

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
 M.E. I Year (ECE) I-Semester (Make Up) Examinations, May - 2015
 (Communication Engineering and Signal Processing)

Array Signal Processing

Time: 3 hours

Max. Marks: 70

Note: Answer ALL questions in Part-A and any FIVE questions from Part-B

Part-A (10 X 2=20 Marks)

1. Derive the relationship between various co-ordinate systems.
2. What is a Spatial frequency?
3. What is the importance of spatial correlation Matrix?
4. Express the signal to noise ratio of single sensor in terms of correlation matrix.
5. Define "Parabolic Width" of an array.
6. State and explain slowness vector for spatial signals.
7. Define resolution of a Beam former.
8. What is a stationary random field?
9. Define spatial sampling theorem.
10. What are various nonparametric methods for the direction of arrival estimation?

Part - B (5 X 10=50 Marks)

11. a) Derive the solution of a wave equation and discuss how wave equation is applicable to signals in space and time.. (6)
- b) Explain about Far and Near field signals. (4)
12. a) Explain about the following i) Fresnel diffraction ii) Ray Theory (5)
- b) Explain both qualitatively and quantitatively about dispersion and attenuation. (5)
13. a) Derive an expression for array factor of a Planar Array. (6)
- b) For a regular array, derive an expression for wavenumber frequency spectrum. (4)
14. a) Define "Beam Forming". Explain about delay and sum beam forming for a near field source. (6)
- b) What is filter and sum beam forming? Explain how temporal Filtering can be achieved using filter and sum beam forming. (4)
15. a) Classify methods for the direction of arrival estimation. Explain any one of the non-parametric method for the direction of arrival estimation. (7)
- b) Explain the signal sub space method of DOA estimation. (3)
16. a) Explain about ESPRIT algorithm. (6)
- b) Explain about Noise subspace method. (4)
17. Write short notes on
 - i. Spatial smoothing (4)
 - ii. Raley-Sommer Field (3)
 - iii. Wave Fields (3)