YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD

BTech IV SEMESTER

Electromagnetic Field Theory (EC212C)

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

Instructions:
1. *It is compulsory to answer all the questions (1.5 marks each) of Part -A in short.*
2. *Answer any four questions from Part -B in detail.*
3. *Different sub-parts of a question are to be attempted adjacent to each other.*
4. .....

PART -A

Q1 (a) Find the gradient of Φ=coshxyz. (1.5)

(b) What is polarization of plane waves? (1.5)

(c) Develop the concept of vector magnetic potential. (1.5)

(d) Write Gauss's law for electric and magnetic fields. (1.5)

(e) What are primary and secondary constants in a transmission line? (1.5)

(f) Define and give the expression for skin depth. (1.5)

(g) Find the characteristic impedance of the line at 1600 Hz if the following measurements have been made Z_{oc}=750 Ω and Z_{sc}= 600 Ω. (1.5)

(h) Differentiate between group velocity and phase velocity. (1.5)

(i) Define VSWR and reflection coefficient. (1.5)

(j) Differentiate between displacement and conduction current. (1.5)

PART -B

Q2 (a) Derive the expressions for attenuation constant, phase constant, velocity of propagation and intrinsic impedance for propagation of wave through a good conductor. Find the velocity of plane wave in a lossless medium having ϵ_r=4 and μ_r=1. (10)

(b) Derive the wave equations for a conducting medium. (05)

Q3 (a) Verify Stoke's Theorem for $F=(x^2+y^2)i-2xyj$ taken around the rectangle bounded by the line x= -a to a, y=0 to b. (7)

(b) Derive Gauss's law in point differential form and hence derive Laplace and Poissons's Equations. (8)

Q4 (a) Derive the expressions for reflection coefficient and transmission coefficient when a plane wave is incident normally at the surface of a perfect dielectric. (08)

(b) Prove that the product of electric and magnetic field intensities at any point is a measure of the rate of energy flow per unit area at that point. (07)

Q5 (a) What are standing waves? Draw the standing wave patterns for open and short circuited transmission lines (8)

(b) A dissipation less transmission line whose characteristic impedance is 200 (7)