

Final written Exam (Sample)

Q1. Design a *rectangular* microstrip antenna so that it will resonate at 2 GHz . The idealistic lossless substrate (RT/Duroid 6010.2) has a dielectric constant of 10.2 and a height of 0.05 in. (0.127 cm).

- (a) Determine the *physical dimensions* (*width* and *length*) of the patch (*in cm*).
- (b) *Approximate range of lengths* (*in cm*) between the two radiating slots of the rectangular patch, *if we want the input impedance (taking into account both radiating slots) to be real*.
- (c) What is the *real input impedance of Part b?* Neglect coupling.
- (d) Location (*in cm from the leading radiating slot*) of a coaxial feed so that the *total input impedance is 150 ohms*.

Q2. For an eight-element ($M = 8$) linear array of isotropic elements with a spacing of $d = 0.5\lambda$ between them, as shown in Figure , it is desired to form a pattern where the pattern maximum (SOI) is at $\theta_0 = 20^\circ$. There are no requirements on any desired nulls (SNOIs) at any specific angles. Determine the relative amplitude (w 's) and phase (β 's) excitation coefficients of the elements using the following:

1. LMS beamforming algorithm

2. Classical method described in Chapter 6. Compare the results (amplitude, phase, and pattern) of the two methods.

