

1079
B. Engg. (Electronics & Comm. Engg.)-5th Semester
EC-503: Antennas & Wave Propagation

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Q. No. 1 (Section-A) which is compulsory and selecting atleast two questions each from Section-B & C.
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Section-A(All questions are compulsory)		
1	i. Compare bandwidth and beam-width of antenna. ii. Define FBR. What is significance of FBR of an antenna? iii. State multiplication of pattern. iv. What is top loading and tuning? v. Discuss mechanism of radio wave bending by ionosphere.	10
Section-B(Attempt any two questions)		
2	a) Compare near field and far field of a small current element. Find the distance at which both fields are equal. b) Discuss the effect of earth on radiation pattern. Derive an expression for the gain of a half wavelength antenna.	6 4
3	a) Define polarization of wave. Give the mathematical expression for linear, circular and elliptical polarization. b) A transmitting antenna has an effective height $2/\pi$ times the physical length. This carries a current of 1500 Amperes at the base and operates at a frequency of 15 KHz. If the physical length of the antenna is 150 meters and antenna efficiency is 15%. Calculate (a) electric field intensity at 300 km (b) Radiation resistance (c) Power radiated (d) Power input in the antenna (e) voltage induced in the receiving antenna of 100 meters effective height at a distance of 350 km.	5 5
4	a) Why impedance matching is required? Discuss various feed networks and impedance matching techniques of antenna. b) Explain in detail the folded dipole antenna. Derive an expression for input impedance of folded dipole antenna.	5 5
Section-C(Attempt any two questions)		
5	a) Describe the principle of operation of rhombic antenna; explain how the various parameters of the antenna control the radiation pattern. b) Determine the change in the electron density of E-layer when the critical frequency changes from 6 MHz to 2 MHz between mid day and sun set.	5 5
6	a) What is the concept of a frequency independent antenna? Explain log periodic antenna as a frequency independent antenna. b) Calculate the transmission path distance for an ionospheric transmission that utilizes a layer of height 150 km. The angle of elevation of the antenna beam is 35 degree. The earth's radius can be assumed to be 6370 km	5 5
7	a) Derive an expression for virtual height for the flat and curved surface. b) Write a short note on receiving and whip antennas.	5 5