

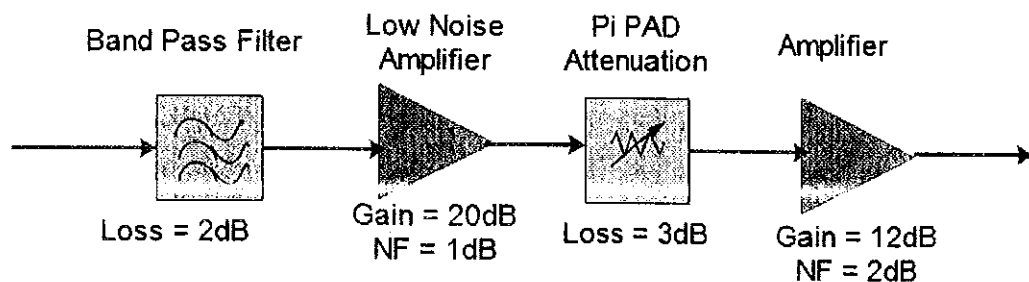
---

*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

---

1. Derive the equation for path-loss factor of two-ray path propagation link model. How do you extend this procedure for multi-path propagation link model? [CO-5 , Marks:4]
2. What are multi-path effects, shadowing and blockage on the mobile satellite communication system? Which properties of the received signal will be affected by these phenomenon? [CO-5 , Marks:4]
3. What are the three different types of techniques used to increase the capacity of the high throughput satellite (HTS) systems? Give a simple numerical example to increase the capacity of the HTS system. [CO-4 , Marks:4]
4. For the given system below, find the overall noise figure of the system.[CO-3 , Marks:4]

**Receiver Chain**



5. Write the equation for the overall received signal strength at multiple sensors (antenna array) with a neat diagram indicating the spacing and path difference calculation. How much is the time delay between two adjacent receivers if the frequency of the signal is 3 GHz and angle of arrival is 30 degrees. [CO-4 , Marks:5]
6. How do you differentiate between scattering and reflection? Give the condition for the surface smoothness to differentiate between these two. Which property is primarily used in the remote sensing satellite systems? [CO-3 , Marks:4]
7. Compare four different types of resolutions with their significance in remote sensing satellite systems. [CO-5 , Marks:4]
8. Define the following briefly. [COs-1 to 5 , Marks:6]
- a. Noise Figure(NF) and Signal to noise ratio (SNR)
  - b. Swath and instantaneous field of view.
  - c. Polar Satellite and Equatorial Satellite systems applications
  - d. Multiple Access techniques
  - e. Two Propulsion techniques
  - f. Isotropic antenna and Directional antenna gains