1. a) Explain significance of directivity and radiation pattern of antenna. 5

b) Explain in brief basic characteristics of microstrip antenna and its applications. 5

c) Describe the concept of near field and far field radiation. 5

d) Explain in brief pattern multiplication for antenna arrays. 5

2 a) state and derive FRIIS transmission equation. 10

b) What is folded dipole antenna? Explain its operation, equation and properties. 10

3 a) Explain and derive equations for total electric field , directivity , half power beam width in case of two isotropic point sources of same amplitude but opposite phase. 10

b) Differentiate between broadside and end fire array. 5

c) Calculate the directivity and gain of a given linear broadside uniform array of 5 isotropic elements with a separation of quarter wavelength between the elements. 5

4. a) what are the physical and electrical requirements of loop antenna. 8

b) Differentiate between resonant and non resonant long wire antenna. 4

c) Explain the working of helical antenna. Give its applications. 8

5. a) Design a long periodic antenna if the scale factor is 1.2. The antenna has to operate in the frequency range of 80 MHz to 120 MHz. 6

b) Explain different feeding mechanism of parabolic reflector. 8

c) a 64 meter diameter parabolic reflector is fed by a non directional antenna at 1430 MHz calculate beam width between half power points and between nulls. 6

6. a) Explain rectangular patch microstrip antenna along with its characteristics and applications 8

b) Explain the dual equations for electric and magnetic current sources 6

c) Describe Maxwell's equations in free space on integral form. 6

7. a) classify different types of wave propagation and explain ground wave propagation. 10

b) Explain in brief the measurements of following antenna parameters

i) Directivity. ii) Polarization. 10

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