

3/12/2024 EXTC SEM-VI C SCHEME ELECTROMAGNETICS AND ANTENNA QP CODE: 10067946

(3 Hours)

(Maximum Marks: 80)

- NB. 1. Que number one is compulsory**
2. Attempt any three out of remaining five questions
3. Assume suitable data
4. Figures to the right indicate the maximum marks

- Q1 Attempt any FOUR: (20)**
- a) Determine the electrostatic force between the two charges of magnitude 2 C and -1 C separated by a distance 1m in air.
 - b) State and explain Faraday's Law
 - c) List Maxwell's equations for time varying fields.
 - d) Explain Gauss's law for magnetic field
 - e) Explain space wave propagation
- Q2 a) Design rectangular microstrip patch with dimension W and L, over a single substrate FR4 whose center frequency is 2.45Ghz. The height of substrate is 1.6 mm. Determine the physical dimensions W and L of the patch, taking into account fringing field. (10)**
b) State and explain Principle of pattern multiplication also explain array factor (10)
- Q3 a) Derive radiation resistance of infinitesimal dipole (10)**
b) Derive an expression for array of two isotropic sources with same amplitude and in phase. (10)
- Q4 a) For an array of four isotropic sources along z-axis separated by a distance of $\lambda/2$ and a progressive phase shift $\alpha = 0$, Find Null directions, directions of maxima, HPBW, FNBW. (10)**
b) State and derive FRII's transmission equation (10)
- Q5 a) Derive an expression for MUF in terms of skip distances and virtual heights. (10)**
b) What is reactive near field and explain its importance in communication and its applications (10)
- Q6 a) Derive boundary conditions for electric field (10)**
b) Explain H-plane sectoral horn antenna and describe various configuration of horn antenna (10)