

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE – SEMESTER- VIII EXAMINATION-SUMMER 2023****Subject Code: 2181103****Date: 15/06/2023****Subject Name: Radar & Navigational Aids****Time: 02:30 PM TO 05:00 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

|             |                                                                                                                              | MARKS     |
|-------------|------------------------------------------------------------------------------------------------------------------------------|-----------|
| <b>Q.1*</b> | (a) Define following terms:<br>1) Blind speed 2) Radar 3) Clutter                                                            | <b>03</b> |
|             | (b) Which are the different Radar frequency bands? List applications of Radar.                                               | <b>04</b> |
|             | (c) Derive the fundamental form of Radar range equation. Discuss the factors affecting the maximum range of radar.           | <b>07</b> |
| <b>Q.2</b>  | (a) Explain about Pulse Doppler radar.                                                                                       | <b>03</b> |
|             | (b) What is the significance of delay line cancellers? Obtain the frequency response of single delay line cancellers.        | <b>04</b> |
|             | (c) Explain the principle and operation of FM-CW radar in brief.                                                             | <b>07</b> |
|             | <b>OR</b>                                                                                                                    |           |
|             | (c) How FMCW radar overcomes the shortcomings of Doppler CW radar? Explain the principle and operation of CW radar in brief. | <b>07</b> |
| <b>Q.3</b>  | (a) Justify the requirement of STALO and COHO.                                                                               | <b>03</b> |
|             | (b) Explain the working principle of Air surveillance radar and write its application.                                       | <b>04</b> |
|             | (c) Write a brief note on an electronic scanning system and its operation.                                                   | <b>07</b> |
|             | <b>OR</b>                                                                                                                    |           |
| <b>Q.3</b>  | (a) Explain Conical scan and Sequential lobing in brief.                                                                     | <b>03</b> |
|             | (b) Define working principal of LORAN-C and list the components of LORAN-C system.                                           | <b>04</b> |
|             | (c) Explain in detail about Principle of phased array for electronic scanning.                                               | <b>07</b> |
| <b>Q.4</b>  | (a) Differentiate tracking and scanning radar.                                                                               | <b>03</b> |
|             | (b) List and explain the parameters that affect the radar range.                                                             | <b>04</b> |
|             | (c) Explain about Adcock Direction Finder and It's advantages over loop antenna.                                             | <b>07</b> |

**OR**

|            |            |                                                                                                 |           |
|------------|------------|-------------------------------------------------------------------------------------------------|-----------|
| <b>Q.4</b> | <b>(a)</b> | Explain MTI radar operation with the help of block diagram.                                     | <b>03</b> |
|            | <b>(b)</b> | What is the principle of TACAN? Explain working of TACAN with the help of simple block diagram. | <b>04</b> |
|            | <b>(c)</b> | What do you mean by VOR? Explain VOR receiving equipment.                                       | <b>07</b> |
| <b>Q.5</b> | <b>(a)</b> | Explain principle of GPS receiver.                                                              | <b>03</b> |
|            | <b>(b)</b> | Write a short note on Adcock Direction Finder.                                                  | <b>04</b> |
|            | <b>(c)</b> | Briefly describe the DECCA receiver with neat sketch.                                           | <b>07</b> |
| <b>OR</b>  |            |                                                                                                 |           |
| <b>Q.5</b> | <b>(a)</b> | Write a short note on Sea clutter.                                                              | <b>03</b> |
|            | <b>(b)</b> | List the four methods of navigation. Describe any one in detail.                                | <b>04</b> |
|            | <b>(c)</b> | Name Navigation Satellites of different countries. Explain GAGAN and NAVIC Receiver System.     | <b>07</b> |

**\*It is advisable to put fundamental questions of respective subject in Q1, as it is compulsory question.**

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