EC6305 TRANSMISSION LINES & WAVE GUIDES question bank

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

UNIT I - TRANSMISSION LINE THEORY

PART – A

1. What is group velocity?
2. What is patch loading?
3. What do you understand by loading of transmission lines?
4. Define Characteristic impedance?
5. What is frequency distortion?
6. Calculate the load reflection coefficient of open and short circuited lines?
7. Calculate the characteristic impedance for the following line parameters

R = 10.4 ohms /km L = 0.00367 H/km

C = 0.00835μf /km G = 10.8×10^{-6} mhos /km

8. Define phase distortion?
9. Write the equation for the input impedance of a TL?
10. Define propagation constant?
11. Define wavelength?
12. Give the input impedance of a open and short circuit line?
13. Define reflection factor?
14. Define reflection loss?
15. What is meant by reflection co – efficient?
16. State the properties of infinite line?
17. Write the condition for a distortion less line?
18. When does reflection take place on a TL?
19. What is transfer impedance? State its expression?
20. What is difference between lumped and distributed parameters?
21. Draw the equivalent circuit of a TL?
22. Write the Campbell's formula for propagation constant of a loaded line?
23. What is the need for loading?

PART – B

1. Obtain the general solution of Transmission line? **(16)**
2. Explain about waveform distortion and distortion less line condition? **(16)**
3. Explain about reflection loss? **(16)**
4. Discuss in details about inductance loading of telephone cables and derive the ttenuation constant (_) and phase constant (_) and velocity of signal transmission (v) for the uniformly loaded cable? **(16)**
5. Derive the equation of attenuation constant and phase constant of TL in terms of R, L, C, G? **(16)**
6. Explain in details about the reflection on a line not terminated in its characteristic mpedance (z0)? **(16)**
7. Explain in following terms **(16)**

(i) Reflection factor (ii) Reflection loss

(iii) Return loss

8. Explain about physical significance of TL? **(16)**
9. Derive the equation for transfer impedance? **(16)**
10. Derive the expression for input impedance of lossless line? **(16)**
11. Explain about telephone cable? **(16)**

UNIT II – HIGH FREQUENCY TRANSMISSION LINES

PART – A

1. Name few applications of half – wave line?
2. Find the VSWR and reflection co – efficient of a perfectly matched line with no reflection from load?
3. Explain the use of quarter wave line for impedance matching?
4. What is the need for stub matching in transmission lines?
5. Why do standing waves exist on TL?
6. Define Node and antinodes?
7. What are constant S circles?
8. What are the advantages of double stub matching over single stub matching?
9. Derive the relationship between standing wave ratio and reflection co – efficient?

PART – B

1. Explain about half wave transformer? **(8)**
2. Application of smith chart? **(8)**
3. Explain about voltage and current waveform of dissipation less line? **(16)**
4. Derive the expression for the input impedance of the dissipation less line and the expression for the input impedance of a quarter wave line. Also discuss the application of quarter wave line? **(16)**

UNIT III IMPEDANCE MATCHING IN HIGH FREUENCY LINES

1. Write the expression for the characteristic impedance Ro' of the matching quarter –
2. wave section of the line?
3. Give the applications of smith chart?
4. Define standing wave ratio?
5. Give the analytical expression for input impedance of dissipation less line?
6. Design a quarter wave transformers to match a load of 200 _ to a source resistance
7. of 500 _. The operating frequency is 200 MHz?
8. Define skin effect?
9. What is zero dissipation line?
10. Mention the assumptions of radio frequency lines?
11. Distinguish between single stub matching and double stub matching?
12. Write down the expression to determine the length of the stub?
13. Write down the expression to determine the position of the stub?

