

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023****Subject Code:3171110****Date:01-12-2023****Subject Name: Radar and Navigational Aids****Time: 10:30 AM TO 01:00 PM****Total Marks:70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define (1) Pulse width **03**
(2) Pulse Repetition Time
(3) Second Time Around Echo
- (b) Discuss the basic principle behind operation of RADAR. Also provide the classification of RADAR **04**
- (c) Draw the block diagram of a simple Radar set and explain the essentials of its operations. What are the basic functions of Radar? **07**

- Q.2** (a) Discuss major advantages and drawbacks of RADAR with relevant examples. **03**
(b) Write a brief note on navigation. **04**
(c) What is a Doppler effect? Derive the equation for radial velocity of a moving target. Also discuss the difference between Continuous Wave RADAR and Pulsed RADAR. **07**

OR

- (c) Draw and explain the block diagram of CW radar. Write its applications and limitations. **07**

- Q.3** (a) What is blind speed and how to avoid it? **03**
(b) Explain the use of delay line cancellers. Give its filter characteristics. **04**
(c) Write a short note on Mono Pulse tracking Radar. **07**

OR

- Q.3** (a) Briefly describe the concept of sequential lobbing approach. **03**
(b) What is meant by PRF? What is the prime merit if PRF is varied? What is Staggered PRF and why is it important? **04**
(c) Explain MTI Radar with its block diagram. Why are STALO and COHO needed in MTI RADAR? **07**

- Q.4** (a) Differentiate coherent MTI and non – coherent MTI. **03**
(b) Explain briefly different antennas used in RADAR transmissions and receptions **04**
(c) Draw the block diagram and discuss the operation of electronic scanning system with relevant examples. **07**

OR

- Q.4** (a) What is tracking? Which important characteristics of target are used for tracking? **03**
(b) Write a short note on Radar Duplexer. **04**
(c) Draw a sketch of Two – cavity Klystron amplifier used in radar transmitter and explain its working. **07**

- Q.5** (a) List down the applications of satellite Navigation. **03**

- (b) Explain night effect and antenna effect of errors in loop direction finder. **04**
(c) Write a short note on NAVIC and GAGAN receivers. **07**

OR

- Q.5** (a) Discuss DECCA navigation system in short **03**
(b) Explain the working of Goniometer. **04**
(c) Write a short note on Instrument Landing System (ILS). **07**
