

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

Test-2 Examination, April 2017

M. Tech. (E.C.E)

Course Code: 13M1WEC432

Max. Marks: 25

Course Name: Radar and sonar signal processing

Max. Time: 1h.30min

Note: All questions are compulsory; Carrying of mobile phone during examination will be treated as case of unfair means. Each question carries five marks. Assume any missing data, if required.

1. Use Woodward-Lawson's method to design the radiation patterns with the specifications $AF(\theta) = \begin{cases} 1, & \text{for } 45 < \theta < 90 \\ 0, & \text{otherwise} \end{cases}$ where θ is the angle with the z-axis.
2. Describe the steps involved in designing the Taylor's sum pattern synthesis with all the relevant equations.
3. Explain briefly about the effects of earth's atmosphere on radar wave propagation. Obtain the expression for pattern propagation factor and give its significance. (Consider flat earth model).
4. What is the main requirement of pulse compression in radar systems? Why linear frequency modulated signal is used extensively in pulse compression? Explain different types of pulse compression techniques.
5. Explain briefly the following
 - a. Ambiguity function.
 - b. Poly-phase codes.
 - c. Earth's reflection coefficients for vertical and horizontal polarizations.
 - d. Relationship between current distribution and far-field radiation patterns. (Give for both continuous and discrete sources).
 - e. Condition for avoiding the grating lobes in an antenna radiation pattern.