PART – B

1 Explain single stub matching on a transmission line and derive the expression and The length of the stub used for matching on a line? **(16)**

2.Design a single stub match for a load of 150+j225 ohms for a 75 ohms line at 500 MHz using smith chart? **(16)**

3.A 30 m long lossless transmission line with characteristic impedance (zo) of 50 ohm Is terminated by a load impedance (ZL) = 60 + j40 ohm. The operating wavelength is 90 m. find the input impedance and SWR using smith chart? **(16)**

4.Explain double stub matching on a transmission line and derive the expression and the

length of the stub used for matching on a line? **(16)**
5.Explain about _ / 8 wave transformer? **(16)**
6.explain about properties of smith chart? **(16)**

UNIT IV- PASSIVE FILTERS

1.What is filters?
2.what is neper?
3.A constant-K T-section high pass filter has a cutoff frequency of 10 KHz. The design impedance is 600 ohms.
Determine the value of L.
4. What are the advantages of m-derived filters?
5.what is constant K filters?
6. Define skin effect?
7.What is zero dissipation line?
8.Mention the assumptions of radio frequency lines?
9.Define propagation constant?
10. Define wavelength?
11. Give the input impedance of a open and short circuit line?
12. Define reflection factor?
13. Define reflection loss?
14. What is meant by reflection co – efficient?
15. State the properties of infinite line?
16. Write the condition for a distortion less line?
17. When does reflection take place on a TL?
18. What is transfer impedance? State its expression?

PART B

1. Design a m-derived T-section low pass filter having a cutoff frequency (fc) of 5000 Hz and a design impedance of 600 ohms. The frequency of infinite attenuation is 1.25 fc
2. Draw and explain the operation of crystal filters.
3. Design a constant-K T-section bandpass filter with cutoff frequencies of 1 KHz and 4 KHz. The design impedance is 600 ohms.
4. Draw a constant-K T-section band elimination filter and explain the operation with necessary design equations.
5.Explain in detail about constant K filters
6. Explain about the symmetrical network
7.explain in detail about the m-derived filters
8. What is band elimination filter? Explain with derivation

UNITV - GUIDED WAVES

Part-A

1. Define group velocity?
2. What are the characteristics of TEM waves?
3. What is the cut off frequency of TEM wave?
4. Give the expression that relates phase velocity (Vp), Group velocity (Vg) and free space velocity?
5. What are TE waves or H waves?
6. What are TM waves or E waves?
7. What are guided waves?

8. What is dominant mode? Give examples?
9. Write down the expression for cut off wavelength and cut off frequency?
10. Write down the expression for velocity of propagation?
11. Define attenuation factor?
12. Define wave impedance?
13. Distinguish between TE and TM waves?
14. Write down the relation between guide wavelengths and cut off wavelength?
15. Give the expression for the guide wavelength when the wave transmitted in between two parallel plates?
16. Find the frequency of minimum attenuation foe TM waves?
17. Give relation between the attenuation factor for TE and TM waves?
18. Draw a neat sketch showing the variation in the value of attenuation with frequency for TE, TM, and TEM mode between two parallel plates?
19. Draw a neat sketch showing the variation in the value of wave impedance with frequency for TE, TM, and TEM mode between two parallel plates?

Part-B

1. Discuss the characteristics of TE and TM waves and also derive the cut off frequency and phase velocity from the propagation constant? **(16)**
2. Derive the expression for the field strength for TE waves between parallel plates propagating in Z direction? **(16)**
3. Derive the expression for attenuation of TM waves in between parallel plates?**(16)**
4. Derive the expression for attenuation of TE waves in between parallel Plates? **(16)**
5. Derive the expression for the field strength for TM waves between Parallel plates propagating in Z direction? **(16)**
6. Obtain the expression for the field components of an electromagnetic wave propagating between a pair of perfectly conducting planes? **(16)**
7. Derive the expression for wave impedance of TE, TM and TEM wave between a pair of perfectly conducting planes? **(16)**
8. Explain about transverse electromagnetic waves between a pair of perfectly conducting planes? **(16)**
9. Prove that the velocity of propagation? **(16)**