

Assignment VI (Active Devices)

- *Tick the most appropriate answer.*
 - *All symbols have their usual meaning.*
-

1. The following device involves only one type of charge carriers

- a. HEMT b. Gunn Diode c. MOSFET, d. all of these.

Ans: d. all of these.

2. The device also known as Transfer Electron Device (TED) is/are

- a. Tunnel Diode b. Gunn diode c. IMPATT diode d. All of these

Ans: b. Gunn diode

3. The following source can provide high power at millimeter wave frequencies.

- a. Gyrotron b. Magnetron, c. Klystron d. TWT

Ans: a. Gyrotron

4. PHEMT is popular for their

- a. high power handling capability b. low power consumption c. higher carrier velocity d. high efficiency

Ans: c. higher carrier velocity

5. PIN diode can be used in application of —

- a. switch b. modulators, c. phase shifter d. All of these

Ans: d. All of these

6. How to improve f_T of a BJT—

- a. Decreasing base width, b. increasing doping concentration in base and using hetero junctions c. increasing electron mobility, d. all of these

Ans: d. all of these

7. The reverse recovery time for an ideal Schottky diode is

- a. infinite b. a few μs , c. zero d. depends on manufacturing process.

Ans: c. zero

8. Schottky diode is an example of

- a. slow recombination device, b. hot carrier device, c. step-recovery diodes, d. none of these

Ans: b. hot carrier device

9. The following device can be used in a tuning circuit.

- a. Schottky diode b. Gunn diode, c. Varactor d. IMPATT diode

Ans: c. Varactor

10. The diode that is formed by joining a doped semiconductor region with a metal is

- a. Schottky, b. PIN, c. Tunnel d. Gunn

Ans: a. Schottky.

11. A popular use of PIN diode is

- a. as a high-power source, b. as a variable resistor, c. power regulator, d. in rectifiers.

Ans: b. as a variable resistor

12. Among the Si, Ge, GaAs, GaN, the material that has highest electron mobility at room temperature is

- a. Si b. Ge c. GaAs d. GaN

Ans: c. GaAs

13. An NMOS is preferred over PMOS for high frequency operation because

- a. electron mobility is high b. electron mobility increases with increasing electric field
c. NMOS uses both electrons and holes as charge carriers d. NMOS has smaller junction capacitance

Ans: a. electron mobility is high

14. For Gunn diodes, gallium arsenide is preferred over silicon because

- a. its higher mobility of charge carriers
b. negative resistance effect
c. electron velocity can be easily increased by increasing applied electric field
d. all of the above

Ans: b. negative resistance effect

15. The device that is used as a popular source of continuous millimeter wave signal is

- a. Heterojunction Bipolar Transistor, b. A step recovery diode, c. Gunn diode,
d. IMPATT diode.

Ans: c. Gunn diode

16. One of the main problem of IMPATT diode is its

- a. lower efficiency than other millimeter wave diodes
b. high phase noise
c. inability to provide pulsed operation
d. low power-handling capability

Ans: b. high phase noise

17. A diode that never turns off in reverse cycle when used at millimeter wave frequencies is

- a. Crystal diode b. Schottky-barrier diode c. Step recovery diode d. PIN diode

Ans: d. PIN diode

18. A PIN diode is used to design a SPST switch. Then it will provide high isolation in the following connection scheme.

- a. series, b. shunt, c. series-shunt, d. series-series

Ans: c. series-shunt

19. Among the Si, Ge, GaAs, GaN, the material that has highest band gap energy is

- a. Si b. Ge c. GaAs d. GaN

Ans: d. GaN

20. The unity gain frequency f_T of a BJT is a function of

- a. Saturated drift velocity b. Dielectric break down c. Junction capacitances d. all of the above

Ans: d. all of the above

