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Question Paper Code : 11335

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2012.

Fifth Semester

Electronics and Communication Engineering

EC 2305/EC 55 — TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2008)

(Common to PTEC 2305 — Transmission Lines and Waveguides for B.E. (Part-Time) Fourth Semester Electronics and Communication Engineering – Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define propagation constant.

2. State the significance of crystal filters in communication system.

3. A $50\,\Omega$ coaxial cable feeds a $75+j20\Omega$ dipole antenna. Find reflection coefficient and standing wave ratio.

4. At a frequency of $80\,MHz$, a lossless transmission line has a characteristic impendence of $300\,\Omega$ and a wavelength of 2.5 m. Find L and C.

5. Write the expression for VSWR in terms of
   (a) the reflection coefficient
   (b) VSWR in terms of z_L and z_O.

6. Mention the significance of $\frac{\lambda}{4}$ line.

7. Compare TE and TM mode.

8. What is the need for Attenuator?

9. What is the dominant TE and TM mode in rectangular waveguide?

10. How to design an air filled cubical cavity to have its dominant resonant frequency at 3 GHz?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain the properties and characteristic impedance of symmetrical networks. (6)

    (ii) Design T and π section low pass filter which has series inductance 80 mHz and shunt capacitance $0.022\,\mu f$. Find the cutoff frequency and design impedance. (10)

Or

(b) What are the advantages of m derived filter? Design an m derived low pass filter (T and π section) having design resistance $R_0 = 500\,\Omega$, cutoff frequency $f_c = 1500\,Hz$ and infinite attenuation frequency $f_\infty = 2000\,HZ$. (16)

12. (a) Explain the condition for distortionless line. Characteristic impedance of a transmission line at 8 MHz is (40-2j) ohm and the propagation constant is (0.01+j 0.18) per meter. Find the primary constants. (16)

Or

(b) Discuss following :
   (i) Reflection on a line not terminated in Z_0. (8)
   (ii) Open and short circuited lines. (8)

13. (a) A 30 m long lossless transmission line with $Z_0 = 50\,\Omega$ operating at 2 MHz is terminated with a load $Z_L = 60 + 40\,j\,\Omega$. If $U = 0.6C$ on the line, find
   (i) Reflection coefficient (5)
   (ii) Standing wave ratio (5)
   (iii) Input impedance. (6)

Or

(b) Discuss the following :
   (i) Impedance matching. (8)
   (ii) Single and double stub matching. (8)

14. (a) Explain the concept of transmission of TM waves and TEM waves between parallel plates. (16)

Or

(b) (i) Derive the relation among phase velocity, group velocity and freespace velocity. (8)

(ii) Design a T and π type attenuators to give attenuation of 20 dB and to work in a line of 600 Ω. (8)

15. (a) Derive the field expression for TM wave propagation in rectangular waveguide stating the necessary assumptions. (16)

Or

(b) (i) Explain the concept of excitation of waveguides. (8)

(ii) Discuss the structure, advantages and disadvantages of resonant cavities. (8)
