

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

CLASS: BE
BRANCH: ECE

SEMESTER: VII/ADD
SESSION : MO/2018

SUBJECT : EC7203 ANTENNAS& WAVE PROPAGATION FOR WIRELESS COMM

TIME: 1.5 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 30.
2. Candidates may attempt for all 30 marks.
3. In those cases where the marks obtained exceed 25 marks, the excess will be ignored.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. The missing data, if any, may be assumed suitably.

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- Q1 (a) A radio link has a 15w transmitter connected to an antenna of 2.5m^2 effective aperture area at 5GHZ. The receiving antenna has a effective aperture of 0.5m^2 and it is located at a 15km line of sight distance ,from transmitting antenna. Assuming lossless, matched antennas, find basic loss and the power delivered to the receiver. [2]
- (b) Write down the EM field components of current element used for radiated power and derive the expression for radiation resistance of short monopole. [3]
- Q2 (a) Mention one of the most important applications of reciprocity theorem in antenna. Find the current obtained by at the 1st antenna when the emf applied to terminals of 2nd antenna is $250\mu\text{v}$ and impedance between the 1st and 2nd antenna is 300ohm. [2]
- (b) Write down the expression for directive gain of antenna. Find out the value of directive gain for half wave dipole. [3]
- Q3 (a) Derive the expression for beam width of broadside array. [2]
- (b) If a array of isotropic radiators is operated at a frequency of 5GHZ and is required to produce a broadside beam. Find Null to Null beam width and directivity if the array length is 10m. [3]
- Q4 (a) What do you mean by pattern multiplication. Using pattern multiplication Draw the radiation pattern for four isotropic element spacing $\lambda/2$. (Mention all the steps required) [2]
- (b) Draw the diagram of Tschebysceff polynomials for m vs x. If a= 9 represents the side lobe ratio of four element Dolph-Tchebyscheff array. Find the degree of polynomial and value of x_0 . What is the signficance of x_0 ? [3]
- Q5 (a) Draw the diagram of Yagi Uda antenna. What is the requirement to achieve the highest gain and circular polarization in Yagi Uda antenna? [2]
- (b) Derive the expression for Radiation resistance of a folded dipole with three arms. What are the factors on which impedance of folded dipole depends? [3]
- Q6 (a) What is the basic difference between axial and normal mode in helix antenna? [2]
- (b) If a helical antenna, spacing 0.05 m dia 0.1m number of turns 20, operates at1000MHZ, Find null to Null beam width of the main beam, half power beam width and directivity. [3]

:::11/09/2018 :::M