2023~2024 学年第二学期 电信传输理论与工程 期末补考

1. As one of the most significant impairments, delay distortion can seriously affect the quality of signal transmission in communication systems.
   a) Present the cause of delay distortion in transmission system. [50%]
   b) Analyze the effects delay distortion and the possible solutions to mitigate them, respectively. [50%]

2. Assume a bidirectional transmission system consist of two transceivers and a transmission line, in which, the transmission line can provide a working spectrum from 6.5 MHz to 7.6 MHz, and the signal to noise ratio of this transmission system is 13dB.
   a) Calculate the transmission capacity of this system. [50%]
   b) Calculate the signaling levels required for this system. [50%]

3. A company deployed a private short distance transmission system, in which a coaxial circuit connects two transmission devices. The working frequency is 70 MHz, and the electrical properties of this cable are $60\Omega/km$, $32\mu S/km$, $47nF/km$ and $0.35mH/km$, respectively.
   a) What is the characteristic impedance of this cable? [50%]
   b) What is the propagation constant of this cable? [50%]

4. Assume that two low earth orbit satellites are 300 KM away from each other. Both of them are equipped with same parabolic antennas for communication, he radius of each antenna is 1.5 meters. The transmitting power is 120W and the working frequency is 2.6GHz.
   a) What are the gains of transmitting antenna and receiving antenna in decibels? [50%]
   b) What is the available signal power out of the receiving antenna? [50%]

5. Assume a step-index optical fiber with core refractive index $n_1 = 1.39$ and cladding refractive index $n_2 = 1.37$. Given the acceptance angle, refraction angle, and reflection angle are denoted as θ_i, θ_j, and θ_k, respectively.
   a) If locate the interface of the optical fiber in liquid, of which the reflective index $n_0 = 1.21$, calculate the numerical aperture? [50%]
   b) If place the interface of the optical fiber in gas with reflective index $n_0 = 1.07$, calculate the maximum acceptance angle? [50%]