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

Question Paper Code : 40963

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Fifth Semester
Electronics and Communication Engineering
EC 6503 – TRANSMISSION LINES AND WAVE GUIDES
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Use (smith chart is to be provided)

Answer ALL questions

PART – A **(10×2=20 Marks)**

1. What is meant by distortion less line ?
2. Define reflection loss.
3. What are assumption to simply the analysis of line performance at high frequencies ?
4. Write the expression for the input impedance of open and short circuited, dissipation less line.
5. What is an impedance matching in stub ?
6. What are the uses of smith chart ?
7. What are the major draw backs of a constant – k prototype filter ?
8. Define propagation constant in a symmetrical network.
9. What is dominant mode ?
10. What are the applications of cavity resonators ?

PART – B **(5×13=65 Marks)**

11. a) Derive the general transmission line equations for voltage and current at any point on a line. **(13)**

(OR)

b) A communication line has L = 3.67 mH/km, G = 0.08 × 10^{-6} ℧/km, C = 0.0083 μF/km and R = 10.4 Ω/km. Determine the characteristic impedance, phase constant, velocity of propagation, wavelength, sending end current and receiving end current forgiven frequency f = 1000 Hz, sending end voltage is 1 volt and transmission line length is 100 kilometers. **(13)**

12. a) i) Derive the line constants of a zero dissipation less line. **(6)**

ii) Describe an experimental setup for the determination of VSWR of an RF transmission. **(7)**

(OR)

b) i) Briefly explain on :

a) Standing wave. **(3)**

b) Reflection loss. **(3)**

ii) Discuss in detail about the variation of input impedance along open and short circuit lines with relevant graphs. **(7)**

13. a) i) Prove that input impedance of a quarter wave line is $Z_{in} = R_o^2/Z_R$. **(6)**

ii) Design a quarter wave transformer to match a load a 200 Ω to a source resistance of 500 Ω. Operating frequency is 200 MHz. **(7)**

(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) Ω length of the line is 1.183 wavelength by using smith chart. **(8)**

ii) Explain the significance of smith chart and its application in a transmission lines. **(5)**

14. a) i) Derive the design equations of a constant K low pass filter. **(7)**

ii) A ∏ 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 15 KHz. What is the value of nominal impedance in the pass band ? **(6)**

(OR)

b) Design m-derived T type lowpass filter connected to a load of 500 Ω with cut off frequency 4 KHz and peak attenuation at 4.15 KHz. **(13)**

15. a) Derive an expression for the transmission of TM waves between parallel perfectly conducting planes for the field components. **(13)**

(OR)

b) An air filled circular wavegide having an inner radius of 1 cm is excited in dominant mode at 10 GHz. Find (a) The cut-off frequency of the dominant mode at 10 GHz. (b) The guide wavelength and (c) Wave impedance. Also find the bandwidth for operation in the dominant mode only. **(13)**

PART – C **(1×15=15 Marks)**

16. a) With neat diagram, explain the single stub and double stub matching network. Also explain the design procedure. **(15)**

(OR)

b) i) Explain the wave behaviour in a guiding structures. **(10)**

ii) Explain why TEM waves does not exist in waveguides. **(5)**