

Time: 3 Hours

N.B: 1. Each question carries 20 marks

2: Question no 1 is compulsory

3: Attempt any three out of remaining

4: Assume suitable data wherever required

[20]

Q.1 Attempt any 4 questions:

- (a) Explain the significance of Gauss Law for magnetic field.
- (b) State Poynting theorem and explain the significance of Poynting vector.
- (c) Derive Laplace's and Poisson's equations.
- (d) Discuss the relationship between Gain and Directivity of an Antenna.
- (e) Describe Duct Propagation with suitable diagram.

Q.2 (A) Derive the Helmholtz wave equations for free space in terms of electric and magnetic fields. [10]

- (B) Design a rectangular microstrip patch with dimensions W and L, over a single substrate whose center frequency is 2.4 GHz. The dielectric constant of the substrate is 4.4 and the height of the substrate is 1.6 mm. Determine the physical dimensions W and L of the patch considering fringing field. [10]

Q.3 (A) Derive the Maxwells equations in integral and point form for time varying fields. Explain the significance of each equation. [10]

- (B) Compare Broadside and End-fire Array. [10]

Q.4 (A) Derive the expression for FRII's transmission formula and also state its significance. [10]

- (B) Determine Magnetic field intensity due to a finite straight conductor using Biot-Savart law. [10]

Q.5 (A) Explain sky wave propagation. How does it differ from ground wave Propagation. [10]

- (B) Derive an expression for array of two isotropic sources with same amplitude and in phase. [10]

Q.6 Write a Short Note on: (Attempt any two). [20]

- (A) Log Periodic Antenna.
- (B) Near field, Inductive field, Radiation field of an Antenna.
- (C) Radiation Resistance of an Infinitesimal dipole and its significance.
- (D) Parabolic Reflector and its feeding mechanisms.

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