ANNA UNIVERSITY COIMBATORE

B.E. / B.TECH. DEGREE EXAMINATIONS : DECEMBER 2009

REGULATIONS - 2007

FOURTH SEMESTER - ECE

070290038 - TRANSMISSION LINES AND WAVEGUIDES

TIME : 3 Hours Max.Marks : 100

PART – A

(20 x 2 = 40 MARKS)

ANSWER ALL QUESTIONS

1. What is characteristic impedance of a transmission line?
2. State the condition for distortionless line.
3. Define wavelength of a line. Give its expression.
4. Define reflection coefficient with its general expression.
5. What is transfer impedance?
6. What are the applications of Smith chart?
7. Mention the assumptions to be made for an open-wire line at high frequency.
8. Define Standing wave ratio.
9. Sketch the standing waves on a dissipationless line having open-circuit termination.
10. Define wave impedance.
11. What is dominant mode? Mention the dominant modes in rectangular waveguide.
12. Define phase velocity and group velocity.
13. What are the characteristics of TEM waves?
14. Define cutoff wavelength.
15. Sketch the field distribution of TE_{10} mode in rectangular waveguide.
16. Why TE waves are so called?

17. A circular cylindrical air-filled cavity with radius 3 cm and length 10 cm is excited in TE_{11} mode having 3dB bandwidth of 2.5 MHz and resonant frequency 10.42 GHz. Find its Q.
18. Why rectangular cavities or circular cavities can be used as microwave resonators?
19. Show schematically how TM_{010} mode is excited in a circular cavity using rectangular waveguide.
20. Define quality factor.

PART – B

(5 x 12 = 60 MARKS)

ANSWER ANY FIVE QUESTIONS

21. Derive the expression for voltage and current at any point on a transmission line.

22. a) Derive an expression for reflection factor on a line. 6
    b) Write short notes on Insertion loss. 6

23. a) Write short notes on Quarter wave line and its applications. 6
    b) Derive an expression for VSWR in terms of reflection coefficient. 6

24. Explain the various applications of Smith Chart.

25. a) Derive the expression for attenuation constant of TE waves in between two parallel conducting planes. 8
    b) Compare the characteristics of TE and TM waves. 4

26. Derive the expression for field components of TM waves in a rectangular waveguide.

27. Explain wave impedance of rectangular waveguide and derive the expression for wave impedance of TE, TM and TEM waves.

28. Derive an expression for unloaded quality factor Q of a rectangular cavity.

*****THE END*****