalk and board, PPT		
Module-2			
Symmetric key Ciphers: Block Cipher principles & Algorithms(DES, AES, Blowfish), Differential and Linear Crypt analysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution Asymmetric key Ciphers: Principles of public key crypt to systems, Algorithms(RSA, Diffie-Hellman, ECC), Key Distribution.			
Teaching-Learning Process	Chalk and board, PPT		
Module-3			
Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm Authentication Applications: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Biometric Authentication.			
Teaching-Learning Process	Chalk and board, PPT		
Module-4			
E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP security overview, IP Security architecture, Authentication Header, Encapsulating security payload, Combining security associations, key management.			
Teaching-Learning Process	Chalk and board, PPT		
Module-5			
Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, virus and Firewalls: Intruders, Intrusion detection, password management, virus and related			

threats, Countermeasures, Firewall design principles, types of firewalls Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual E lectures														
Teaching-Learning Process	Chalk and board, PPT													
<p>Assessment Details (both CIE and SEE)</p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • Three Unit Tests each of 20 Marks • Two assignments each of 20 Marks or one Skill Development Activity of 40 marks • to attain the COs and POs <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</p> <p>Semester End Examination:</p> <ul style="list-style-type: none"> • The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50. • The question paper will have ten full questions carrying equal marks. • Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module. • Each full question will have a sub-question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module 														
<p>Suggested Learning Resources:</p> <p>Text Books:</p> <ul style="list-style-type: none"> • Cryptography and Network Security : William Stallings, Pearson Education, 4th Edition • Cryptography and Network Security : Atul Kahate, Mc Graw Hill Edition <p>Reference Books:</p> <ol style="list-style-type: none"> 1• Cryptography and Network Security: C K Shyamala, N Harin i, Dr T R Padmanabhan, Wiley India, 1st <ul style="list-style-type: none"> • Cryptography and Network Security : Forouzan Mukhopadhyay, MC Graw Hill, 2nd Edition 														
<p>Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> • http://nptel.ac.in/courses/106105031/lecture by Dr. Debdeep Mukhopadhyay IIT Kharagpur • https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-system-engineering-spring-2009/video-lectures 														
<p>Course outcome (Course Skill Set)</p> <p>At the end of the course the student will be able to :</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sl. No.</th> <th style="width: 70%;">Description</th> <th style="width: 20%;">Blooms Level</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td>To Understand Document as Vector Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.</td> <td>L2</td> </tr> <tr> <td>CO2</td> <td>Ability to identify information system requirements for both of them such as client and server.</td> <td>L2</td> </tr> <tr> <td>CO3</td> <td>Ability to understand the current legal issues towards information security.</td> <td>L2</td> </tr> </tbody> </table>			Sl. No.	Description	Blooms Level	CO1	To Understand Document as Vector Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.	L2	CO2	Ability to identify information system requirements for both of them such as client and server.	L2	CO3	Ability to understand the current legal issues towards information security.	L2
Sl. No.	Description	Blooms Level												
CO1	To Understand Document as Vector Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.	L2												
CO2	Ability to identify information system requirements for both of them such as client and server.	L2												
CO3	Ability to understand the current legal issues towards information security.	L2												

Mapping of COS and POs												
	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		x					x					
C02	x											x
C03			x		x							

