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Question Paper Code : 30950

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Fifth Semester

Electronics and Communication Engineering

EC 2305 — TRANSMISSION LINES AND WAVE GUIDES

(Regulation 2008)

(Common to PTEC 2305 – Transmission Lines and Wave Guides for. B.E. (Part-Time) Fourth Semester – ECE – Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. For a symmetrical network, define propagation constant and characteristic impedance.

2. A constant-K T Section high pass filter has a cut off frequency of 10 KHz. The design impedance is 600 Ω. Determine the value of L.

3. What is characteristic impedance?

4. Distinguish between single stub and double stub matching in a transmission line.

5. Write the expression for the input impedance of open and short circuited dissipation less line.

6. Write the expression for standing wave ratio in terms of reflection co-efficient.

7. What is dominant mode?

8. Define the terms :

   (a) Phase velocity,

   (b) Group velocity.

9. Write the expression for Phase velocity for a rectangular waveguide.

10. Enumerate the parameters describing the performance of a cavity resonator.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Derive the design equations of a constant K low pass filter. (8)

(ii) A $\prod$ section filter network consists of a series arm inductance of 20 mH and two shunt capacitor of 0.16 μF each. Calculate the cut off frequency, attenuation and phase shift at 15KHz. What is the value of nominal impedance in the pass band? (8)

Or

(b) Design a m-derived T type lowpass filter connected to a load of 500 Ω with cut off frequency 4KHz and peak attenuation at 4.15 KHz. (16)

12. (a) Derive the general transmission line equations for voltage and current at any point on a Line. (16)

Or

(b) (i) A 2 meter long transmission line with characteristic impedance of $(60 + j40)\Omega$ is operating at $\omega = 10^6$ rad/sec has attenuation constant of 0.921 Np/m and phase shift constant of 0 rad/m. If the line is terminated by a load of $(20 + j50)\Omega$. Determine the input impedance of this line. (8)

(ii) Derive the condition for minimum attenuation in a distortion-less line. (8)

13. (a) (i) Derive the line constants of a zero dissipation less line. (8)

(ii) Briefly explain on

(1) Standing wave (4)

(2) Reflection loss. (4)

Or

(b) (i) Find the sending end impedance of a line with negligible losses when characteristic impedance is 55 Ω and the load impedance is $(115 + j75)\Omega$ length of the line is 1.183 wavelength by using smith chart. (8)

(ii) Explain the significance of smith chart and its application. (8)

14. (a) Derive an expression for the transmission of TM waves between parallel perfectly conducting planes for the field components. (16)

Or

(b) For a frequency of 10 GHz and plane separation of 5 cm in air, find the cut off frequency, cut off wavelength, phase velocity and group velocity of the wave. (16)

15. (a) Derive the field component of a transverse electric wave in Rectangular wave guides. (16)

Or

(b) An air filled circular waveguide having an inner radius of 1 cm is excited in dominant mode at 10GHz. Find :

(i) The cut-off frequency of the dominant mode at 10 GHz.

(ii) The guide wavelength and

(iii) Wave impedance. Also find the bandwidth for operation in the dominant mode only. (16)
