Code No. 159/0

FACULTY OF ENGINEERING

BE 3/4 (ECE) II- Semester (Old) Examination, December, 2017

Subject: Antennas and Wave propagation

Time: 3 hours **Max. Marks: 75**

Note : Answer all questions from Part-A and any five questions from Part-B.

PART – A (25 MARKS)

1	Define the terms a) MUF b) Critical angle and c) Critical frequency of an antenna	3
2	Define pattern multiplication for antenna arrays	2
3	Explain the broad-side and end-fire arrays	3
4	What are gain and directivity of an antenna?	2
5	State the advantages and disadvantages of lens antennas	3
6	If the critical frequency of an ionized layer is 1.5 MHz, then find the electron Density of the layer	2
7	What are the advantages of cassegrain feed for a parabolic reflector?	3
8	Distinguish between the normal and axial modes of a helical antenna	3
9	Define retarded potential	2
10	Calculate the voltage (in milli-volts) induced by a plane wave of field strength $0.01 \frac{v}{m}$ and frequency 1 MHz in a vertical antenna 8 meters high	2

PART – B (50 MARKS)

11 a)	Define the terms (i) radiation intensity and (ii) radiation resistance of an antenna	4
b)	What is effective length of an antenna? How to calculate its value for transmitting and receiving antennas?	6
12 a)	What are near and far fields of a radiating element?	5
b)	Determine the electric field strength at a distance of 10 km from an antenna having a directive gain of 5 dB and radiating a total power of 20 KW.	5
13	What is the principle of radiation? Deduce an expression for radiation resistance of a half-wave dipole.	10
14 a)	What are basic types of arrays? Explain.	5
b)	Derive an expression for normalized field strength magnitude of a uniform linear array.	5
15	Define a point source. Derive and sketch the normalized E-field pattern of uniform Two-element array consisting of two isotropic sources of equal amplitude and phase.	10
16 a)	Briefly explain how gain measurement is carried out for an antenna.	4
b)	Discuss the construction and working of horn antennas.	6
17 a)	Explain the three modes of wave propagation and briefly discuss about ionospheric abnormalities.	5
b)	At what frequency, a wave must propagate for the D-region to have a refractive index of 0.5. Take electron density equal to 400 for the given region.	5

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