SNI 2022 Syllabus

Blockchain Technology			
Course Code	22SNI332	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> To explore the driving force behind the cryptocurrency Bitcoin. Along with the Decentralization, 			
Module-1			
Blockchain 101: Distributed systems, History of blockchain, Introduction to blockchain, Types of blockchain, CAP theorem and blockchain, Benefits and limitations of blockchain.			
Teaching-Learning Process	Chalk and Talk/ PPT / Web resources		
Module-2			
Decentralization and Cryptography: Decentralization using blockchain, Methods of decentralization, Routes to decentralization, Decentralized organizations. Cryptography and Technical Foundations: Cryptographic primitives, Asymmetric cryptography, Public and private keys			
Teaching-Learning Process	Chalk and Talk/ PPT / Web resources		
Module-3			
Bitcoin and Alternative Coins A: Bitcoin, Transactions, Blockchain, Bitcoin payments B: Alternative Coins, Theoretical foundations, Bitcoin limitations, Namecoin, Litecoin, Primecoin, Zcash			
Teaching-Learning Process	Chalk and Talk/ PPT / Web resources		
Module-4			
Smart Contracts and Ethereum 101: Smart Contracts: Definition, Ricardian contracts. Ethereum 101: Introduction, Ethereum blockchain, Elements of the Ethereum blockchain, Precompiled contracts.			
Teaching-Learning Process	Chalk and Talk/ PPT / Web resources		
Module-5			
Alternative Blockchains: Blockchains Blockchain-Outside of Currencies: Internet of Things, Government, Health, Finance, Media			
Teaching-Learning Process	Chalk and Talk/ PPT / Case Study		

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:**Text Books:**

1. Bitcoin and Cryptocurrency Technologies, Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, Steven Goldfeder, Princeton University, 2016

Reference Books:

1. Blockchain Basics: A Non-Technical Introduction in 25 Steps, Daniel Drescher, Apress, First Edition, 2017
2. Mastering Bitcoin: Unlocking Digital Cryptocurrencies, Andreas M. Antonopoulos, O'Reilly Media, First Edition, 2014

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/106105184>
- https://ocw.mit.edu/courses/15-s12-blockchain-and-money-fall-2018/video_galleries/video-lectures/

Skill Development Activities Suggested

The students with the help of the course teacher can take up relevant technical activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Interpret the types, benefits and limitation of blockchain.	L1
CO2	Explore the blockchain decentralization and cryptography concepts.	L2
CO3	Enumerate the Bitcoin features and its alternative options.	L1

Mapping of COS and POs

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
C01		x		x			x					x
C02	x			x							x	
C03		x								x		x

SNI 2022 Syllabus

Semester- III

Information Security Policies in Industry			
Course Code	22SNI333	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives: <ul style="list-style-type: none"> • Explain the content, need, and responsibilities of information security policies. • Explain the standards, guidelines, Procedures, and key roles of the organization. • Able to write policy document for securing network connection and interfaces. • Explain the threats to the stored data or data in transit and able to write policy document. 			
Module-1			
Introduction to Information Security Policies: About Policies, why Policies are Important, When policies should be developed, How Policy should be developed, Policy needs, Identify what and from whom it is being protected, Data security consideration, Backups, Archival storage and disposal of data, Intellectual Property rights and Policies, Incident Response and Forensics, Management Responsibilities, Role of Information Security Department, Security Management and Law Enforcement, Security awareness training and support.			
Teaching-Learning Process	Chalk and board, PPT		
Module-2			
Policy Definitions, Standards, Guidelines, Procedures with examples, Policy Key elements, Policy format and Basic Policy Components, Policy content considerations, Program Policy Examples, Business Goal Vs Security Goals, Computer Security Objectives, Mission statement Format, Examples, Key roles in Organization, Business Objectives, Standards: International Standards.			
Teaching-Learning Process	Chalk and board, PPT		
Module-3			
Writing The Security Policies: Computer location and Facility construction, Contingency Planning, Periodic System and Network Configuration Audits, Authentication and Network Security, Addressing and Architecture, Access Control, Login Security, Passwords, User Interface, Telecommuting and Remote Access, Internet Security Policies, Administrative and User Responsibilities, WWW Policies, Application Responsibilities, E-mail Security Policies.			
Teaching-Learning Process	Chalk and board, PPT		
Module-4			

