Reg. No. : | | | | | | | | | | |

Question Paper Code: 31544

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2016

Fifth Semester

Electronics and Communication Engineering

01UEC504 - TRANSMISSION LINES AND WAVEGUIIDES

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. A constant-*k* T-section high pass filter has a cut-off frequency of 10 *kHz*. The design impedance is 600Ω. Determine the value of *L*.
2. What is the drawback of m-derived filter? How can it be overcome?
3. State the important properties of the infinite line.
4. List any two advantages of lumped loading.
5. What are the drawbacks of single stub matching? How it is overcome by double stub matching?
6. Write the relationship between standing wave ratio and reflection coefficient.
7. Write Maxwell's equations.
8. Define the terms phase velocity and group velocity.
9. A rectangular waveguide with dimensions a=8.5cm and b=4.3cm. Determine the cut-off frequency for TM_{10} mode of propagation.
10. List the applications of cavity resonator.

PART - B (5 x 16 = 80 Marks)

11. (a) Derive expressions for characteristics impedance and propagation constant of a symmetrical π network. (16)

Or

(b) (i) Derive relevant equations of m-derived low pass filter. (8)

(ii) Design an *m*-derived T section low pass filter having cut-off frequency of 1 *kHz*. Design impedance is 400Ω and the resonant frequency is 1100 *Hz*. (8)

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

Or

(b) (i) Explain in detail about the waveform distortion and also derive the condition for distortion less line. (10)

(ii) A telephone cable 64 *km* long has a resistance of 13Ω*/km* and a capacitance of 0.008 *μF/km*. Calculate the attenuation constant, velocity and wavelength of the line at 1000 *Hz*. (6)

13. (a) A open wire consist of two copper conductors each of radius 2 *mm* and distance of separation of 200 *mm* in free air. Calculate the following parameters per unit length of the line if frequency of signal transmitted is 40 *kHz.* Find Inductance *L*, Capacitance *C*, DC resistance per length and AC resistance per length. Assume for copper $\sigma = 5.75 \times 10^7$ *℧/m*. (16)

Or

(b) (i) Derive the expression for the input impedance of a dissipation line. (8)

(ii) A transmission line has a characteristics impedance of 300 Ω and terminated in a load Z_L=150 + j150 Ω .Find the following using smith chart. (a) VSWR (b) Reflection coefficient (c) Input impedance at distance 0.1λ from the load (d) Input admittance from 0.1 λ from load. (8)

14. (a) Discuss the transmission of TM waves between parallel perfect conducting planes with necessary expressions for the field components. (16)

Or

(b) Explain wave impedance and obtain the expression of wave impedance for TE, TM and TEM waves guided along parallel planes. (16)

15. (a) A rectangular air-filled waveguide with dimension 0.9 *inch* x 0.4 inch cross section and 12 *inch* length is operated at 9.2 *GHz* with a dominant mode. Find cut-off frequency, guide wave-length, phase velocity, characteristics impedance and the loss. (16)

Or

(b) Explain the propagation of electromagnetic waves in a cylindrical waveguide with suitable expressions. (16)

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