Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Fourth Year Bachelor of Engineering (Computer)

(To be Proposed For: Academic Year 2020-21)

Subject Code: CE801-N	Subject Title: Next Generation Networks
Pre-requisite	

Teaching Scheme (Credits and Hours)

Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	Marks
04	00	02	06	05	03	70	30	20	30	150

Course Objective:

- To understand the basic concepts of mobile computing.
- To learn the basics of mobile telecommunication system.
- To be familiar with the network layer protocols and Ad-Hoc networks.
- To know the basis of transport and application layer protocols.
- To gain knowledge about different mobile platforms and application development.
- Also this course introduces software defined networking, an emerging paradigm in computer networking that allows a logically centralized software program to control the behavior of an entire network.
- Differentiate between traditional networks and software defined networks

Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Introduction	08
2	Mobile Telecommunication System	09
3	Mobile Network Layer	11
4	Mobile Transport, Application Layer and Applications	09
5	SDN Background and Motivation	08
6	SDN Data plane and OpenFlow	06
7	SDN Control Plane	07
8	SDN Application Plane	06

Total hours (Theory): 64
Total hours (Lab): 32
Total hours: 96

Detailed Syllabus

Sr. No	Topic	Lecture Hours	Weight age(%)
1	Introduction: Introduction to Mobile Computing – Applications of Mobile Computing- Generations of Mobile Communication Technologies,5G, Multiplexing, Spread spectrum, MAC Protocols, SDMA, TDMA, FDMA, CDMA	08	13
2	Mobile Telecommunication System: Introduction to Cellular Systems, GSM – Services & Architecture – Protocols – Connection, Establishment – Frequency Allocation – Routing – Mobility Management – Security, GPRS, UMTS – Architecture – Handover – Security	09	14
3	Mobile Network Layer Mobile IP, DHCP, AdHoc, Proactive protocol-DSDV, Reactive Routing Protocols – DSR, AODV , Hybrid routing –ZRP, Multicast Routing- ODMRP, Vehicular Ad Hoc networks(VANET) –MANET Vs VANET, Security	11	17
4	Mobile Transport, Application Layer and Applications Mobile TCP, WAP –Architecture, WDP – WTLS – WTP –WSP – WAE – WTA Architecture, WML Mobile Device Operating Systems, Special Constraints & Requirements	09	14
5	SDN Background and Motivation: Evolving network requirements-The SDN Approach: Requirements, SDN Architecture, Characteristics of Software-Defined Networking, SDN and NFV- Related Standards: Standards-Developing Organizations, Industry Consortia, Open Development Initiatives.	08	13
6	SDN Data plane and OpenFlow: SDN data plane: Data plane Functions, Data plane protocols, Openflow logical network Device: Flow table Structure, Flow Table Pipeline, The Use of Multiple Tables, Group Table- OpenFlow Protocol.	06	09
7	SDN Control Plane: SDN Control Plane Architecture: Control Plane Functions, Southbound Interface, Northbound Interface, Routing, ITU-T Model- OpenDaylight-REST- Cooperation and Coordination Among Controllers.	07	11
8	SDN Application Plane: SDN Application Plane Architecture: Northbound Interface, Network Applications, User Interface- Network Services Abstraction Layer: Abstractions in SDN, Frenetic- Traffic Engineering Measurement and MonitoringSecurity- Data Center Networking- Mobility and Wireless.	06	09
	Total	64	100

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.

- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

Learning Outcome:
After learning the course the students should be able to:
- Understand mobile and wireless network systems such as 2G/3G/4G mobile telephony/data networks,
- Understand GSM and GPRS
- Understand the working of wireless local area network, Bluetooth.
- Understand advanced and emerging networking technologies
- Obtain skills to do advanced networking research and programming
- Learn how to use software programs to perform varying and complex networking tasks
- Expand upon the knowledge learned and apply it to solve real world problems

e-Resources:
1. http://www.wirelessdevnet.com/
2. http://www.protocols.com/
3. https://developer.apple.com/
4. https://www.udemy.com
5. http://nptel.ac.in

Reference Books:
1. Mobile ComputingTechnology,Applications and service creation ,Asoke K Telukder, Roopa R Yavagal by TMH.
2. Mobile Computing,Raj Kamal by Oxford
3. Wireless Communications & Networks, Second Edition,William Stallings by Pearson
4. Mobile Computing Theory and Practice-Kumkum Garg-Pearson 5. TCP/IP Protocol Suite by Behrouz A Forouzan, Third Edition,TMH
5. Software Defined Networks: A Comprehensive Approach by Paul Goransson and Chuck Black, Morgan Kaufmann Publications, 2014
6. SDN - Software Defined Networks by Thomas D. Nadeau & Ken Gray, O'Reilly, 2013
7. Software Defined Networking with OpenFlow By SiamakAzodolmolky, Packt Publishing, 2013
8. Wireless Communications & Networks, Second Edition,William Stallings by Pearson
9. Mobile ComputingTechnology,Applications and service creation ,Asoke K Telukder, Roopa R Yavagal by TMH

List of experiments

No	Name of Experiment
1	Introduction of Wireless sensor network applications and its simulation.
2	Network Simulator installation of wireless sensor network using NS2.
3	Write TCL script for transmission between mobile nodes using NS2.
4	Write TCL script for sensor nodes with different parameters using NS2.
	The following experiments using Mininet
5	Network Toplology creation and REST API introduction.
6	Influencing flows via cURL commands.
7	Create a network and run a simple performance test.
8	Mininet Random Topology Generator.