Establishing Type of Viruses Protection: Rules for handling Third Party Software, User Involvement with Viruses, Legal Issues, Managing Encryption and Encrypted data, Key Generation considerations and Management, Software Development policies, Processes Testing and Documentation, Revision control and Configuration management, Third Party Development, Intellectual Property Issues.	
Teaching-Learning Process	Chalk and board, PPT
Module-5	
Maintaining the Policies: Writing the AUP, User Login Responsibilities, Organization's responsibilities and Disclosures, Compliance and Enforcement, Testing and Effectiveness of Policies, Publishing and Notification Requirements of the Policies, Monitoring, Controls and Remedies, Administrator Responsibility, Login Considerations, Reporting of security Problems, Policy Review Process, The Review Committee, Sample Corporate Policies, Sample Security Policies.	
Teaching-Learning Process	Chalk and board, PPT
<p>Assessment Details (both CIE and SEE)</p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p>Continuous Internal Evaluation:</p> <ul style="list-style-type: none"> • Three Unit Tests each of 20 Marks • Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</p> <p>Semester End Examination:</p> <ul style="list-style-type: none"> • The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50. • The question paper will have ten full questions carrying equal marks. • Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module. • Each full question will have a sub-question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module 	
<p>Suggested Learning Resources:</p> <p>Text Books:</p> <ul style="list-style-type: none"> • Writing Information Security Policies. Scott Barman. Sams Publishing. 2002. • Information Policies Procedures and Standards. Thomas.R.Peltier. Thomas.R.Peltier. CRC Press. 2004. <p>Reference Books:</p>	

- Information Security Fundamentals. Thomas R Peltier, Justin Peltier, John Backley. CRC Press,2005.
- Information Security Management Handbook.Harold F. Tipton and Micki Krause. Auerbach publications. 5th Edition, 2005.

Web links and Video Lectures (e-Resources):

- <https://www.mygreatlearning.com/academy/learn-for-free/courses/introduction-to-cyber-security>

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms L
CO1	Able to write policy document for securing network connection and interfaces.	L2
CO2	Able to explain the threats to the stored data or data in transit and able to write policy document.	L2
CO3	Able to write, monitor, and review policy document.	L2

Mapping of COS and POs

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010
CO1		x		x						x
CO2	x			x						
CO3		x								x

Semester- III

Pragmatic of Information Security			
Course Code	22SNI334	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • Explain the fundamentals of Cryptographic techniques • Identify the security issues in the network and resolve it. • Identifying the type of malware attacks and implementing preventive measures 			
Module-1			
Overview: Computer Security Concepts, Requirements, Architecture, Trends, Strategy Perimeter Security: Firewalls, Intrusion Detection, Intrusion Prevention systems, Honeypots Case Study: Readings, Intrusion and intrusion detection by John McHugh			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content: https://youtu.be/HorJOe2yl8Q		
Module-2			
User Authentication: Password, Password-based, token based, Biometric, Remote User authentication. Access Control: Principles, Access Rights, Discretionary Access Control, Unix File Access Control, Role Based Access Control Internet Authentication Applications: Kerberos, X.509, PKI, Federated Identity Management.			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content : https://youtu.be/qz0aGYrrlhU		
Module-3			
Cryptographic Tools: Confidentiality with symmetric encryption, Message Authentication & Hash Functions, Digital Signatures, Random Numbers. Symmetric Encryption and Message Confidentiality: DES, AES, Stream Ciphers, Cipher Block Modes of Operation, Key Distribution.			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content: https://youtu.be/6mbwJ2xhgzM?list=PLu0W_9lII9agiCUZYRsvtGTXdxkzPyItg		
Module-4			
Internet Security Protocols: SSL, TLS, IPSEC, S/ MIME. Public Key Cryptography and Message Authentication: Secure Hash Functions, HMAC, RSA, Diffie Hellman Algorithms Case Study: Readings, Programming Satan's Computer Ross Anderson and Roger Needham.			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content: https://youtu.be/nVzrfog33j4		
Module-5			
Malicious Software: Types of Malware, Viruses & Counter Measures, Worms, Bots, Rootkits Software Security: Buffer Overflows, Stack overflows, Defense, Other overflow attacks Case Study..			
Teaching-Learning Process	Chalk and talk/PPT/case study/web content: https://youtu.be/6EukZDFE_Zg		

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:**Text Books:**

- William Stalling &Lawrie, Computer Security: Principles and Practice, Pearson. 2010

Reference Book:

- Aleph, Readings: Smashing The Stack For Fun And Profit, [http:// www.phrack. com/](http://www.phrack.com/)
- Chuck Easttom, Computer Security Fundamentals, Pearson, 2012.
-

