GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: III

Wireless Communication Systems and Networks (EC)

Subject Name: **Smart Antennas for Wireless Communication**
(Major Elective – IV)

Subject Code: **732701**

1.	**Introduction to Antennas:** Review the fundamental theory of antennas: Reciprocity theorem, Antenna equivalent circuit, Classification of antennas, Brief understanding of special types of Antennas. Important concepts associated with Antenna: Radiation Impedance, Radiation Pattern, Antenna Impedance, Bandwidth, Directivity, Gain, Antenna efficiency, Radiation Efficiency, Antenna Polarization, Antenna Systems, Basic Concepts in Radio-Wave Propagation, Small Scale fading, and Large Scale Path Loss.
2	**Introduction to Smart Antennas: Spatial Processing for Wireless Systems :** Key benefits of Smart Antenna Technology, Introduction to Smart Antenna Technology, The Vector Channel Impulse Response and the Spatial Signature, Spatial Processing Receivers, Fixed Beam forming networks, Switched Beam Systems.
3	**Adaptive Antenna Systems:** Wideband Smart Antennas, Spatial Diversity, Diversity Combining, and Sectoring, Transmission Beam forming, Array Calculation.
4	**Smart Antennas Techniques for CDMA:** Non-Coherent CDMA Spatial Processors, Coherent CDMA Spatial Processors and the Spatial Processing Rake Receiver, Multi-User Spatial Processing, Dynamic Re-sectoring Using Smart Antennas, Downlink Beam-forming for CDMA.
5	**CDMA System Range and Capacity Improvement Using Spatial Filtering**: Range Extension in CDMA, Reverse Channel Performance of Multi-cell Systems with Spatial Filtering at the Base Station, Range and Capacity Analysis Using Smart Antennas – A Vector Based Approach
6	**RF Position Locating Systems:** Direction finding PL systems, True ranging PL Systems, Elliptical PL Systems, Hyperbolic PL Systems, Hyperbolic Vs DF PL Systems, TDOA Estimation Techniques: General Model for TDOA Estimation, Measures of Position Location Accuracy: Circular Error Probability and Geometric Dilution of Precision.

Reference Books:

1. Joseph C. Liberti and Theodore S. Rappaport, Smart Antennas for Wireless Communications IS 95 and Third Generation CDMA Applications, Prentice Hall PTR
2. Balanis C A, Antenna Theory: design and applications, Wiley
3. Frank Gross, Smart Antennas for Wireless Communications-Mc Graw Hill
4. Ahmed El-Zooghby, Smart Antenna Engineering, Artech House Publishers
5. Constantine Balanis, Introduction to Smart Antennas, Morgan and Claypool Publisher.