

Roll No. ....

**24446**

**B. Tech 7th Sem. (ECE)**

**Examination – December, 2014**

**Radar & Sonar Engg.**

**Paper : ECE-453 - F**

***Time : Three Hours ]***

***[ Maximum Marks : 100***

*Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.*

**Note :** Question no. 1 is *compulsory*. Attempt *one* question from each of *four* Section. All questions carry equal marks.

1. (a) Give the classification of radar on the application bases. 5
- (b) Explain cross range and Doppler resolution of the radar. 5
- (c) Explain the term signal to noise ratio and noise factor. 5
- (d) Explain the doppler effect by considering the moving targets. 5

2. Explain the principle of operation of radar system. Also derive the simple form of radar range equation. 20
3. Discuss the different applications of radar in detail. 20

### SECTION - B

4. Discuss the following terms. 20
  - (i) Range
  - (ii) Pulse width
  - (iii) Pulse repetition frequency.
5. Derive the simple form of a radar range equation and relate the transmitter peak power to the maximum range of radar. Also explain the term signal to noise ratio and noise factor. 20

### SECTION - C

6. (a) Explain the range gated Doppler filters in detail. 10
  - (b) Describe the limitation of M T I Performance. 10
7. (a) Explain the tracking with radar concept in detail. 10

- (b) A CW radar is operating at a frequency of 6 GHz when an aircraft is approaching the radar at the radial velocity of 600 km/hr. Find out the doppler shift frequency. 10

### SECTION – D

8. What is the difference between RADAR and SONAR ? Explain the SONAR System with block diagram. 20
9. (a) What is the purpose of a mixer ? Write the various types of mixers used in the radar system. 10
- (b) Explain the term duplexer used in radar in detail. 10