Web links and Video Lectures (e-Resources):

- <https://www.classcentral.com/subject/infosec>
- <https://www.udemy.com/topic/information-security/>
-

Skill Development Activities Suggested

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
C01	List various tags in html and use these, apply Cascaded style sheet to create web page.	L1
C02	Design and Explain the basic concept of XML and Create XML documents and Schema.	L3
C03	Compare Servlet and JSP concepts and apply JSP concepts to create dynamic web Pages by reducing the code complexity and store data in database.	L2
C04	Illustrate the usage of web servers and use this to develop webpage and store data in database in JSP on Web server.	L3
C05	Develop solution to complex problems using appropriate method, technologies, framework, web services and content management.	L4

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01	x											x
C02			x									
C03					x							
C04	x											
C05				x								

Semester- III

Information Retrieval			
Course Code	22SNI335	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Course Learning objectives:			
<ul style="list-style-type: none"> • To Understand Document as Vector • Performance evolution metric for IR • To understand search Engine functionality • Various Supervised and Unsupervised learning Method 			
Module-1			
Overview of text retrieval systems: Boolean retrieval, the term vocabulary and postings lists, dictionaries and tolerant retrieval, Index construction and compression. Retrieval models and implementation: Vector Space Models, TF-IDF Weight, Evaluation in information retrieval			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/Web contents		
Module-2			
Query expansion and feedback: Relevance feedback, pseudo relevance feedback, Query Reformulation Probabilistic models; statistical language models: Okapi/BM25; Language models, KL-divergence, Smoothing			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/ Case study		
Module-3			
Text classification & Text clustering: The text classification problem, Naive Bayes text classification, k- nearest neighbors, Support vector Machine, Feature Selection, Vector-space clustering; K-means algorithm, Hierarchical clustering, DBSCAN algorithm, PAM and PAMK, EM algorithm			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/ Case study		
Module-4			
Web search basics, crawling, indexes, Link analysis : Web Characteristic, Crawling , Web As a graph, Page Rank, Hubs and Authorities			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/Web contents		
Module-5			
IR applications: Information extraction, Question answering, Opinion summarization, Social Network			
Teaching-Learning Process	Chalk and talk method / PowerPoint Presentation/Web contents		

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- Three Unit Tests each of **20 Marks**
- Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**
CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question is for 20 marks. There will be two full questions (with a maximum of four sub-questions) from each module.
- Each full question will have a sub-question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module

Suggested Learning Resources:

Text Books

- Christopher D. Manning, Prabhakar Raghavan and Hinrich Schütze, Introduction to Information Retrieval, Cambridge University Press. 2008. <http://nlp.stanford.edu/IR-book/information-retrieval-book.html>
- ChengXiang Zhai, Statistical Language Models for Information Retrieval (Synthesis Lectures Series on Human Language Technologies), Morgan & Claypool Publishers, 2008.
- http://www.morganclaypool.com/doi/abs/10.2200/S00158ED1V01Y200811HLT_001

Web links and Video Lectures (e-Resources):

- <https://www.youtube.com/watch?v=akEr8cUAd5g>
- <https://www.udemy.com/topic/storage-area-network/>

Skill Development Activities Suggested

The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill. The prepared report shall be evaluated for CIE marks.

Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
C01	To Understand Document as Vector	L1
C02	Performance evolution metric for IR	L2
C03	To understand search Engine functionality	L2
C04	To understand Various Supervised and Unsupervised learning Method	L2

Mapping of COS and POs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01		x					x					
C02	x											x
C03			x		x							
C04		x					x					

