# FACULTY OF ENGINEERING

## B.E. 3/4 (ECE) II - Semester (New) (Main) Examination, April / May 2013

# 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.	Distinguish between far field and near field of an antenna.	(2)
2. 3. 4. 5. 6. 7. 8. 9. 10.	An antenna has a field pattern given by $E(\theta) = \cos^2 \theta$ for $0^\circ \le \theta \le 90^\circ$ . Find the directivity. Define antenna beam efficiency. What is an end fire array? Write the excitation coefficients for a 5 element binomial array. Define MUF. Describe the wide band characteristics of helical antenna. What is skip distance? What is atmospheric duct? In ionospheric propagation critical frequency is 8 MHz with 100 km virtual height for a particular layer and the skip distance is 200 km. Calculate the angle of incidence.	<ul> <li>(3)</li> <li>(2)</li> <li>(3)</li> <li>(2)</li> <li>(3)</li> <li>(2)</li> <li>(3)</li> <li>(2)</li> <li>(3)</li> <li>(3)</li> </ul>
PART – B (5x10 = 50 Marks)		
11.(a) (b)	Derive an expression for electric and magnetic components of a Hertizian dipole. Determine the directivity of source with sine square power pattern. Given U = U <sub>M</sub> Sin <sup>2</sup> $\theta$ ; $0 \le \phi \le 2\pi$ , $0^{\circ} \le \theta \le \pi$ .	(6) (4)
12.(a) (b)	Derive an expression for radiated electric field of a n-element array with uniform excitation (magnitude and phase) and inter-element spacing $\lambda/2$ . Consider an array of two identical infinitesimal dipole separated by a distance $\lambda/4$ with same magnitude excitation but a phase excitation difference $\beta$ between the elements. Find the nulls of the total field for $\beta=0$ ; $\beta=\pi/2$ .	(4) (6)
13.	What is pattern multiplication using this concept obtain the pattern of binomial array of 8 point sources?	(10)
14.(a) (b)	With a neat sketch explain about Yagi-uda antenna. Explain the working principle of parabolic reflector antenna.	(6) (4)
15.	Briefly discuss about the formation of ionosphere and describe now the radio waves can be propagated using ionosphere. Derive the expression for the relative refractive index of the ionosphere.	(10)
16.(a) (b)	Explain the working principle of microstrip antenna and also give its advantages and disadvantages. Explain the principle of a metal plate lens antenna.	(6) (4)
17.	<ul> <li>Write short notes on:</li> <li>a) Turnstile antenna</li> <li>b) Space and surface wave</li> <li>c) Horn antenna</li> </ul>	(3) (4) (3)
****		