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B TECH
(SEM-VIII) THEORY EXAMINATION 2017-18
SATELLITE & RADAR SYSTEMS

Time: 3 Hours *Total Marks: 100*

Note: **1.** Attempt all Sections.
2. Assume any missing data.

SECTION A

1. Attempt *all* questions in brief. **2 x10 = 20**

a. What do you mean by false alarm?
b. Calculate average power when peak power is 200 KW, pulse width is 2 μs and rest time is 2000s.
c. What do you understand by Blind speed?
d. What are the limitations of MTI performance?
e. Explain Low angle tracking in brief.
f. Why down link frequency should be lower than uplink frequency?
g. Describe the term Telemetry.
h. Explain kepler's law of planetary rotation.
i. Write Short note on timing Accuracy.
j. Write Short note on GPS signal levels.

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 30**

a. Derive radar range equation. Radar is operating at 10GHz with the peak power of 500KW, the power gain of antenna is 5000 & minimum power of the receiver is 10^{-14}. Calculate the maximum range of radar if the effective area of antenna is $10m^2$ & radar cross-section is $4m^2$.
b. Explain MTI radar with suitable block diagram. Also give its applications. Compare Pulse Doppler Radar & MTI radar with block diagram.
c. What do you understand by Tracking with radar? Explain Mono pulse tracking in detail.
d. Derive the general link equation. Find out the expression for C/N and G/T ratio.
e. Explain the basic principle of a GPS system. Explain why a minimum of four satellites must be visible at an earth location utilizing the GPS system for position determination.

SECTION C

3. Attempt any one parts of the following: **10 x 1 = 10**

a. What is a duplexer? Explain the operation of a radar duplexer with the help of a circuit diagram. What is the main limitation of the duplexer? Explain.

b. With the help of schematic block diagram, explain radar transceiver system.

4. Attempt any one parts of the following: **10 x 1 = 10**

a) Explain Delay Line Canceller and Staggered Pulse Repetition Frequencies in detail.
b) Draw the block diagram and explain the operation of CW radar using zero intermediate frequency in the receiver. How have the drawbacks of the radar been overcome?

5. Attempt any one parts of the following: **10 x 1 = 10**

a) Describe with aid of sketch, the conical scanning method of tracking. How it is improvement over Lobe switching

b) Explain what is meant by geostationary orbit. How do the geostationary orbit and geosynchronous orbit differ? Explain how a satellite is placed into a geostationary orbit?

6. Attempt any one parts of the following: **10 x 1 = 10**

a) Derive the expression for overall satellite link design. How a complete satellite link becomes down link limited? How the overall satellite link design is affected by intermodulation noise?

b) Discuss about various satellite subsystems highlighting their important functions and characteristics.

7. Attempt any one parts of the following: **10 x 1 = 10**

a) State and explain the different segments of GPS. What is meant by satellite signal acquisition in GPS?

b) With the help of a suitable block diagram, explain the working of DBS Television network in detail.