

THAPAR INSTITUTE OF ENGINEERING & TECHNOLOGY, PATIALA  
Electronics and Communication Engineering Department  
End Semester Examination BE (ECE) Final Year

Max Marks: 72

Time allowed: 3 Hrs.

Examiner: Ankush Kansal

EC- 008 (Antenna & Wave Propagation)

- Note: 1. Attempt five questions in all. Question number 6 is Compulsory.  
 2. Assume suitable data if required.  
 3. All notations/characters carry their usual meanings.  
 4. All the parts of one question must be done at one place.  
 5. Over attempted questions will not be evaluated.  
 6. You can check your evaluated answer sheets on 18<sup>th</sup> Dec, 2006, in my office as per schedule displayed on notice board.

Q.1) a.	Find the Divergence of the vector function $A = x^2 a_x + (xy)^2 a_y + 24x^2 y^2 z^3 a_z$	(5)
b.	Prove $\nabla \cdot (\nabla \times A) = 0$	(5)
c.	Derive the expression for Strok's Theorem	(5)
Q.2) a.	Calculate the Effective length of a $\lambda/2$ antenna with $R_r = 75\Omega$ , $(A_e)_{max} = 0.15 \lambda^2$ and $\eta = 120 \Omega$	(5)
b.	An antenna has Radiation resistance of $72\Omega$ , a loss resistance of $8 \Omega$ and a power gain of 10. Calculate Antenna efficiency and Directive gain in db.	(5)
c.	Derive the Friis Formula of transmission.	(5)
Q.3) a.	Draw & explain the radiation pattern of loop antenna.	(5)
b.	Explain the working of Yagi uda antenna. Also draw its radiation pattern.	(5)
c.	What is Dolph-Chebyshev distribution for linear broadside arrays? Why it is used?	(5)
Q.4) a.	What are Horn antennas? Explain its working?	(5)
b.	Explain Principal & working of Lens antenna. Also give its various types.	(5)
c.	How beam is formed in Parabolic reflector antenna?	(5)
Q.5) a.	Communication is to be established between two stations 1500 km apart. Calculate the max frequency for communication using the ionosphere as reflector if the height is 250 km and critical frequency is 12 MHz.	(5)
b.	A pulse of a given frequency transmitted upward is received back after a period of 5 milliseconds. Find the Virtual height of the reflecting layer.	(5)
c.	Explain Virtual height, Skip distance and MUF.	(5)
Q.6) a.	What are various forms of antenna array? Explain.	(6)
b.	Write in detail all modes of Propagation.	(6)