

**IV B.Tech I Semester Supplementary Examinations, April/May 2005**  
**SATELLITE COMMUNICATIONS**  
 ( Common to Electronics & Communication Engineering and Electronics & Telematics)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions  
 All Questions carry equal marks

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1. Explain in detail the space and ground segments of a satellite communication network.
2. Compare the propagation effects in the maritime, aeronautical and land mobile satellite channels.
3. Explain the architectural design of spacecraft.
4. (a) Why uplink frequency is higher than downlink frequency. Explain “in detail”.  
 (b) Explain various antennas structure employed for satellite communication.
5. (a) Define Noise temperature. How it is used to calculate noise power and derive an equation for C/N ratio for the antenna delivering a power  $P_r$  to the receiver with a IF gain of the receiver  $G$  ( $G$  is a ratio).  
 (b) Calculate the system noise temperature of the earth station receiver shown, assuming appropriate factors as shown in figure1

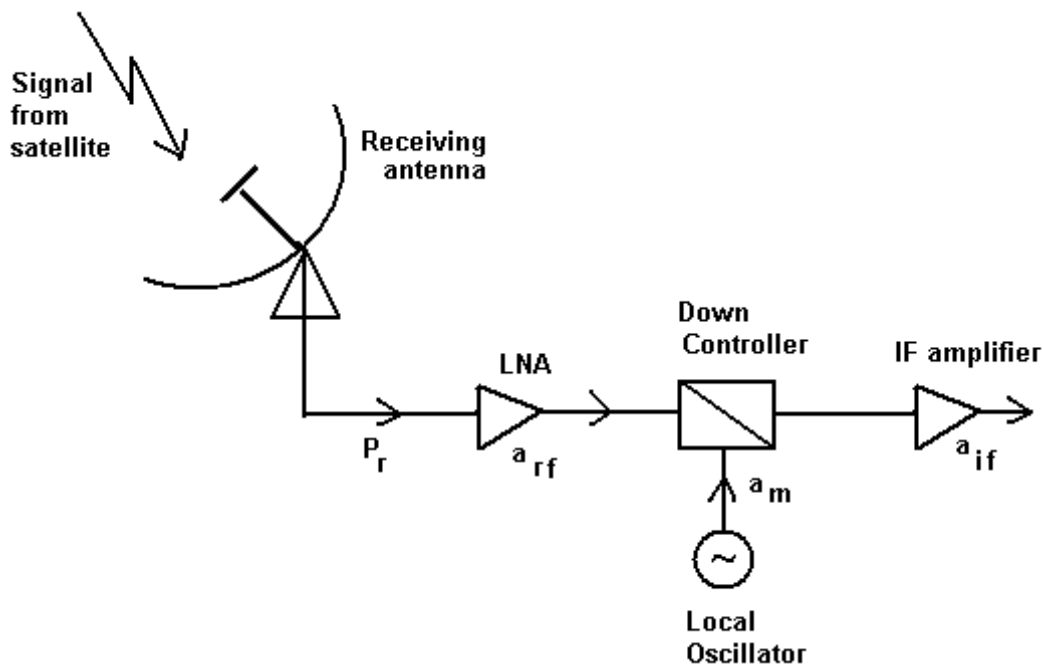


Figure 1:

6. (a) What is meant by communication resource? What are the similarities and differences between the terms Multiplexing and Multiple Access ?.
- (b) A TDMA system operates at 100 Mbits/s with a 2 ms frame time. Assume that all slots are of equal length and that a guard time of  $1\mu$  s is required between slots. Compute the efficiency of the communications resource (CR) for the case of 1, 2, 5, 10 slots per frame
7. (a) A 14/11 GHz antenna has a G/T ratio of 40.3dB at 11.2 GHz. The antenna gain is 64dB and the system noise temperature at 10 deg elevation angle in clear air conditions is 234k. The antenna aperture efficiency and noise temperature are detailed in the list below. During heavy rain, the slant path attenuation reaches 8dB for 0.01 percent of the year. Calculate G/T ratio for their fraction of the year and the corresponding reduction in C/N for the received signal.  
Aperture efficiency: 71.3%  
Sky noise at 10deg elevation: 30k  
LNA noise temperature: 150k
- (b) Explain in detail how geostationary satellites are tracked from the earth station?
8. (a) What is LNA? Why it is required at the front-end of the receiver? Explain.
- (b) What is a TVRO? Explain various components of a TVRO system.

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