

نظم اتصالات
الكومبيوتر

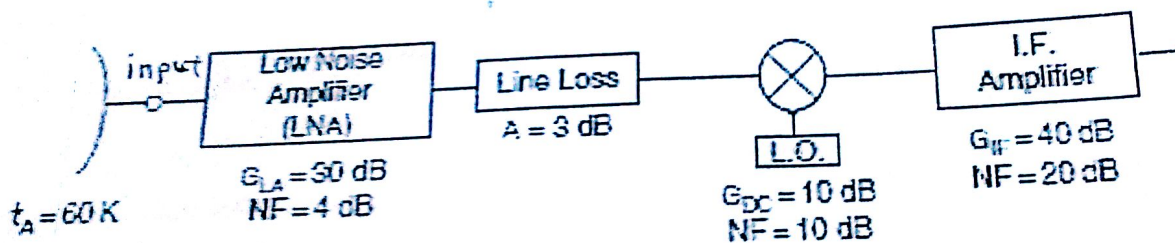
Damascus University
Faculty of Mechanical and Electrical Engineering
Department: Electronics & Communications Engineering
Course Name : modern communication systems
Level: Fifth Year
Academic Year: 2014-2015
Semester: Second

Q₃ (10 m.):

- 1- Sketch the block diagram for DS-SS (T & R).
- 2- Sketch the block diagram for Forward link in single carrier- CDMA system.

Q₄ (10 m.):

For the communication system shown in the figure (*). Calculate the noise temperature referred to the input and the figure of merit. Where antenna gain (at boresight): $G_{\max} = 30$ dB and $T_0 = 290$ K.



The figure (*)

السؤال الثالث (١٠ علامات):

- ١- ارسم المخطط الصندوقي لنظام التتابع المباشر للطيف المنتشر (مرسل و مستقبل)
- ٢- ارسم المخطط الصندوقي للوصلة الأمامية لنظام CDMA وحيد الحامل.

السؤال الرابع (١٠ علامات):

نظام اتصالات مبين بالشكل (*) أحسب درجة حرارة الضجيج بالنسبة للمدخل وميزة الشكل علماً أن الربح الأعظمي للهوائي 30 dB و $T_0 = 290$ K

D. Mohammed Mayhoub

Part III - 20 points - two pages

Question 5: Basics of satellite communications (12 points)

Answer only two of the following questions:

- 5-1 List eight main characteristics of highly elliptical orbit (HEO), giving typical values, and two examples of operational systems using this orbit.
 5-2 List the six orbital elements and their symbols. What are they needed for?
 5-3 Sketch the general orbit form that uses the circumscribed circle, and that allows locating the satellite in orbit. Indicate the different parameters.

Question 6: Study of a low data rate digital satellite link (8 points)

Suppose a satellite system that sends a digital data signal at a bit rate of 9.6 kbps in a nominal RF channel bandwidth of 15 kHz. With near-ideal Nyquist filters, which can be implemented with DSP techniques, the bandwidth of the baseband digital waveform can be restricted to 0.5×bit rate. So, for a 9.6 kbps data stream, the baseband bandwidth (maximum frequency) is 4.8 kHz.

- 6-1 If we use a peak frequency deviation of 3.6 kHz, calculate the resulting RF signal bandwidth using Carson's rule.
 6-2 What will be the result of sending this RF signal through band pass filters designed for 15 kHz FM analog transmissions?
 6-3 Find the FM improvement factor for the baseband channel waveform assuming no de-emphasis.
 6-4 Suppose the C/N for the signal from the satellite is 10 dB. Calculate the S/N for the baseband waveform.

 End of part III questions - Good Luck

Potentially helpful formulas

$$SNR_{dB} = 10 \log_{10} SNR \quad SNR = 10^{SNR_{dB}/10} \quad B_{RF} = 2(\Delta f_{pk} + f_{max})$$

$$(S/N)_{outFMdB} = (C/N)_{dB} + 10 \log_{10} (B_{RF}/f_{max}) + 20 \log_{10} (\Delta f_{pk}/f_{max}) + 1.8 \text{ dB}$$

