Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

FOURTH SEMESTER B.Tech. (E & C) DEGREE END SEMESTER EXAMINATION
APRIL/MAY 2018
SUBJECT: ANTENNAS (ECE - 2201)

TIME: 3 HOURS **MAX. MARKS: 50**

Instructions to candidates

- Answer **ALL** questions.
- Missing data may be suitably assumed.

1A. Starting from fundamentals derives the expressions for FNBW, HPBW and FSLBW for an N element, end fire array of isotropic point sources with uniform amplitude and spacing.

1B. Explain atmospheric effects in space wave propagation and Duct propagation

1C. Find the radiation resistance of a single turn and 8 turns small circular loop of radius 0.2λ operating at 150MHz with a ferrite core having relative effective permeability of 640.

(5+3+2)

2A. Derive the radiation resistance of an infinitesimal dipole antenna.

2B. State and explain the following terms related to the antenna
(i) Antennas efficiency (ii) Beam efficiency (iii) Solid angle.

2C. Draw the current distribution for a λ/2 dipole for different instant of time.

(5+3+2)

3A. Derive an expression for vector potential wave equation for an electric current source and obtain the solution for the same.

3B. Derive an expression for the maximum effective aperture of an antenna in terms of its maximum directivity.

3C. Explain the Antennas field region with mathematical expressions.

(5+3+2)

4A. Derive the expression for the **E, H** and radiation resistance in the far field for small circular antenna of small radius

4B. State and prove Reciprocity theorem for far field.

4C. State Huygen's & Babinet's Principal.

(5+3+2)

5A. The normalized radiation intensity of an antenna is given by

$U = \sin\theta \sin^2\phi, 0 \le \theta \le \pi, 0 \le \phi \le \pi$

Find the directivities in dB by using all the methods.

5B. A vertical infinitesimal linear dipole is placed at a distance h=3λ/2 above an infinite perfectly conducting flat ground plane. Determine the angles (in degrees from vertical) where the null occurs.

5C. Explain BALUNS.

(5+3+2)