Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

FOURTH SEMESTER B.TECH. (E & C) DEGREE END SEMESTER EXAMINATION JUNE 2019 SUBJECT: ANTENNAS (ECE - 2201)

TIME: 3 HOURS

MAX. MARKS: 50

- Instructions to candidatesAnswer ALL questions.
 - Missing data may be suitably assumed.
- 1A. With relevant equations explain (a) Radiation Power density (b) Radiation intensity(c) Radiation efficiency (d) Directivity (exact and approximate)
- 1B. The effective antenna temperature of an antenna looking towards zenith is approximately 5K. Assuming that the temperature of the transmission line (waveguide) is 72°F, find the effective temperature at the receiver terminals when the attenuation of the transmission line is 4dB/100ft and its length is (a) 2ft. (b) 100ft.

(6+4)

(7+3)

- 2A. Starting from fundaments derive the expressions/values for radiation resistance and directivity for a small circular loop of constant current.
- 2B. State and prove Lorentz Reciprocity theorem for far fields.
- 3A. Starting from far field equations derive the Values of Directivity and radiation resistance of a half wave dipole.
- 3B. For a horizontal infinitesimal electric dipole placed at a height 'h' above a perfectly reflecting conductor derive the expression for far field Electric field in terms of spherical coordinate system.
- 3C. A linear infinitesimal dipole of length l and constant current is placed vertically a distance h above an infinite electric ground plane. Find the first five smallest heights (in ascending order) so that a null is formed (for each height) in the far- field pattern at an angle of 60° from the vertical.

(4+3+3)

- 4A. Starting from fundamentals derive the expression for array factor, First Null beam width & Half power beam width for a *N* element broadside array of isotopic point sources, with uniform amplitude and spacing.
- 4B. Derive the expression for array factor of a 5 element binomial array. Also obtain the value of the excitation coefficients.

(7+3)

- 5A. Derive the equation relating to radiation in a single wire and clearly state (a) when there will be radiation and (b) when there will be no radiation
- 5B. Write explanatory notes on (a) Yagi-Uda antenna (b) Microstrip antennas
- 5C. Briefly explain space wave propagation.

(3+4+3)