B B7034

CareerYuga.com **Total Pages: 1**

Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EC303

Course Name: APPLIED ELECTROMAGNETIC THEORY (EC)

Max. Marks: **100** Duration: 3 Hours

Smith Chart to be supplied on request.

PART A

Answer any two full questions, each carries 15 marks.

1 a) Derive the expressions for Energy stored in Electric Field. (8)

b) Eight identical charges,Q each are placed on the corners of a cube of side 'a'. Find the resultant force on a charge. (7)

2 a) Derive Maxwell's first and second equations from fundamental laws. (8)

b) Starting from Maxwell equation, derive the wave equation for a conducting medium. (7)

3 a) Determine the inductance of a Two- wire transmission line. (5)

b) A Parallel plate capacitor with plate area of $5cm^2$ and a plate separation of 3mm has a voltage $50\sin 10^3 t$ Volt applied to its plates.Calculate the displacement current assuming $\varepsilon = 2\varepsilon_0$. (4)

c) Derive the boundary conditions for electric field at the interface of two dielectrics. (6)

PART B

Answer any two full questions, each carries 15 marks.

4 a) State Poynting theorem. Derive the equation of complex vector. (8)

b) A lossless 50-Ω transmission line is terminated in a load with $Z_L = (50+ j25)\ \Omega$. Calculate (i) The reflection coefficient Γ. (ii) The standing-wave ratio. (7)

5 a) Derive the input impedance of a transmission line. For a shorted section of 75 ohm transmission line, $l = \lambda/4$, Find the input impedance assuming $\alpha = 0$. (7)

b) Differentiate circular and elliptical polarization. (8)

6 a) Derive standard Transmission line equations. (6)

b) Derive Brewster angle.A parallel-polarized plane wave is incident from air onto a dielectric medium with $\varepsilon r = 9$ at the Brewster angle. What is the refraction angle? (9)

PART C

Answer any two full questions, each carries20 marks.

7 a) A lossless transmission line with $Z_0=50\Omega$ is 30m long and operates at 2MHz. The line is terminated with a load $Z_L=60+j40\Omega$. If u=0.6c on the line, find i)Reflection coefficient ii) Standing wave ratio iii) Input impedance (15)

b) Discuss the attenuation of waveguides. (5)

8 a) Explain single stub matching in detail using analytical method. (12)

b) Explain Group velocity and Phase velocity. When a wave of 6GHz propagates in parallel conducting plates separated by 3cm, find the V_P and $V_g$of the wave for dominant wave. (8)

9 a) Explain waveguides and its different modes of wave propagation. (10)

b) Explain Half Wave and Quarter Wave Transmission lines. Given that $Z_L=30+j40\Omega$, $Z_0=50\Omega$. Find the shortest length ('*l*') and point where stub has to be placed for a matching. (Use Smith chart) (10)

****