GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: III

Signal Processing & VLSI Technology (EC)

Subject Name: **Array Signal Processing (Major Elective - IV)**
Subject Code: **732603**

Sr No.	Course Content	Total Hrs
1	**Introduction:** Antenna parameters, Basic Antenna elements, Array Fundamentals-Element pattern, directive gain, Directivity, Power Gain, Polarization, array pattern, array gain, array taper efficiency, Pencil beam array, linear array synthesis-schelknoff 's polynomial array, binomial array, chebyshev array, Microstrip patch array, Noise in communication.	06
2	**Spatial Signals:** Signals in space and time. Spatial frequency, Direction vs. frequency. Wave fields. Far field and Near field signals.	08
3	**Sensor Arrays:** Spatial sampling, Nyquist criterion. Sensor arrays. Uniform linear arrays, planar and random arrays. Array transfer (steering) vector. Array steering vector for ULA. Broadband arrays.	08
4	**Spatial Frequency:** Aliasing in spatial frequency domain. Spatial Frequency Transform, Spatial spectrum. Spatial Domain Filtering, sectorization, switched beam, phased antenna array, adaptive antenna array and adaptive signal processing application, Beam Forming. Spatially white signal. Introduction to microphone array signal processing	10
5	**Direction of Arrival Estimation:** Non parametric methods - Beam forming and Capon methods. Resolution of Beam forming method. Subspace methods - MUSIC, Minimum Norm and ESPRIT techniques. Spatial Smoothing.	10
6	**Applications of Array Signal Processing:** RADAR, Sonar, Seismic, Acoustics, Wireless Communications and networks and Radio Astronomy signal processing applications	08

Reference Books:

1. Dan E. Dugeon and Don H. Johnson. (1993). Array Signal Processing: Concepts and Techniques. Prentice Hall.
2. Petre Stoica and Randolph L. Moses. (2005, 1997) Spectral Analysis of Signals. Prentice Hall.
3. Handbook of Array Signal Processing and Sensor Networks by Simon Haykins and K. J. Ray Liu, Wiley(IEEE Press).
4. Bass J, McPheeters C, Finnigan J, Rodriguez E. Array Signal Processing [Connexions Web site].February 8, 2005
5. Antennas for all applications 3 edition. By J.D.Krauss, TMH.
6. Electromagnetic wave & radiating systems by Jordan & Balmain, PHI Publication.
7. Antenna Theory: Analysis and design –C. Balanis, Wiley India.