Unit-II

1.M-type microwave tubes operate on the principle of:

A) Velocity modulation
B) Cross-field interaction
C) Current modulation
D) Phase modulation

Answer: B) Cross-field interaction

2. In M-type tubes, electric and magnetic fields are:

A) Parallel
B) Opposite
C) Perpendicular
D) Zero

Answer: C) Perpendicular

3. The most widely used M-type microwave tube is:

A) Klystron
B) TWT
C) Magnetron
D) Gunn Diode

Answer: C) Magnetron

4. Magnetron is mainly used as a:

A) Microwave amplifier
B) Microwave oscillator
C) Detector
D) Mixer

Answer: B) Microwave oscillator

5. Magnetron operation is based on:

A) Transit time effect
B) Cross-field effect
C) Photoelectric effect
D) Hall effect

Answer: B) Cross-field effect

6. In a magnetron, electrons move under the influence of:

A) Electric field only
B) Magnetic field only
C) Crossed electric and magnetic fields
D) Gravity

Answer: C) Crossed electric and magnetic fields

7. The cathode in a magnetron is located at the:

A) Outer cylinder
B) Center
C) Side wall
D) Resonator

Answer: B) Center

8. The anode in a cylindrical magnetron is:

A) Rod shaped
B) Ring shaped
C) Spiral shaped
D) Grid shaped

Answer: B) Ring shaped

9. Hull cut-off condition determines:

A) Oscillation frequency
B) Minimum magnetic field for electron motion
C) Output power
D) Efficiency

Answer: B) Minimum magnetic field for electron motion

10. Hartree condition is related to:

A) Oscillation requirements
B) Cathode heating
C) Collector efficiency
D) Waveguide losses

Answer: A) Oscillation requirements

11. The most efficient mode of magnetron operation is:

A) 0 mode
B) π/2 mode
C) π mode
D) 2π mode

Answer: C) π mode

12. In π-mode operation, adjacent cavities differ in phase by:

A) 0°
B) 90°
C) 180°
D) 360°

Answer: C) 180°

13. Strapping is used in magnetrons for:

A) Cooling
B) Cathode heating
C) π-mode separation
D) Power measurement

Answer: C) π-mode separation

14. The output frequency of a magnetron is determined mainly by:

A) Cathode current
B) Resonant cavities
C) Collector voltage
D) Filament current

Answer: B) Resonant cavities

15. Typical efficiency of a magnetron is:

A) 10–20%
B) 20–30%
C) 40–50%
D) 70–90%

Answer: D) 70–90%

16. Microwave solid-state devices are generally made of:

A) Insulators
B) Semiconductors
C) Conductors
D) Ferrites

Answer: B) Semiconductors

17. Microwave solid-state devices are preferred because of:

A) Large size
B) Low reliability
C) Compact size and high reliability
D) High maintenance

Answer: C) Compact size and high reliability

18. TED stands for:

A) Transit Electron Device
B) Tunnel Electron Device
C) Thermal Electron Device
D) Trigger Electron Device

Answer: A) Transit Electron Device

19. Gunn diode belongs to the category of:

A) LSA devices
B) TEDs
C) FETs
D) BJTs

Answer: B) TEDs

20. Gunn diode is also known as:

A) Bulk effect diode
B) Tunnel diode
C) PIN diode
D) Schottky diode

Answer: A) Bulk effect diode

21. Gunn diode is made from:

A) Silicon only
B) Germanium only
C) GaAs (Gallium Arsenide)
D) Copper

Answer: C) GaAs (Gallium Arsenide)

22. Gunn diode operates on:

A) Avalanche effect
B) Tunnel effect
C) Transferred electron effect
D) Photoelectric effect

Answer: C) Transferred electron effect

23. The principle of Gunn diode is based on:

A) Negative resistance
B) Positive resistance
C) Hall effect
D) Diffusion

Answer: A) Negative resistance

24. RWH theory stands for:

A) Ridley-Watkins-Hilsum Theory
B) Rayleigh-Watt-Henry Theory
C) Robert-Wilson-Hall Theory
D) Ridley-Williams-Hartree Theory

Answer: A) Ridley-Watkins-Hilsum Theory

25. According to RWH theory, electrons transfer from:

A) Lower valley to higher valley
B) Higher valley to lower valley
C) Cathode to anode only
D) Anode to cathode

Answer: A) Lower valley to higher valley

26. In Gunn effect, electron mobility:

A) Increases
B) Becomes zero
C) Decreases
D) Remains constant

Answer: C) Decreases

27. The negative resistance region occurs because:

A) Current decreases with increasing voltage
B) Current increases with voltage
C) Voltage remains constant
D) Frequency decreases

Answer: A) Current decreases with increasing voltage

28. Gunn diodes are mainly used as:

A) Rectifiers
B) Oscillators
C) Transformers
D) Filters

Answer: B) Oscillators

29. Typical microwave frequency range of Gunn diodes is:

A) kHz range
B) MHz range
C) GHz range
D) Hz range

Answer: C) GHz range

30. Which characteristic exhibits negative resistance?

A) Magnetron
B) Gunn diode
C) Klystron
D) TWT

Answer: B) Gunn diode

Fill in the Blanks

1. M-type microwave tubes operate with _____ electric and magnetic fields.
Answer: crossed
2. In M-type tubes, the electric and magnetic fields are _____ to each other.
Answer: perpendicular
3. The most important M-type microwave tube is the _____.
Answer: Magnetron
4. Magnetron is primarily a microwave _____.
Answer: oscillator
5. The operation of M-type tubes is based on the _____ effect.
Answer: cross-field
6. n a magnetron, the cathode is located at the _____.
Answer: center
7. The anode of a cylindrical magnetron is _____ shaped.
Answer: cylindrical
8. Electrons emitted from the cathode move under the influence of crossed _____ and magnetic fields.
Answer: electric
9. The minimum magnetic field required to prevent electrons from reaching the anode is called the _____ cut-off condition.
Answer: Hull
10. The condition necessary for sustained oscillations in a magnetron is called the _____ condition.
Answer: Hartree
11.The most efficient mode of magnetron operation is the _____ mode.
Answer: π (pi)
12. In π-mode operation, adjacent cavities differ in phase by _____ degrees.
Answer: 180
13.The process of separating the π-mode from other modes is called _____.
Answer: mode separation
14. Metal straps are used in magnetrons for _____ mode separation.
Answer: π
15. The resonant frequency of a magnetron depends on the dimensions of its _____ cavities.
Answer: resonant
16. Magnetrons are widely used in microwave _____ systems.
Answer: radar
17. A magnetron converts DC power into microwave _____.
Answer: power
18.The efficiency of a magnetron is approximately _____ to _____ percent.
Answer: 70, 90
19.The output power of a magnetron is generally _____ than that of a Gunn diode.
Answer: higher
20.The electron cloud rotating around the cathode is called the electron _____.
Answer: spokes