

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (NEW) EXAMINATION – SUMMER 2024****Subject Code:2181103****Date:18-05-2024****Subject Name:Radar & 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) What do you mean by Navigation? Explain different types of Navigation Aids. **03**
- (b) Define the following parameters: **04**
- i) Receiver noise
 - ii) Pulse repetition frequency
 - iii) False alarm
 - iv) Blind speed
- (c) What is a multiple-time-around echoes and how it is related to radar's PRF? Considering three targets at different distances, explain a method of distinguishing MTA echoes from unambiguous echoes, using A scope. **07**
- Q.2**
- (a) Explain the principle of RADAR. **03**
- (b) Define and explain RADAR cross-section. **04**
- (c) Why loop antennas are used in direction finding? Derive an expression for induced output voltage of loop antenna having N turns. **07**
- OR**
- (c) Write, explain and compare the three radar range equations. Maximum range of the radar is inversely proportional to the square-root of wavelength, Justify. **07**
- Q.3**
- (a) What is Principle of Hyperbolic Navigation **03**
- (b) Define radar clutter & prove that clutter power is inversely proportional to the square of the range. **04**
- (c) Define Direction Finding term and which antenna is used for this purpose and why? **07**
- OR**
- Q.3**
- (a) Explain basic principle of MTI radar. **03**
- (b) What do you mean by Beat frequency? Explain in brief. **04**
- (c) How do tracking and scanning radar differ? Explain Conical scan tracking radar. **07**
- Q.4**
- (a) How clutter Attenuation is obtained in the delay line cancellers? **03**
- (b) Draw neat block diagram of FMCW radar. **04**
- (c) Explain working of Microwave landing system (MLS). Also mention its advantage and disadvantage. **07**

OR

- Q.4** (a) What is meant by Satellite Constellations? **03**
 (b) Enlist and explain different types of displays used in Radar **04**
 (c) Explain the principle of working of LORAN A. Discuss the sequence of transmission and reception of pulses. How absolute delay τ is measured? **07**

- Q.5** (a) Describe minimum detectable signal and SNR with respect to radar. **03**
 (b) Explain Radio Altimeter with neat waveform. **04**
 (c) Explain the GPS Principle of operation. Enlist the uses of GPS system. **07**

OR

- Q.5** (a) Enlist the important applications of RADAR. **03**
 (b) Compare Basic Pulse RADAR and CW RADAR System. **04**
 (c) With a neat sketch describe the TACAN beacon equipment. Explain how the desired antenna pattern is obtained and timing of the reference pulse groups is ensured. **07**
