

**Kadi Sarva Vishwavidyalaya**  
Faculty of Engineering and Technology  
**First Year Master of Engineering (Computer Engineering)**  
In Effect from Academic Year 2017-18

<b>Subject Code: MECE-205-N-A</b>	<b>Subject Title: ADHOC NETWORKING</b>
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Teaching scheme				Total Credit	Evaluation Scheme					
L	T	P	Total		Theory		Mid Sem Exam	CIA	Pract.	Total Marks
Hrs	Hrs	Hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
04	00	02	06	05	03	70	30	20	30	150

**LEARNING OBJECTIVES:**

The course provides knowledge of various architectures, working merits and demerits of Ad-hoc Network protocols. This course also provides knowledge of various application areas and current applications of Ad-hoc Wireless Networks.

- To Provide knowledge of fundamental concepts of Communication Technology, and adhoc network.
- Design issues and solution to the issues, and application of Ad-hoc Networks.

**OUTLINE OF THE COURSE:**

Unit No	Topics	Hrs
1	FUNDAMENTALS	12
2	AD HOC ROUTING PROTOCOLS	14
3	MULTICAST ROUTING IN ADHOC NETWORKS	14
4	TRANSPORT LAYER and SECURITY PROTOCOLS	12
5	QOS and ENERGY MANAGEMENT	12

**Total hours (Theory) : 64**

**Total hours (Practical) : 32**

**Total hours : 96**

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**DETAILED SYLLABUS:**

UNIT	Topic	Lecture Hours	Weightage (%)
1	<b>FUNDAMENTALS</b> <ul style="list-style-type: none"> <li>● Wireless Communication Technology</li> <li>● The Electromagnetic Spectrum</li> <li>● Radio Propagation Mechanisms</li> <li>● Characteristics of the Wireless Channel</li> <li>● IEEE 802.11a–b Standard</li> <li>● Origin of Ad hoc Packet Radio Networks</li> <li>● Technical Challenges</li> <li>● Architecture of PRNETs – Components of Packet Radios</li> <li>● Ad hoc Wireless Networks – What is an Ad Hoc Network?  Heterogeneity in Mobile Devices – Wireless Sensor Networks - Ad hoc wireless Internet</li> <li>● Traffic Profiles</li> <li>● Types of Ad hoc Mobile Communications</li> <li>● Types of Mobile Host Movements</li> <li>● Challenges Facing Ad hoc Mobile Network</li> </ul>	12	19
2	<b>AD HOC ROUTING PROTOCOLS</b> <ul style="list-style-type: none"> <li>● Issues in Designing a Routing Protocol for Ad Hoc Networks</li> <li>● Classifications of Routing Protocols</li> <li>● Table driven Routing Protocols – Destination Sequenced Distance Vector (DSDV) – Wireless Routing Protocol (WRP) – Cluster Switch Gateway Routing (CSGR)</li> <li>● Source Initiated On–Demand Approaches – Ad hoc On–Demand Distance Vector Routing (AODV) – Dynamic Source Routing (DSR) – Temporally Ordered Routing Algorithm (TORA) – Signal Stability Routing (SSR) –Location–Aided Routing (LAR) – Power–Aware Routing (PAR) – Zone Routing Protocol (ZRP).</li> </ul>	14	22

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3	<b>MULTICAST ROUTING IN ADHOC NETWORKS</b> <ul style="list-style-type: none"> <li>● Issues in Designing a Multicast Routing Protocol</li> <li>● Operation of Multicast Routing Protocols</li> <li>● An Architecture Reference Model for Multicast Routing Protocols</li> <li>● Classifications of Multicast Routing Protocols – Tree Based Multicast Routing Protocols– Mesh Based Multicast Routing Protocols – Summary of Tree and Mesh based Protocols</li> <li>● Energy–Efficient Multicasting</li> <li>● Multicasting with Quality of Service Guarantees</li> <li>● Application dependent Multicast Routing</li> <li>● Comparisons of Multicast Routing Protocols.</li> </ul>	14	22
4	<b>TRANSPORT LAYER and SECURITY PROTOCOLS</b> <ul style="list-style-type: none"> <li>● Issues in Designing a Transport Layer Protocol for Ad hoc Wireless Networks</li> <li>● Design Goals of a Transport Layer Protocol for Ad hoc Wireless Networks</li> <li>● Classification of Transport Layer Solutions – TCP over Ad hoc Wireless Networks – Other Transport Layer Protocols for Ad hoc Wireless Networks</li> <li>● Security in Ad Hoc Wireless Networks – Network Security Requirements – Issues and Challenges in Security Provisioning – Network Security Attacks – Key Management – Secure Routing in Ad hoc Wireless Networks.</li> </ul>	12	19
5	<b>QoS AND ENERGY MANAGEMENT</b> <ul style="list-style-type: none"> <li>● Issues and Challenges in Providing QoS in Ad hoc Wireless Networks</li> <li>● Classifications of QoS Solutions – MAC Layer Solutions – Network Layer Solutions</li> <li>● QoS Frameworks for Ad hoc Wireless Networks</li> <li>● Energy Management in Ad hoc Wireless Networks : Introduction – Need for Energy Management in Ad hoc Wireless Networks – Classification of Energy Management Schemes – Battery Management Schemes – Transmission Power Management Schemes – System Power Management Schemes.</li> </ul>	12	18
	<b>Total</b>	64	100

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**INSTRUCTIONAL METHOD AND PEDAGOGY** (Continuous Internal Assessment (CIA) Scheme)

- 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, 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.

**STUDENTS LEARNING OUTCOMES:**

On successful completion of the course, the student will:

1. This unit gives an introduction to Ad-Hoc Networks, Issues, Understand the needs of Ad-hoc Networks.
2. Understanding about the concepts, working, merits and demerits of various Ad-hoc network protocols and TCP over AdHoc Protocol.
3. Understanding about Necessity for Mesh Networks , IEEE 802.11s Architecture and different types of Mesh Networks
4. Comparison of Ad-hoc Network with existing Cellular Network in different aspects.
5. Understand the various areas of applications of Ad-Hoc Network

**REFERENCE MATERIAL:**

**TEXT BOOK**

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks Architectures and Protocols", Prentice Hall

**REFERENCES**

1. C. K. Toh, "Ad Hoc Mobile Wireless Networks Protocols and Systems", Prentice Hall
2. Charles E. Perkins, "Ad Hoc Networking", Addison Wesley

**PREREQUISITES:**

1. Network Simulator Softwares (NS2, NS3), Matlab

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**LIST OF PRACTICALS:**

<b>Sr. No</b>	<b>Name of Experiment</b>
1	Introduction to network simulators used for wireless Ad-Hoc Networks.
2	Introduction to TCL scripting: demonstration of one small network simulation script.
3	To study various trace file formats of network simulators.
4	To implement and compare various MAC layer protocols.
5	To implement and compare AODV routing algorithms in MANET.
6	To implement and compare DSR routing algorithms in MANET.
7	To implement DSDV routing algorithms in MANET.
8	To implement signal strength based link management routing protocols.
9	To calculate and compare average throughput for various TCP variants.
10	To study Ethereal / Wireshark software and analyze dump files.