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B.E / B.Tech (FT) END SEMESTER EXAMINATIONS – APRIL / MAY 2019

ELECTRONICS AND COMMUNICATION ENGINEERING

V Semester

EC8504 & Transmission Lines and Waveguides

(Regulation 2012)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. Define characteristic impedance and write the expression for characteristic impedance and phase constant.
2. What is an infinite line.
3. Derive the characteristic impedance for a quarter wave transmission line.
4. For a 50Ω transmission line with a load of 100+j200Ω. Find the reflection coefficient and standing wave ratio.
5. In a k type low pass filter give the condition for the transition from pass band to stop band frequencies.
6. Draw a symmetrical lattice attenuator and write the expression for the attenuation.500Ω.
7. Does a TEM wave exist in cylindrical waveguides .Justify the answer?
8. For a rectangular waveguide with dimension of a=3 cm and b=1.2 cm. Find the cut of wavelength for TE_{10} mode.
9. What are the disadvantages of circular waveguide?
10. Define Q of the cavity resonator.

Part – B (5 x 16 = 80 marks)

11. An transmission line with a normalized impedance of (0.5+j0.5)Ω is to be matched to a 50Ω loss less line with shorted stub. Determine the position and length of the stub using. (16)

12. a) (i) A transmission line of 0.165 in. diameter open wire is 100 miles long and terminated in Z_o has the following primary constants, G=0.14μmho,C=0.00996μf,R=4.11Ω,L=0.00311H and f=500cycles.find the characteristic impedance, attenuation constant, phase constant, propagation constant, velocity of propagation and wavelength. (10)
(ii) Give the physical significance of the transmission line equation. (6)

(OR)

b) (i) Consider the transmission line of infinitesimal length and derive the voltage and current equations at any point of time. (12)
(ii) Derive the condition for the distortion less line. (4)

13. a) (i) Explain the design procedure for the constant k high pass filter (8)
(ii) Find the values of circuit elements needed for a high pass T section filter with

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cut off of 5000 cycles, to work into a 1000Ω load. Draw the circuit diagram. (8)

(OR)

b) (i)Derive and analyze the symmetrical lattice type attenuator. (10)
(ii) If the ratio of input and output power is 6.76, calculate the attenuation in decibel, series arm and shunt arm impedance, if the load impedance is 400Ω(For an symmetrical T attenuator). (6)

14. a) Derive the field equations and excitation methods for TM waves in the rectangular waveguide. (16)

(OR)

b) Derive the expression for the following waveguide parameters and explain in detail. (i) cut of frequency,(ii) guided wavelength,(iii) attenuation constant,(iv) phase constant and (v) phase velocity. (16)

15. a) Derive the field equation for TE and TM waves in the cylindrical waveguides, and discuss the characteristics . (16)

(OR)

b) What is meant by cavity resonator? Derive the expression for the resonant frequency for the rectangular cavity resonator? (16)