No. of Printed Pages : 3 **BIEL-006**

B.Tech. IN ELECTRONICS AND COMMUNICATION ENGINEERING (BTECVI)

00752

Term-End Examination

December, 2011

BIEL-006 : ELECTROMAGNETIC FIELD THEORY

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt **any five** questions. All questions carry **equal** marks.*

1. (a) Explain dot product and cross product. 7

Give a vector $A = 2\hat{a}x + \hat{a}y - \hat{a}z$ and $\vec{B} = 6\hat{a}x - 3\hat{a}y + 2\hat{a}z$. Find $\vec{A} \times \vec{B}$ and the unit vector perpendicular to both $\vec{A}$ and $\vec{B}$.

(b) State and explain Gauss's law of electromagnetics in integral form. 7

2. (a) Explain the concept of electric field and derive expression for electric field due to line charge. 7

(b) State and explain Biot-Savart's law. Derive expression for $\vec{B}$, due to current I carrying infinite length conductor. 7

3. (a) Derive reflection and refraction coefficient of plane wave at boundaries for normal incidence. 7

(b) Briefly explain all four Maxwell equations. 7

4. (a) State and prove poynting theorem. A plane wave propagating in free space with a peak electric field of intensity 750 mV/m. Find the average power through the square area of 120 cm on a side perpendicular to the direction of propagation. 7

(b) Derive Transmission line equation for voltage and current. 7

5. (a) An open circular wire transmission line has 7

$R = 5\ \Omega/m, L = 5.2 \times 10^{-8}$ H/m

$G = 6.2 \times 10^{-3}$ mho/m, $C = 2.13 \times 10^{-13}$ F/m

frequency is 4 GHz. Find Z_0, γ and Vp.

(b) Discuss the input impedance of open circuit and short - circuit line. Explain principle of impedance matching. 7

6. (a) Define wave impedance. Derive an expression for wave impedance in case of TE and TM waves. 7

(b) What do you mean by guided wave ? Explain TEM, TE and TM waves. 7

7. Write short note on following *(any two)* : **7x2=14**

(a) Divergence and curl of vector field

(b) Ampere's circuital law and its application

(c) Smith chart

(d) Attenuation in parallel plane guides.