**Registration no:** | | | | | | | | | | |

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**M.TECH**
**ETPE 201**

# M.Tech 2nd Semester Regular / Back Examination – 2014-15

## RADAR SYSTEM ENGINEERING

**Branch : ETC**

**Q.Code:T293**

**Time: 3 Hours**

**Max marks: 70**

**Answer Question No.1 which is compulsory and any five from the rest.**
**The figures in the right hand margin indicate marks.**

Q1 Answer the following questions: (2 x 10)

a) At what frequency RADAR works? Why?
b) What is meant by RADAR cross-section? Why is it important?
c) Write different airborne radar methods for detection of ground moving targets.
d) Why MTI Radar fails to detect fixed target?
e) In sequential lobing tracking radar how do you obtain the angular error in both the coordinates?
f) What do you mean by tracking radar and how many types of tracking radar is used?
g) What is the revisit time?
h) Will it be possible to scan the beam electronically by varying the frequency of the source feeding the antenna array?
i) What do you mean by Beam steering?
j) How can you avoid grating lobes?

Q2 a) Formulate the RADAR range equation in terms of minimum detectable signal and other parameters. (5)

b) A marine RADAR operating at 10Ghz has maximum range of 50Km with an antenna gain of 4000.If the transmitter has a power of 250Kw and minimum detectable signal of $10^{-11}$ watt. Determine the cross section of the target the RADAR can sight. (5)

Q3 a) Draw the block schematic diagram of a FMCW RADAR and Explain in brief its working principle. (5)

b) Derive the transfer function of a delay line canceller. What information do you obtain from it? (5)

Q4 Design the block schematic diagram of an Amplitude comparison monopulse tracking radar which extracts angular error signal in one angular Co-ordinate only. Explain in brief, it's working principle, Compare its performance with that of Conical scan tracking radar. (10)

Q5 a) What is the difference between single target tracker and air-surveillance radar? Briefly explain automatic tracking with surveillance RADAR. (5)

b) With the help of block schematic representation explain the principle of operation of MTI RADAR. (5)

Q6 a) Derive the working of a phased array RADAR. Derive the necessary supporting expressions? (5)

b) What is need of phase shifters for phased array radar application and briefly explain diode phase shifters. (5)

Q7 a) Briefly explain beam steering by changing the radar frequency. (5)

b) Draw and Explain principle of operation of cassegrain Antenna. (5)

Q8 Write short notes on any two (5 x 2)

a) RADAR displays.
b) Sequential lobing.
c) Synthetic Aperture Radar.
d) Doppler filters banks.