

<b>COURSE TITLE</b>	<b>ADHOC WIRELESS NETWORKS</b>
<b>COURSE CODE</b>	<b>01CT0719</b>
<b>COURSE CREDITS</b>	<b>4</b>

**Objective:**

- 1 The main objectives of this course are to understand the concepts of Ad Hoc wireless networks and its architecture, understand the designing issues and challenges of various layer protocols, and analyze Ad Hoc wireless networks and its applications.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Identify different issues in Ad Hoc wireless networks
- 2 Evaluate the existing network and improve its quality of service
- 3 Analyze various layer protocols for different applications
- 4 Apply the concepts of Ad Hoc Networks in WSN and VANETs.

**Pre-requisite of course:**Computer Networks

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
3	0	2	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Overview of Ad Hoc wireless networks</b> Elements of Ad hoc Wireless Networks,, Issues in Ad Hoc wireless networks, Examples and applications of Ad Hoc networking	2
2	<b>MAC protocols</b> MAC Protocols for Ad-hoc Wireless Networks: Introduction,, Issues in Designing a MAC Protocol, Design Goals of MAC Protocols, Classification of MAC protocols, Contention-Based Protocols,, Contention-Based Protocols with Reservation Mechanisms,, Contention-Based Protocols with Scheduling Mechanisms,, MAC Protocols that Use Directional Antennas	8
3	<b>Routing protocols</b> Routing Protocols for Ad-hoc Wireless Networks Introduction,, Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks,, Classification of Routing Protocols	8
4	<b>Transport protocols</b> Introduction, Issues in designing a Transport Layer Protocol,, design goals of a Transport Layer Protocol, Classification of Transport Layer protocols,, Classification of Transport Layer protocols, Security in Ad-hoc Wireless Networks,, Issues and Challenges in Security Provisioning, Network Security Attacks and solutions	4

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
5	<b>Quality of Service</b> Quality of Service and Energy Management in Ad-hoc Wireless Networks: Issues and Challenges in Providing QoS in Ad-hoc Wireless Networks,, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions	2
6	<b>Sensor Networks</b> Introduction and Architecture: Challenges for Wireless Sensor Networks, Enabling Technologies for Wireless Sensor Networks, WSN applications and examples,, Single-Node Architecture - Hardware Components, Energy consumption of Sensor Nodes,, Network architecture - Sensor Network scenarios, WSN Networks and protocols: MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols and Wakeup Concepts - S-MAC,, Contention based protocols, Schedule based protocols – LEACH, IEEE 802.15.4 MAC protocol,, Routing Protocols- Energy Efficient Routing, Challenges and Issues in Transport layer protocol., WSN security: Network Security Requirements, Issues and Challenges in Security Provisioning,, Network Security Attacks, Layer wise attacks in wireless sensor networks, possible solutions	10
7	<b>Vehicular Ad-Hoc Network</b> Vehicular Ad-Hoc Network Introduction: Challenges and Requirements, Layered architecture for VANETs,, DSRC /WAVE standard (IEEE 802.11p), IEEE 802.11p protocol Stack (PHY & MAC),, survey on Proposed MAC approaches for VANETs like TDMA, SDMA and CDMA based approaches,, DSRC MAC & LLC, Georouting: CBF,, Flooding with broadcast suppression	8
<b>Total Hours</b>		<b>42</b>

#### Suggested List of Experiments:

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Experiment-1</b> Introduction and installation of NS-2.	2
2	<b>Experiment-2</b> Introduction to TCL script. , Introduction to TCL Syntax, looping, conditional check, functions, execution of Mathematical Operations and Execution of commands.	2
3	<b>Experiment-3</b> Simulation of Wireless topology of two Nodes.	2
4	<b>Experiment-4</b> Simulate the mobile node for Ad Hoc wireless network.	2
5	<b>Experiment-5</b> Simulate the Ad Hoc wireless network and analyze data rate for various situations.	2

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
6	<b>Experiment-6</b> Simulate the Ad Hoc wireless network and analyze delay for various situations.	2
7	<b>Experiment-7</b> Implement a Power Efficient and Delay Aware MAC protocol using Simulation Tool	2
8	<b>Experiment-8</b> Implement an Ad-hoc On-demand Distance Vector protocol using a Simulation tool.	2
9	<b>Experiment-9</b> Compare Ad Hoc wireless routing protocols.	2
10	<b>Experiment-10</b> Implement a Transmission Control Protocol using Simulation tool.	2
11	<b>Experiment-11</b> Implement User Datagram Protocol using Simulation Tool.	2
12	<b>Experiment-12</b> Create a mobile Ad-hoc network using a Simulation Tool and analyze the results for speed vs data rate.	2
13	<b>Experiment-13</b> Simulate WSN and analyze the QoS parameters.	2
14	<b>Experiment-14</b> Mini project.	2
<b>Total Hours</b>		<b>28</b>

### Textbook :

- 1 Ad hoc Wireless Networks Architectures and protocols, Siva Ram Murthy and B.S. Manoj,, Pearson Education, 2007
- 2 Adhoc Mobile Wireless Networks, C. K. Toh, Pearson, 2002
- 3 Charles E. Perkins,, Adhoc Mobile Wireless Networks, Addison – Wesley,, 2000
- 4 Emerging Wireless Technologies and the Future Mobile Internet, Dipankar Raychaudhuri, Mario Gerla, Cambridge, 2011

### References:

- 1 Protocols and Architectures for Wireless Sensor Networks, Protocols and Architectures for Wireless Sensor Networks, Holger Karl, Andreas Willing, John Wiley & Sons, Inc., 2005
- 2 Ad-hoc Wireless Networks, Ad-hoc Wireless Networks, Ozan K. Tonguz and Gianguigi Ferrari, John Wiley, 2007
- 3 Ad-hoc Wireless Networking, Ad-hoc Wireless Networking, Xiuzhen Cheng, Xiao Hung, Ding-Zhu Du, Kluwer Academic Publishers,, 2004

### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
10.00	15.00	20.00	30.00	15.00	15.00

#### **Instructional Method:**

- 1 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 2 Practical examination will be conducted at the end of the semester for evaluation of performance of students in laboratory.
- 3 Students may use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory, etc.
- 4 The course delivery method will depend upon the requirement of content and need of the students. The teacher in addition to conventional teaching method (Chalk and Talk) may use any of the tools such as demonstration, role play, Quiz, brainstorming, Flipped class, Project based learning, Collaborative learning, MOOCs etc. for effective teaching.

#### **Supplementary Resources:**

- 1 <https://study-ccna.com/eigrp-overview/>
- 2 <https://www.netacad.com/>
- 3 <https://www.computernetworkingnotes.com/>
- 4 <https://www.isi.edu/nsnam/ns/>