Veermata Jijabai Technological Institute

ESE B. Tech Third Year (Semester V)

181090071   02/12/2020

This is the subjective part of your examination. Write the answers on a paper, then scan and upload it in the appropriate classroom. All questions are compulsory.

R4ET3001S - Electromagnetic Wave Engg.

Section 1: 10 marks per question   **10**

1. Region 1, described by $2x + 3.5y \geq 10$, is free space whereas region 2, described by $2x + 3.5y \leq 10$, is a magnetic material for which $\mu = 10\mu_o$. Assuming that the boundary between the material and free space is current free find B2 if B1 = $0.3a_x + 0.2a_y + 0.1a_z$ Wb/m2

Section 2: 10 marks per question   **10**

1. A plane wave in free space ($z \leq 0$) is incident normally on a large block of material with $\varepsilon_r = 11$, $\mu_r = 5$, $\sigma = 0$ which occupies $z \geq 0$. If the incident electric field is $E = 15 \cos(\omega t - z) a_y$ V/m find: (a) ω, (b) the standing wave ratio, (c) the reflected magnetic field, (d) the average power density of the transmitted wave.

Section 3: 10 marks per question   **10**

1. A distortionless line operating at 150 MHz has R = 15 Ω/m, L = 0.5 μH/m, and C = 23 pF/m. (a) Determine γ, μ, and Zo. (b) How far will a voltage wave travel before it is reduced to 30% of its initial magnitude? (c) How far will it travel to suffer a 45° phase shift?

Section 4: 10 marks per question   **10**

1. Explain TM and TE modes with two examples each

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