

Time: 3 Hour

Max Marks: 80

Note: 1. Each question carries 20 marks

2: Question no 1 is compulsory

3: Solve any 3 out of remaining

4: Assume suitable data wherever required

Q1: Solve any four.

- a) A transmission line has the following parameters:
 $R = 2 \Omega/m$, $G = 0.5 \text{ mmho/m}$, $f = 1 \text{ GHz}$, $L = 8 \text{ nH/m}$, $C = 0.23 \text{ pF}$
 Calculate the characteristics impedance and propagation constant. **5**
- b) Explain characteristics of E plane tee. **5**
- c) Explain Applegate diagram of two cavity klystron **5**
- d) Explain characteristics and working principle of tunnel diode **5**
- e) Explain how to avoid mode jumping in Magnetron. **5**

Q2: A) Derive equation for field components in Rectangular waveguide. **10**

B) State and prove condition for negative resistance in Gunn Diode. **10**

Explain Two -Valley model theory.

Q3: A) An impedance $Z_L = (450 - j600) \Omega$ at 1 GHz is connected to a 300Ω line. **10**

Calculate the position and length of a short circuited stub designed to match this load to the line.

B) Explain working and characteristics of IMPATT diode. **10**

Q4: A) Explain H plane Tee and Magic Tee. State their applications. **10**

B) Explain basic construction of rotary attenuator and rotary phase shifter. **10**

Q5: A) Explain Reflex Klystron with neat schematic diagram. Explain process of **10**

Velocity modulation with the help of Applegate diagram.

B) A two cavity klystron has the following parameters **10**

$V_0 = 1000 \text{ V}$, $R_0 = 40 \text{ K}\Omega$, $I_0 = 25 \text{ mA}$, $f = 3 \text{ GHz}$

Gap spacing in either cavity $d = 1 \text{ mm}$, Spacing between the two cavities

$L = 4 \text{ cm}$ and effective shunt impedance excluding beam loading $R_{sh} = 30 \text{ K}\Omega$.

Find the input gap voltage to give maximum voltage V_2

Q6 A) Explain any one method to measure power at microwave frequency. **10**

B) Write short note on

a) VSWR measurement **5**

b) Varactor diode **5**