**EE 602: Practice Problems**

1. Pulsed radar operating at 10 GHz with transmission pulse width of 2 µs and pulse repetition frequency (PRF) of 1 kHz.
2. If the received signal is sampled at 2 MSPS (mega samples per second). What is the accuracy of range estimate? what is the range resolution?
3. 75,150m (b) 75m, 300m (c) 30 m 150m (d)30m, 300m
4. What is the maximum (approximate) unambiguous range in ‘nautical miles’?

(1 nmi=1.852 km)

1. 75.2 nmi (b)40.5 nmi (c)150 nmi (d) 81 nmi
2. The radar antenna has a diameter of 1.5m (D) and revolves at 4 revolutions per minute (rpm). An airplane approached radially towards the radar. What is the Beam residence time on the airplane? (Beam width (in degrees) = 70λ/D). What

(Write steps like computation of beam width). If the radar has a pulse width of 1 μs, What should be the minimum velocity (in km/hr) of the airplane so as to jump 10 range-bins when the beam is re-incident on it?

1. The signal strength of the echo received from a point target at a distance ‘R’ is ‘P’ Watts. What will be the echo power from the same target when it is at a distance of ‘2R’?
2. 0.5 P Watts (b) 0.0625 P Watts (c) P mW (d) 0.25P dBm …
3. Mono-static radar was operated with a parabolic dish antenna. This antenna was replaced by a similar dish antenna with twice the diameter. If the echo strength from a typical target was ‘P’ watts with original antenna, what would be the received signal strength with the new antenna?
4. 16 P watts (b) 4 P watts (c)1/4 P watts (d) P watts
5. Radar with pulse width of 1 µs and PRF of 10 kHz was operated with a peak transmit power of 1 kW. What is the average transmit power?
6. 100 Watts (b) 10 watts (c) 1 watt (d) 1 kW ...
7. If a received signal at 4 GHz is passed through a mixer with local oscillator frequency of 70 MHz. Following frequency components will be observed at the output.
8. 3.93 GHz (b) 3.93 and 4.07 GHz (c) 4.07 GHz and 7.07 GHz (d) 4.07 GHz … (1 Mark)

**Answers**

1. (b)
2. (d)
3. Beam width (70 X 0.03)/1.5=**1.40** rpm=> 20 s per revolution=> 240/s =>1.4/24=**58.33ms** beam residence time**.**

Range Resolution is 150. The air plane must travel more than 1.5 km in 20 s.

Hence the minimum velocity= 75ms-1 🡺 270km/hr

1. (b)
2. (a)
3. (b)
4. (b)