

Registration No :

| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|
| | | | | | | | | | |
|--|--|--|--|--|--|--|--|--|--|

Total Number of Pages : 01

**M.Tech
ETPE201**

**2nd Semester Back Examination 2018-19
RADAR SYSTEM ENGINEERING
BRANCH : ELECTRO & COMM. ENGG
Time : 3 Hours
Max Marks : 70
Q.CODE : F582**

**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) What are the specific bands assigned by the ITU for RADAR?
 - b) A radar echo is observed after 15 μ s of the transmitter pulse. Calculate the range of the target.
 - c) Why matched filter is needed in pulse radar?
 - d) What is beam steering?
 - e) What are the peak power and duty cycle of a radar whose average transmitter power is 200Watt, pulse width of 1 μ s and pulse repetition frequency of 1KHz.
 - f) What are the errors in arrays?
 - g) Distinguish between search radar and tracking radar.
 - h) How radar is used to measure the direction and position of targets?
 - i) What is the maximum range of the radar system from first principle?
 - j) What are the various unwanted signals which causes errors in FM altimeter?
- Q2 a) Explain Doppler shift and its role in pulsed and CW RADAR. (5)**
b) Explain Instrument landing system for aircraft navigation. (5)
- Q3 a) Radar operating at 1.5 GHz uses a peak pulse power of 2.5MW and has a range of 100nmi for objects whose RADAR cross section is 1 m² if the minimum receivable power of the receiver is 2 \times 10⁻¹³ watt. What is the smallest diameter of antenna reflector could have assuming it to be a full paraboloid with η =0.65. (5)**
b) With block diagram explain the MTI RADAR system. Give its limitation. (5)
- Q4 a) Write the simplified version of RADAR range equation and explain how this equation does not adequately describe the performance of particular Radar? (5)**
b) What are the advantages of mono-pulse radar over conical scan radar? Explain the block diagram of amplitude comparison of monopulse for extracting error signals in both elevation and azimuth. (5)
- Q5 a) Explain the function of Duplexer in RADAR system. (5)**
b) Give the complete analysis of Electronically steered phased-array antennas. (5)
- Q6 Explain the following limitations of MTI radar : (10)**
a) Equipment instabilities
b) Scanning modulation
A MTI radar is operating at 9GHz with a PRF of 3000pps. Calculate the first two lowest blind speeds of this radar. Derive the formula used.
- Q7 What are the advantages of the phased array antenna over conventional antennas for RADAR application. (10)**
- Q8 Write short answer on any TWO : (5 x 2)**
- a) super heterodyne radar receiver
 - b) ferrite phase shifters
 - c) cosecant-squared antenna pattern