

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MAKE-UP EXAMINATION April 2017

M.Tech 04 Semester

COURSE CODE: 13M1WEC432

COURSE NAME: Radar and Sonar Signal processing

MAX. MARKS: 25

COURSE CREDITS: 03

MAX. TIME: 1hour 30minutes5 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume any missing data. Each question carries 5 marks.

1. Derive the expression for the antenna array factor (even number of elements) for N elements kept along the z -direction at a separation of d . Draw the typical pattern for $d = \lambda/2$, $d = \lambda$ and $d = 2\lambda$. Give the conditions on excitations for end-fire and broadside antenna patterns.
2. Obtain the ambiguity function for rectangular pulse of duration τ seconds. List the properties of the ambiguity function.
3. Explain in detail about the radar wave propagation in space with regards to refraction, diffraction, atmospheric losses and polarization.
4. What do you mean by poly-phase codes? How do you derive a poly-phase code? Give different types of poly-phase codes?
5. Explain in brief about the following.
 - a. Doppler invariant property.
 - b. Linear frequency modulation and non-linear frequency modulation.
 - c. Schelkunoff's method of pattern synthesis.
 - d. Electronic beam steering.
 - e. Range resolution and velocity resolution.