Bengal Engineering &Science University, Shibpur
M.E (ETC)Final Examination, 2013
Sub: Radar Signal Processing & Imaging (ETC-1036)

Full Marks – 70. Time – 3 Hrs.

The questions are of equal value
Answer any Five questions.
Answer should be brief and to the point.

1. (a) A three element array operating frequency 3 GHz with a uniform element spacing of 7.35 cm. All elements are fed at the same phase .Find the angle of the first null in the beam pattern.
(c) What do you mean by aperture blockage? Describe Cassegrain reflector antenna.
(d) Briefly describe different side lobe suppression techniques.
[4+6+4]

2. (a) Define Pulse compression technique. What do you mean by signal integration for target echoes and the randomness of noise?
(b) What do you mean by Target Fluctuation model? Define glint and scintillation.
[7+7]

3. (a) Find the length of the synthetic antenna necessary to produce cross range resolution of 1 m at a range of 5 km, find also maximum length of the real antenna and distance to the far field of the synthetic antenna. The RADAR frequency is 10 GHz.
(b) For SAR prove that range resolution is equal to $\lambda R/ 2L\sin\theta$. What are the modes in SAR?
[6+8]

4. (a) Find out the RCS for flat plate and Luneburg lens. Estimate the peak RCS of a Luneburg lens of 8 inch diameter to an X band(10 GHz) Radar.

(b) A RADAR has a PRF of 1250 pps. What is the maximum range which targets can have if they are to be in the first range zone?
[8+6]

5. (a) Define Radar Cross Section .Describe the effect of polarization on RCS.
(b) A target at range 5km reflects power such that -58dBm appears at the output of an antenna with an effective area of 10 m^2 . The illumination power density at the target is 20 mW/ m^2 . Find the RCS of the target.
[10+4]

6. (a) What do you mean by A scope B scope and P scope in Radar display?
(b) What are the difference between Pyramidal and Tapered loading Absorbers? Describe Salisbury screen and Jaumann Absorbing material.
[4+10]

7. Write short notes on (any Two) : [7+7]

(a) Matched filters (b) RCS prediction technique (c) Synthetic Aperture Radar.