SNI 2022 Syllabus

PROJECT WORK PHASE – 1			
Course Code	22SNI34	CIE Marks	100
Number of contact Hours/Week	6	SEE Marks	--
Credits	03	Exam Hours	--
<p>Course objectives:</p> <ul style="list-style-type: none"> • Support independent learning. • Guide to select and utilize adequate information from varied resources maintaining ethics. • Guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly. • Develop interactive, communication, organisation, time management, and presentation skills. • Impart flexibility and adaptability. • Inspire independent and team working. • Expand intellectual capacity, credibility, judgement, intuition. • Adhere to punctuality, setting and meeting deadlines. • Instil responsibilities to oneself and others. • Train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas. 			
<p>Project Phase-1 Students in consultation with the guide/s shall carry out literature survey/ visit industries to finalize the topic of the Project. Subsequently, the students shall collect the material required for the selected project, prepare synopsis and narrate the methodology to carry out the project work.</p> <p>Seminar: Each student, under the guidance of a Faculty, is required to</p> <ul style="list-style-type: none"> • Present the seminar on the selected project orally and/or through power point slides. • Answer the queries and involve in debate/discussion. • Submit two copies of the typed report with a list of references. <p>The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident.</p>			
<p>Course outcomes:</p> <p>At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> • Demonstrate a sound technical knowledge of their selected project topic. • Undertake problem identification, formulation, and solution. • Design engineering solutions to complex problems utilising a systems approach. • Communicate with engineers and the community at large in written and oral forms. • Demonstrate the knowledge, skills and attitudes of a professional engineer. 			
<p>Continuous Internal Evaluation</p> <p>CIE marks for the project report (50 marks), seminar (30 marks) and question and answer (20 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session by the student) by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.</p>			

Societal Project			
Course Code	22SNI35	CIE Marks	100
Number of contact Hours/Week	6	SEE Marks	—
Credits	3	Exam Hours	03
Course objectives:			
<ul style="list-style-type: none"> • Build creative solutions for development problems of current scenario in the Society. • Utilize the skills developed in the curriculum to solve real life problems. • Improve understanding and develop methodology for solving complex issues. 			
Some of the domains to choose for societal projects:			
<ul style="list-style-type: none"> • Infrastructure • Health Care • Social security • Security for women • Transportation • Business Continuity • Remote working and Education • Digital Finance • Food Security • Rural employment • Water and land management • Pollution • Financial Independence • Agricultural Finance • Primary Health care • Nutrition • Child Care • E-learning • Distance parenting • Mentorship Etc 			
Course outcomes:			
At the end of the course the student will be able to:			
<ul style="list-style-type: none"> • Building solution for real life societal problems. • Improvement of their technical/curriculum skills 			
Continuous Internal Evaluation:			
Identifying the real life problems and producing literature report : 20 marks			
Data sampling and Cleaning :10 Marks			
Establishing the right Objective: 10 Marks			
Developing the solution : 20 Marks			
Propagating the solution to the stake holders 1)Lectures 2)Social Meetings 3)Social media 4)Street plays 5)Advertisement Either of the 3(evidence of the work through geo tag photo)			
Certified by stake holders and authorized by concerned government authorities.			
Project Report: 20 marks. The basis for awarding the marks shall be the involvement of the student in the project and in the preparation of project report. To be awarded by the internal guide in consultation with external guide if any.			
Project Presentation: 10 marks.			
The Project Presentation marks of the Project Work Phase -II shall be awarded by the			

committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.

Evaluation: 10 marks.

The student shall be evaluated based on the ability in the Question and Answer session for 10 marks.

