

## **SUBJECT-Microwave and Satellite communication**

### **SEMESTER-6<sup>th</sup> EC (BE)**

### **GUJARAT UNIVERSIT**

#### **All questions carry equal marks (10 marks)**

- Q.1> What is velocity modulation? Explain the construction, principle of working and operation of two cavity klystron amplifier
- Q.2> Explain Magnetron Oscillators with the diagram and explain its performance characteristics.
- Q.3> Explain structure and working of PIN diode. What are the applications of PIN diode?
- Q.4> Describe construction, principle of operation and working of two cavity klystron amplifier
- Q.5> Sketch the standing wave patterns for voltage and current along a transmission line when it is terminated with : i>short circuit, ii>open circuit, iii>matched load, iv>inductive load>capacitive load, vi>resistive load less than characteristic impedance.
- Q.6> An air filled rectangular waveguide has dimension of 10 cmX8 cm.It propagates a signal at 5 GHz. Compute the following for TE<sub>10</sub> mode. I>cut off frequency, ii>Guide wavelength, iii>phase velocity, iv>Group velocity, v>Wave impedance.
- Q.7> Explain impedance matching. What is single stub matching?
- Q.8> Write short notes on i>IMPATT Diode & TRAPATT Diode.
- Q.9> Explain the construction, equivalent circuit and application of E-plane tee. How it is different from H-plane tee.
- Q.10> Describe the construction and working of a reflex klystron.
- Q.11> Write short notes on i>Directional coupler and ii>Isolator.
- Q.12> Draw and explain waveguide bend, corners and twist in detail with their applications.
- Q.13> Derive wave equation for TM wave. How waveguides are different from normal two

wire transmission lines

- Q.14> Explain Magnetron Oscillators .How it is different from travelling wave tube?
- Q.15> What is the use of Parametric Amplifier? Also explain the working principle of it in details.
- Q.16> An air filled rectangular waveguide has dimension of 6 cm X 4 cm.It propagates a signal at 2GHz.Compare the following for  $TE_{10}$  mode. i>cut-off frequency.  
ii>Guide wavelength.  
iii>Phase velocity.
- Q.17>Describe circular and rectangular waveguide. Compare their dominant mode.
- Q.18> Explain Double Stub matching.
- Q.19>Explain in details  
i>Magic tee  
ii>Quarter wave transformer.
- Q.20> Explain the difference between IMPATT diode and TRAPATT diode in details.
- Q.21>What is the purpose of directional Coupler. Define coupling factor, directivity, isolation of Directional coupler and write expression for each.
- Q.22>A typical transmission line has a resistance of 6 ohm /km, inductance of 2.2mH/km, a capacitance of 0.005  $\mu$ F/km and a conductance of 0.05 $\mu$ mho/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
- Q.23>Explain the operation of Magic TEE with its s-parameter. Also list some Applications of magic TEE
- Q.24>Explain the amplification process for a helix type travelling wave tube. What are? Its different applications?
- Q.25>Explain Gunn Effect using two valley theory with neat diagram.
- Q.26>Explain the Tunnel diode characteristics with the aid of Energy band diagram.

- Q.27> Explain the amplification process for a travelling wave tube. Compare it with two cavity klystron.
- Q.28> A rectangular waveguide is filled by dielectric material of  $\epsilon_r = 9$ , with inside Dimension of  $7 \times 3.5$  cm. It operates in the dominant TE<sub>10</sub> mode. Determine (i) cut Off frequency (ii) phase velocity at a frequency of 2 GHz (iii) guided wavelength at the same frequency.
- Q.29> What are microwaves? Explain advantages of microwave and its applications.
- Q.30> Derive necessary equations for attenuation constant and phase constant with reference to EM wave propagating along transmission line.
- Q.31> Sketch circular and rectangular waveguide and compare their dominant mode , advantages and disadvantages.
- Q.32> The dimension of a waveguide is  $2.5 \times 1$  cms. The frequency is 8.6 GHz Find the possible modes that can propagate through the waveguide also find the cutoff frequencies for the same.
- Q.33> Explain single stub matching and double stub matching. Find the difference between this two.
- Q.34> What is difference between E-plane Tee and H-plane Tee. How it is related to Magic Tee.
- Q.35> Explain in details how a reflex klystron is different from Two cavity klystron?
- Q.36> What is phase velocity and group velocity? Derive the expressions used for phase velocity and  
Group velocity.
- Q.37> Explain in details i> Duct propagation, ii> Insertion loss, iii> Return loss.
- Q.38> Explain in details what is station keeping? Why it is necessary ?  
Why uplink and downlink frequencies are different and downlink frequencies always lower?
- Q.39> List three main functions of transponder. Draw the block diagram for a single channel transponder. Describe also working of transponder. What is Geostationary orbits?
- Q.40> Explain Kepler's first law, and Kepler's second law. What is the method of modulation and polarization used in up/down channel in satellite transmission?