JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

SUPPLEMENTARY EXAMINATION- May 2017

M.Tech IV Semester

COURSE CODE: 13M1WEC432

MAX. MARKS:100

COURSE NAME: Radar and Sonar Signal Processing

COURSE CREDITS: 03

MAX. TIME: 2 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Marks are indicated in parenthesis. Assume any missing data.

1. Explain the use of non-linear components in radar systems. Explain the working of a double balanced mixer with diagram and with equations. (15)

2. Explain the effects of atmosphere on the radar wave purgation. Explain different factors that affect the wave propagation with regards to sonar as well. (15)

3. Explain the steps involved in designing the antenna array pattern using Schelkunoff's method and Taylor's method. (15)

4. Explain in detail about the different methods of pulse compression (15)

5. Explain the working of a continuous wave linear frequency modulated signal radar system in order to find the velocity of the target. (15)

6. Derive the expression for the radar equation and determine the minimum signal strength required to detect the presence of the target if SNR of the receiver is given.(15)

7. Calculate the unambiguous range for the pulse radar with carrier frequency of 1.5GHz and pulse repetitive frequency of 10 kHz. What is the Doppler shift that can be measured using this system? (10)