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INTERNSHIP / PROFESSIONAL PRACTICE			
Course Code	22SNI36	CIE Marks	50
Number of contact Hours/Week	3	SEE Marks	50
Credits	06	Exam Hours	03
<p>Course objectives: Internship/Professional practice provide students the opportunity of hands-on experience that include personal training, time and stress management, interactive skills, presentations, budgeting, marketing, liability and risk management, paperwork, equipment ordering, maintenance, responding to emergencies etc. The objective are further, To put theory into practice. To expand thinking and broaden the knowledge and skills acquired through course work in the field. To relate to, interact with, and learn from current professionals in the field. To gain a greater understanding of the duties and responsibilities of a professional. To understand and adhere to professional standards in the field. To gain insight to professional communication including meetings, memos, reading, writing, public speaking, research, client interaction, input of ideas, and confidentiality. To identify personal strengths and weaknesses. To develop the initiative and motivation to be a self-starter and work independently.</p>			
<p>Internship/Professional practice: Students under the guidance of internal guide/s and external guide shall take part in all the activities regularly to acquire as much knowledge as possible without causing any inconvenience at the place of internship. Seminar: Each student, is required to</p> <ul style="list-style-type: none"> • Present the seminar on the internship orally and/or through power point slides. • Answer the queries and involve in debate/discussion. • Submit the report duly certified by the external guide. • The participants shall take part in discussion to foster friendly and stimulating environment in which the students are motivated to reach high standards and become self-confident. 			
<p>Course outcomes: At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> • Gain practical experience within industry in which the internship is done. • Acquire knowledge of the industry in which the internship is done. • Apply knowledge and skills learned to classroom work. • Develop a greater understanding about career options while more clearly defining personal career goals. • Experience the activities and functions of professionals. • Develop and refine oral and written communication skills. • Identify areas for future knowledge and skill development. • Expand intellectual capacity, credibility, judgment, intuition. • Acquire the knowledge of administration, marketing, finance and economics. 			
<p>Continuous Internal Evaluation CIE marks for the Internship/Professional practice report (30 marks), seminar (10 marks) and question and answer session (10 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session by the student) by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.</p>			

Semester End Examination

SEE marks for the internship report (20 marks), seminar (20 marks) and question and answer session (10 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session) by the examiners appointed by the University.

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PROJECT WORK PHASE -2			
Course Code	22SNI41	CIE Marks	100
Practical /Field work/Week	8	SEE Marks	100
Credits	18	Exam Hours	03
<p>Course objectives:</p> <ul style="list-style-type: none"> • To support independent learning. • To guide to select and utilize adequate information from varied resources maintaining ethics. • To guide to organize the work in the appropriate manner and present information (acknowledging the sources) clearly. • To develop interactive, communication, organization, time management, and presentation skills. • To impart flexibility and adaptability. • To inspire independent and team working. • To expand intellectual capacity, credibility, judgement, intuition. • To adhere to punctuality, setting and meeting deadlines. • To instill responsibilities to oneself and others. • To train students to present the topic of project work in a seminar without any fear, face audience confidently, enhance communication skill, involve in group discussion to present and exchange ideas. 			
<p>Project Work Phase - II: Each student of the project batch shall involve in carrying out the project work jointly in constant consultation with internal guide, co-guide, and external guide and prepare the project report as per the norms avoiding plagiarism.</p> <ul style="list-style-type: none"> • Follow the Software Development life cycle • Data Collection ,Planning • Design the Test cases • Validation and verification of attained results • Significance of parameters w.r.t scientific quantified data. • Publish the project work in reputed Journal. 			
<p>Course outcomes:</p> <p>At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> • Present the project and be able to defend it. • Make links across different areas of knowledge and to generate, develop and evaluate ideas and information so as to apply these skills to the project task. • Habituated to critical thinking and use problem solving skills • Communicate effectively and to present ideas clearly and coherently in both the written and oral forms. • Work in a team to achieve common goal. • Learn on their own, reflect on their learning and take appropriate actions to improve it. 			
<p>Continuous Internal Evaluation:</p> <p>Project Report: 20 marks. The basis for awarding the marks shall be the involvement of the student in the project and in the preparation of project report. To be awarded by the internal guide in consultation with external guide if any.</p> <p>Project Presentation: 20 marks.</p> <p>The Project Presentation marks of the Project Work Phase -II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.</p> <p>Project Execution: 50 Marks</p> <p>The Project Execution marks of the Project Work Phase -II shall be awarded by the committee constituted for the purpose by the Head of the Department. The committee shall consist of three faculty from the department with the senior most acting as the Chairperson.</p> <p>Question and Answer: 10 marks.</p>			

The student shall be evaluated based on the ability in the Question and Answer session for 10 marks.

Semester End Examination

SEE marks for the project report (60 marks), seminar (30 marks) and question and answer session (10 marks) shall be awarded (based on the quality of report and presentation skill, participation in the question and answer session) by the examiners appointed by the University.

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