



**Unit-I**

**1. The major limitation of conventional vacuum tubes at microwave frequencies is:**

- A) High efficiency
- B) Transit time effect
- C) Low voltage operation
- D) High gain

**Answer:** B) Transit time effect

**2. The inductive reactance of lead wires increases with:**

- A) Temperature
- B) Current
- C) Frequency
- D) Voltage

**Answer:** C) Frequency

**3. Microwave tubes are mainly classified into:**

- A) Active and Passive tubes
- B) O-Type and M-Type tubes
- C) Vacuum and Gas tubes
- D) High and Low power tubes

**Answer:** B) O-Type and M-Type tubes

**4. In O-type tubes, the electric field is:**

- A) Perpendicular to electron beam
- B) Parallel to electron beam
- C) Opposite to magnetic field only
- D) Absent

**Answer:** B) Parallel to electron beam

**5. Which of the following is an O-type tube?**

- A) Magnetron
- B) Crossed Field Amplifier
- C) Klystron
- D) Cyclotron

**Answer:** C) Klystron



6. Which of the following is an M-type tube?

- A) TWT
- B) Reflex Klystron
- C) Two-Cavity Klystron
- D) Magnetron

**Answer:** D) Magnetron

7. A Two-Cavity Klystron consists of:

- A) One cavity
- B) Two resonant cavities
- C) Three cavities
- D) Four cavities

**Answer:** B) Two resonant cavities

8. The first cavity in a Klystron is called:

- A) Catcher cavity
- B) Drift cavity
- C) Buncher cavity
- D) Collector cavity

**Answer:** C) Buncher cavity

9. The second cavity in a Klystron is called:

- A) Buncher cavity
- B) Catcher cavity
- C) Repeller cavity
- D) Collector cavity

**Answer:** B) Catcher cavity

10. Velocity modulation takes place in:

- A) Drift space
- B) Collector
- C) Buncher cavity
- D) Repeller space

**Answer:** C) Buncher cavity



11. Current modulation in a Klystron is produced due to:

- A) Velocity modulation
- B) Magnetic focusing
- C) Cathode heating
- D) Repeller voltage

**Answer:** A) Velocity modulation

12. Electron bunching occurs in:

- A) Collector
- B) Drift space
- C) Cathode
- D) Repeller

**Answer:** B) Drift space

13. Applegate diagram is used to explain:

- A) Frequency tuning
- B) Electron bunching process
- C) Cooling system
- D) Magnet design

**Answer:** B) Electron bunching process

14. Reentrant cavities are used because they provide:

- A) Low Q-factor
- B) High Q-factor
- C) Low capacitance
- D) Low efficiency

**Answer:** B) High Q-factor

15. In a Klystron, the catcher cavity extracts:

- A) Thermal energy
- B) RF energy
- C) Magnetic energy
- D) Mechanical energy

**Answer:** B) RF energy

16. Typical efficiency of a Two-Cavity Klystron is:

- A) 5–10%
- B) 15–20%
- C) 30–40%
- D) 70–90%

**Answer:** C) 30–40%

17. Reflex Klystron uses:

- A) Two cavities
- B) Three cavities
- C) One cavity
- D) No cavity

**Answer:** C) One cavity

18. Reflex Klystron acts as:

- A) Amplifier only
- B) Oscillator only
- C) Detector only
- D) Modulator only

**Answer:** B) Oscillator only

19. The electrode responsible for reflecting electrons back is:

- A) Collector
- B) Cathode
- C) Grid
- D) Repeller

**Answer:** D) Repeller

20. In Reflex Klystron, velocity modulation occurs in:

- A) Resonant cavity gap
- B) Collector
- C) Cathode
- D) Drift tube

**Answer:** A) Resonant cavity gap

21. Maximum efficiency of Reflex Klystron is approximately:

- A) 10%
- B) 22.4%
- C) 40%
- D) 80%

**Answer:** B) 22.4%

22. Which parameter is varied for frequency tuning in Reflex Klystron?

- A) Beam current
- B) Heater voltage
- C) Repeller voltage
- D) Collector current

