SHRI ANGALAMMAN COLLEGE OF ENGINEERING & TECHNOLOGY
(An ISO 9001:2008 Certified Institution)
SIRUGANOOR,TRICHY-621105.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SUBJECT CODE : EC1303 **SEM / YEAR : V/III**

SUBJECT NAME: TRANSMISSION LINES & WAVE GUIDES

UNIT - I

TRANSMISSION LINE THEORY

PART - A (2 Marks)

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. Define phase or delay distortion.
7. Write the equation for the input impedance of a TL
8. Define propagation constant 9.

Define wavelength.

10. Give the input impedance of an open and short circuit line
11. Define reflection factor
12. Define reflection loss or return loss.
13. What is meant by reflection co - efficient?
14. Write the condition for a distortion less line
15. When does reflection take place on a TL?
16. What is transfer impedance? State its expression

17. What is inductive or lumped loading?
18. Write the Campbell's formula for propagation constant of a loaded line?

PART - B (16 marks)

1. Obtain the general solution of Transmission line. (16)
2. Explain about waveform distortion and distortion less line condition (16)
3. Derive the expression for input impedance of lossless line. (16)
4. Explain about different types of transmission line. (16)
5. Explain about reflection coefficient, reflection factor and reflection losses. (16)

UNIT - II

THE LINE AT RADIO FREQUENCIES

PART - A (2 Marks)

1. State the application of half - wave line
2. Explain the use of quarter wave line for impedance matching.
3. What is the need for stub matching in transmission lines?
4. Why do standing waves exist on TL?
5. Define Node and antinodes
6. What are constant S circles?
7. What are the advantages of double stub matching over single stub matching?
8. Derive the relationship between standing wave ratio and reflection co - efficient.
9. Write the expression for the characteristic impedance Ro' of the matching quarter - wave section of the line.
10. Give the applications of smith chart 11.

Define standing wave ratio.

12. Define skin effect
13. Distinguish between single stub matching and double stub matching.
14. Write down the expression to determine the position of the stub.

PART - B (16 Marks)

1. Explain about properties of smith chart (16)
2. Write notes on Quarter wave transformer and state the applications of Smith chart. (16)
3. 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)
4. Explain double stub matching on a transmission line and derive the expression for the length of the stub used for matching on a line. (16)
5. Explain about $\lambda/8$ wave transformer (16)

Unit - III GUIDED WAVES

PART - A (2 Marks)

1. What are guided waves? Give examples.
2. What is TE wave or H wave? 3.
What is TH wave or E wave?
4. What is a TEM wave or principal wave?
5. What is a dominant mode?
6. Give the dominant mode for TE and TM waves
7. What is cut off frequency?
8. What is cut-off wavelength?
9. Write down the expression for cut off frequency when the wave is propagated in between two parallel plates. 10.

Mention the characteristics of TEM waves. 11.
Define attenuation factor.

12. Give the relation between the attenuation factor for TE waves and TM waves
13. Define wave impedance
14. What is a parallel plate wave guide?
15. Why are rectangular wave-guides preferred over circular wave-guides?

16. Mention the applications of wave guides

Part - B (16 Marks)

1. Discuss the characteristics of TE and TM waves and also derive the cutoff 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 TE waves in between parallel Plates. (16)
4. Derive the expression for attenuation of TE waves in between parallel Plates (16)
5. Explain about transverse electromagnetic waves between a pair of perfectly conducting planes. (16)

UNIT IV-RECTANGULAR WAVEGUIDES

PART - A (2 Marks)

1. Why is circular or rectangular form used as waveguide?
2. What is an evanescent mode?
3. What is the dominant mode for the TE waves in the rectangular waveguide?
4. What is the dominant mode for the TM waves in the rectangular waveguide?
5. What is the dominant mode for the rectangular waveguide?
6. Which are the non-zero field components for the for the TE10 mode in a rectangular waveguide?
7. Which are the non-zero field components for the for the TM11 mode in a rectangular waveguide?
8. Define characteristic impedance in a waveguide
9. Why TEM mode is not possible in a rectangular waveguide?

10. Explain why TM01 and TM10 modes in a rectangular waveguide do not exist.
11. What are degenerate modes in a rectangular waveguide?

PART - B(16 marks)

1. Derive the field expressions for the field components of TM waves in a rectangular waveguide. (16)
2. Derive the field expressions for the field components of TE waves in a rectangular waveguide. (16)
3. Derive an expression for the cut-off frequency for the TE10 mode for a rectangular waveguide. (16)
4. Derive an expression for attenuation for TM11 waves in a rectangular waveguide (16)
5. Derive an expression for attenuation for TE10 waves in a rectangular waveguide. (16)

UNIT - V

CIRCULAR WAVEGUIDES AND CAVITY RESONATORS

PART - A (2 Marks)

1. What is a circular waveguide?
2. Why circular waveguides are not preferred over rectangular waveguides?
3. Mention the applications of circular waveguide.
4. Which mode in a circular waveguide has attenuation effect decreasing with increase in frequency?
5. What are the possible modes for TM waves in a circular waveguide?
6. What are the root values for the TM modes?
7. Define dominant mode for a circular waveguide.
8. What are the possible modes for TE waves in a circular waveguide?
9. What are the root values for the TE modes?
10. What is the dominant mode for TE waves in a circular waveguide?

11. What is the dominant mode for TM waves in a circular waveguide?
12. What is the dominant mode in a circular waveguide?
13. Mention the dominant modes in rectangular and circular waveguides.

PART - B (16 marks)

1. Derive expressions for the field components of TM waves in a circular waveguide. (16)
2. Derive expressions for the field components of TE waves in a circular waveguide (16)
3. Derive an expression for Q of a waveguide. (16)
4. Describe the different types of coaxial resonators (16)
5. Derive an expression for the quality factor Q of microwave cavities (16)

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