

Note :—Attempt all questions.

Attempt any two of the following :— (10×2=20)

- (a) What do you understand by Radar signal models ? Obtain the expression for simple point target radar range equation.

Consider an X-band (10 GHz) radar with a peak transmitted power of 1 KW and a pencil beam antenna with a 1° beam-width, and suppose an echo is received from a jumbo jet aircraft with an RCS of 100 m^2 at a range of 10 km. The antenna gain is 26,000. Calculate the received power assuming atmospheric and system losses are negligible.

- (b) Define signal to noise ratio in the noise model.

- (c) Write short notes on :—

(i) Swirling model

(ii) Clutter and Signal to Clutter Ratio (SCR).

2. Attempt any two of the following :— (10×2=20)

- (a) What is Doppler shift and explain the simplified approach to Doppler shift.

- (b) Define matched filter. Explain matched filtering of moving targets.
- (c) Define the following :—
- (i) Radar Ambiguity function
 - (ii) Matched filter for the Pulse Burst waveform.
3. Attempt any **two** of the following :— **(10×2=20)**
- (a) What are different detection theories ? Explain them in brief.
 - (b) Describe the Radar detection as hypothesis testing.
 - (c) Define Albersheim's and Schidman's equation.
4. Attempt any **two** of the following :— **(10×2=20)**
- (a) Explain the working of DME system with the help of block diagram. Explain briefly the characteristic features of the DME system.
 - (b) Define VOR. Explain the purpose of VOR and its uses, also explain the principle of operation.
 - (c) Define the following :—
 - (i) Block diagram of Basic Decca receiver.
 - (ii) Modes of operation in omega system.
5. Write short notes on any **two** of the following :— **(10×2=20)**
- (i) NAVSTAR system
 - (ii) MLS (Microwave Landing System)
 - (iii) GPS.