**Answer:** C) Repeller voltage

23. Common oscillating mode of Reflex Klystron is:

- A) 1/2 mode
- B) 3/4 mode
- C) 5/8 mode
- D) 1/4 mode

**Answer:** B) 3/4 mode

24. Traveling Wave Tube is commonly abbreviated as:

- A) TPT
- B) TVT
- C) TWT
- D) TCT

**Answer:** C) TWT

25. TWT is a:

- A) Narrowband amplifier
- B) Wideband amplifier
- C) Oscillator only
- D) Detector

**Answer:** B) Wideband amplifier

26. The slow-wave structure most commonly used in TWT is:

- A) Cavity resonator
- B) Waveguide
- C) Helix
- D) Coaxial cable

**Answer:** C) Helix

27. The purpose of a slow-wave structure is to:

- A) Increase electron velocity
- B) Reduce RF phase velocity
- C) Increase frequency
- D) Reduce gain

**Answer:** B) Reduce RF phase velocity

28. Continuous interaction between electron beam and RF wave occurs in:

- A) Magnetron
- B) Reflex Klystron
- C) Helix TWT
- D) Gunn Diode

**Answer:** C) Helix TWT

29. An attenuator is inserted in a TWT to:

- A) Increase power supply voltage
- B) Improve cathode emission
- C) Suppress oscillations
- D) Increase collector current

**Answer:** C) Suppress oscillations

30. Typical gain of a TWT ranges from:

- A) 1–5 dB
- B) 5–10 dB
- C) 20–70 dB
- D) 100–150 dB

**Answer:** C) 20–70 dB

### Fill in the Blanks

1. The major limitation of conventional tubes at microwave frequencies is the \_\_\_\_\_ effect.  
**Answer:** Transit time
2. Lead inductance causes increased \_\_\_\_\_ at high frequencies.  
**Answer:** Reactance
3. Inter-electrode \_\_\_\_\_ causes shunting of RF signals.  
**Answer:** Capacitance
4. At microwave frequencies, radiation \_\_\_\_\_ become significant.  
**Answer:** Losses
5. Skin effect increases the effective \_\_\_\_\_ of conductors.  
**Answer:** Resistance
6. Microwave tubes are classified into \_\_\_\_\_ type and \_\_\_\_\_ type tubes.  
**Answer:** O, M
7. In O-type tubes, the electric field is \_\_\_\_\_ to the electron beam.  
**Answer:** Parallel
8. In M-type tubes, electric and magnetic fields are \_\_\_\_\_ to each other.  
**Answer:** Perpendicular
9. \_\_\_\_\_ is an example of an O-type microwave tube.  
**Answer:** Klystron
10. \_\_\_\_\_ is an example of an M-type microwave tube.  
**Answer:** Magnetron
11. A Two-Cavity Klystron contains \_\_\_\_\_ resonant cavities.  
**Answer:** Two
12. The first cavity is called the \_\_\_\_\_ cavity.  
**Answer:** Buncher
13. The second cavity is called the \_\_\_\_\_ cavity.  
**Answer:** Catcher
14. Velocity modulation takes place in the \_\_\_\_\_ cavity.  
**Answer:** Buncher
15. Electron bunching occurs in the \_\_\_\_\_ space.  
**Answer:** Drift
16. The process of grouping electrons together is called \_\_\_\_\_.  
**Answer:** Bunching
17. Applegate diagram is used to explain electron \_\_\_\_\_.  
**Answer:** Bunching
18. The cavity used for extracting RF energy is called the \_\_\_\_\_ cavity.  
**Answer:** Catcher
19. Klystron operation is based on \_\_\_\_\_ modulation.  
**Answer:** Velocity