Kadi Sarva Vishwavidyalaya, Gandhinagar
MCA Semester II
MCA-26 (C) : Heterogeneous Networks

Rationale: The objective of this course is based on understanding Overview, Technology, Management and Application of Heterogeneous networks. It **c**overs theoretical as well as applied aspects of Heterogeneous Network and analyzes a number of working systems (case studies).

Prerequisite:
Knowledge of Knowledge of Wireless Networks, Protocols, Transmission Media, Computer Network Operating Systems

Learning Outcomes:
Students will learn following aspects:

1. They will learn about basic concepts of HetNets
2. They will learn concepts of protocols used in HetNets.
3. They will learn various Mobile Technologies and their protocols

Sub Total Credit	Teaching scheme (per week)		Examination scheme				
			MID	CEC	External		Total Marks
	Th	Pr	Th	Th	Th.	Pr.	
3	3	-	25	25	50	-	100

Course content:

UNIT- I: Introduction and overview of Heterogeneous Networks [25%]

- Motivations for Heterogeneous Networks
- Definitions of Heterogeneous Networks
- Heterogeneous Networks Use Scenarios
- Aspects of Heterogeneous Network Technology
    - RF Interference
    - Radio System Configuration
    - Network Coupling
    - User and Device Credential
    - Interworking
    - Handover
    - Data Routing
    - Quality of Service
    - Security and Privacy
    - Capacity and Performance Evaluation
- Heterogeneous cellular network nodes
    - Remote radio heads
    - Micro base stations

- Pico base stations
- Femoto cell access points
- Relay nodes

- Introduction to 3GPP LTE advanced heterogeneous cellular networks.

UNIT-II: Multi-tier Network Architecture **[25%]**

- Heterogeneous Network Deployment Scenarios.
  - OSG scenario
  - CSG scenario
- Interference Management
- Multi-radio techniques
- Cross-tier interference
- Deployment Scenarios for LTE-Advanced HetNet
  - Macro-Femto Scenario
  - Macro-Pico Scenario.

Unit-3 Inter-cell interference Management **[10%]**

- Introduction
- Conventional inter-cell interference Coordination
- Enhanced inter-cell Interference Coordination
  - Interference Scenarios

Unit-4 Mobility and handover management **[20%]**

- Mobility Management in RRC-connected state.
- Mobility Management in RRC-idle state
  - Mobility Management in heterogeneous cellular networks.

Unit-5 Cell Selection Modes in Heterogeneous Deployment **[20%]**

- Distinction of cells
- Access Control
  - Access Control Scenarios
  - Access Control Executor
  - Access Control Mechanism
- Cell Selection and Cell Reselection.
- Cell Reselection in Macro-Femto cells.

Text Book:

1. Heterogeneous Cellular Networks. – Rose Qing Hu, Yi Qian – Wiley Publication, IEE Press

Reference Books:

1. Heterogeneous Cellular Networks – Theory, Simulation and Deployment, By: Xiaoli Chu, David Lopez- Perez, Yang Yang, Fedrik Gunnarsson - Cambridge University Press.
2. Heterogeneous Wireless Access Networks – Ekram Hossain – Springer.