

Communications Systems

Course: Communication Systems
Credit Hours: 3
Test #3 Spring 1428

Course code: EE 424
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Question I (5 marks)

1. What is the main reason for using FM instead of AM in MW LOS radio-link systems?
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2. How would you define: *Noise threshold*
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...
3. How would you define *FM threshold*?
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4. Compare MW radio and cable transmission system with regard to repeater spacing.
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5. What is the difference between attenuation and fading in MW LOS radio-link systems?
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Question II (5 marks)

1. Doubling the carrier frequency increases the free space attenuation by.....dB,
2. and increases the link outage time due to propagation by a factor of
3. Increasing fade margin by 10 dB reduces the outage time by a factor of.....
4. Doubling the hop distance increases the tower height by a factor of.....
5. and increase free space attenuation by dB

Question III (10 marks)

1. A microwave radio link (Line-of-Sight) operating in the 17 GHz frequency band is intended to carry a color TV signal over a 40 km hop. If S/N=50 dB, and transmitted power is 27 dBm. Design the system showing the antenna gain (s)

Make any reasonable assumptions.

$$L(dB) = 32.44 + 20 \log D(km) + 20 \log f(MHz)$$

Free-Space Attenuation

2. What is the expected link reliability for the radio link in part 1 above, if installed along the Central region of SA? The link has a 20dB fade margin

Make any reasonable assumptions.

$$FM(dB) = 30 \log D + 10 \log (6ABF) - 10 \log (1-R) - 70$$