Government Engineering College, Dahod

Electronics and Communication Engineering Department

Subject Name: - Microwave Engineering (2171001)

Assignment 3

1 Define TE, TM and TEM modes. Why TEM mode cannot propagate through a rectangular wave guide?

2 Define the following terms.
   a) Guide Wavelength
   b) Group Velocity
   c) Phase Velocity
   d) Standing wave
   e) VSWR

3 Define the following terms.
   a) Transmission Coefficient.
   b) Return loss (RL)
   c) Insertion loss (IL)
   d) Return loss
   e) Normalized Impedance.

4 Draw equivalent circuit of transmission line and derive basic equations for voltage and current of transmission line.

5 Define characteristic impedance of transmission line. Also Derive the equation.

6 Explain reflection coefficient of transmission line and derive expression for the impedance and reflection coefficient at any point on the line.

7 What is the importance impedance matching? Derive expression of the length of short-circuit stub for impedance matching on transmission line.

8 Explain the loss less transmission line. Also gives equations of voltage and current for loss less transmission line.

9 Explain the low loss transmission line.

10 What is microstrip line? Derive equation of characteristics impedance and quality factor of microstrip line.

11 Enumerate merits and demerits of micro strip line compared to other type's transmission media at microwave frequencies. Explain briefly parallel strip lines.

12 Explain with diagram the pattern of field lines observed in strip lines and microstrip lines.

13 A typical transmission line has a resistance of 4Ω/km, inductance of 3.5mH/km, a capacitance 0.009μF/km and a conductance of 0.29μ mho/km. Calculate the characteristic impedance, attenuation constant, phase constant and phase velocity of the transmission line at a frequency of 1 KHz.

14 A typical transmission line has a resistance of 6Ω/km, inductance of 2.2mH/km, a capacitance of 0.005μF/km and a conductance of 0.05μmho/km. Calculate the characteristic impedance, attenuation constant and phase constant of the transmission line at a frequency of 1kHz.Alo calculate the phase velocity of the signal.

15 **A transmission line has the following parameters:**

$$R = 2\ \Omega/\text{m} \qquad G = 0.5\ \text{mmho/m} \qquad f = 1\ \text{GHz}$$
$$L = 8\ \text{nH/m} \qquad C = 0.23\ \text{pF}$$

Calculate: (a) the characteristic impedance; (b) the propagation constant.

16 A transmission line has a characteristic impedance of (50+j0.01) Ω and is terminated in a load impedance of (73+j42.5) Ω. Calculate (a) the reflection coefficient; (b) the standing wave ratio; (c) attenuation constant and phase constant.

17 The terminating load of UHF transmission line with characteristics impedance 50 Ω, working at 300MHz is 50+j50 Ω. Calculate the VSWR and reflection coefficient.

18 A 600 Ω lossless transmission line is fed by a 50 Ω generator. If line is 200 m long and terminated by load of 500 Ω, determine in dBs (1) reflection loss, (2) transmission line and (3) return loss

- **Compulsory clearly mention question number.**
- **Write in sequence.**

Last Date of submission: 18th August 2018

(After last date requires to write down 2 times)