Sheet (6)

Q1:
Determine the specific attenuation for a circularly polarized satellite signal at a frequency of 4 GHz, where a point rain rate of 8 mm/h is exceeded for 0.01 percent of the year.

Q2:
Explain the difference between *cross-polarization discrimination* and *polarization isolation*.

Q3: Calculate, for a frequency of 12 GHz and for horizontal and vertical polarizations, the rain attenuation which is exceeded for 0.01 percent of the time in any year, for a point rain rate of 10 mm/h. The earth station altitude is 600 m, and the antenna elevation angle is 50° . The rain height is 3 km.

Q4: Determine the specific attenuation for a circularly polarized satellite signal at a frequency of 4 GHz, where a point rain rate of 8 mm/h is exceeded for 0.01 percent of the year.

Q4: Given that for **Q1** the earth station is situated at altitude 500 m and the rain height is 2 km, calculate the rain attenuation. The angle of elevation of the path is 35° .

Q5:A plane TEM wave has a horizontal (_*x* directed) component of electric field of amplitude 3 V/m and a vertical (_*y* directed) component of electric field of amplitude 5 V/m. The horizontal component lags the vertical component by a phase angle of 20° . Determine the sense of polarization

Q6: A plane TEM wave has a horizontal (_*x*-directed) component of electric field of amplitude 3 V/m and a vertical (_*y*-directed) component of electric field of amplitude 5 V/m. The components are in time phase with one another. Determine the angle a linearly polarized antenna must be at with reference to the *x* axis to receive maximum signal

TABLE 4.2 Specific Attenuation Coefficients

Frequency, GHz	a_h	a_v	b_h	b_v
1	0.0000387	0.0000352	0.912	0.88
2	0.000154	0.000138	0.963	0.923
4	0.00065	0.000591	1.121	1.075
6	0.00175	0.00155	1.308	1.265
7	0.00301	0.00265	1.332	1.312
8	0.00454	0.00395	1.327	1.31
10	0.0101	0.00887	1.276	1.264
12	0.0188	0.0168	1.217	1.2
15	0.0367	0.0335	1.154	1.128
20	0.0751	0.0691	1.099	1.065
25	0.124	0.113	1.061	1.03
30	0.187	0.167	1.021	1

SOURCE: Ippolito, 1986, p. 46.