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B TECH
(SEM VI) THEORY EXAMINATION 2018-19
RADAR ENGINEERING

Time: 3 Hours *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.** 2 x 7 = 14

a. Write applications of RADAR.
b. What do you understand by minimum detectable signal?
c. Calculate lowest two blind speeds of an MTI radar operating at 9 GHz with a PRI of 1000pps.
d. Why low angle tracking is used in RADAR?
e. Explain monopulse tracking.
f. Why false alarm occurred in radar system?
g. Define radar clutter.

SECTION B

2. **Attempt any *three* of the following:** 7 x 3 = 21

a. A radar system has following specifications.
Operating frequency = 9GHz, transmitted power = 1000kW, power gain of antenna used = 500, minimum power to be received = 10^{-10}W. Calculate the maximum range of this radar system (Use A_e=10m^2 and σ=4m^2).

b. Explain the use of delay line cancelers (DLC) in radar system. Also, explain the frequency response of DLC.

c. Compare monopulse and conical scan tracking radars. Also, explain factors limiting the tracking accuracy.

d. What are the different types of detectors used in radar?

e. Explain in brief basic measurement parameters of a radar system?

SECTION C

3. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) With the help of schematic block diagram, explain radar trans-receiver system.

(b) Derive simple form of radar range equation.

4. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) An L-Band radar operating at 1.25 GHz uses a peak pulse power of 3MW and must have a range of 100 nautical miles for object whose radar cross section is 1.0m^2. If the minimum receivable power of the receiver is 2x10-^{13}Watt, what is the smallest diameter of the antenna reflector could have, assuming it to be a full paraboloid with K=0.65?

(b) What is receiver noise? Show its effect on radar range equation.