2005-PUNJAB UNIVERSITY

B.TECH IV SEMESTER DEGREE EXAMINATION

ELECTROMAGNETIC FIELD THEORY

(ELECTRONICS AND COMMUNICATION ENGINEERING)

TIME-3HOUR
MARKS-100

PART A[10*2=20 MARKS]

1. What is permeability?

2. What is attenuation constant?

3. What is EM wave?

4. What do you understand by waveguide?

5. State the significance of Maxwell's equations.

6. State the significance of permittivity.

7. What is transmission line?

8. State the importance of impedance matching in transmission lines.

9. Explain briefly the magnetic flux density, B.

PART B[10*8=80 MARKS]

2. Write and state different forms of Maxwell's equations.

3. What do you understand by the terms phase velocity and group velocity as applicable to Plane Electromagnetic Waves?

4. A transmission line of length 5 m is tested at a frequency of 20 MHz. When the far end of the line is short circuited, the impedance measured at the sending end is 4.61 ohms resistive and when the far end is open circuited, the impedance becomes 1390 ohms resistive. Calculate the characteristics impedance of the line, attenuation constant in dm/m, the velocity of propagation and permittivity of the dielectric.

5. What do you understand by the term wave guide, guided wave, transmission line, wave impedance and characteristic impedance?

6. Show that the electric and magnetic energy densities in a plane traveling wave are equal.

7. What are waveguides? What is the fundamental difference propagation in waveguides and propagation in transmission lines of free space? Compare the practical advantages and disadvantages of circular waveguide with those of rectangular waveguides.

8. (a) Starting with Faraday's law, derive Maxwell's equations in integral form based on this law.

(b) A plane Travelling wave in free space has an average Poynthing vector of 1 W/m2. Find the average energy density.

9. (a) What are the losses in transmission lines? Explain the circuit representation of the parallel plane transmission line with loss.

(b) Calculate the velocity of electromagnetic wave in a medium whose dielectric constant