

## OTHER SPECIAL DIODES AND PHOTONIC DEVICES

1. Zener diode, when used in voltage stabilization circuit is biased in
  - a. Reverse bias region below the breakdown region.
  - b. Reverse breakdown region.
  - c. Forward biased region.
  - d. Forward biased constant current mode.

[GATE 2011]

2. In a Zener diode
  - a. Only the P-region is heavily doped
  - b. Only the N-region is heavily doped
  - c. Both P and N region are heavily doped
  - d. Both P and N region are lightly doped

[GATE 1989]

3. Which of these has highly doped p and n region?
  - a. PIN diode
  - b. Tunnel diode
  - c. Schottkey diode
  - d. Photo diode
4. Which of these diodes has the layer of intrinsic semiconductor
  - a. Zener diode
  - b. PIN diode
  - c. Photo diode
  - d. Schottkey diode

5. In which of the following diodes the width of junction barrier is very large
  - a. Tunnel diode
  - b. Photo diode
  - c. PIN diode
  - d. Schottkey diode
6. Which of these diodes has degenerate p and n material
  - a. Zener diode
  - b. PIN diode
  - c. Tunnel diode
  - d. Photo diode

7. Consider the following assertions.  
S<sub>1</sub>: For Zener effect to occur, a very abrupt junction is required

$S_2$ : For quantum tunneling to occur, a very narrow energy barrier is required  
Which of the following is correct?

- a. Only  $S_2$  is true
- b.  $S_1$  and  $S_2$  are both true but  $S_2$  is not a reason for  $S_1$
- c.  $S_1$  and  $S_2$  are both true but  $S_2$  is a reason for  $S_1$
- d. Both  $S_1$  and  $S_2$  are false

[GATE 2008]

8. Which of these diodes is also called hot carrier diode.

- a. PIN diode
- b. LED
- c. Photo diode
- d. Schottkey diode

9. In which of these diode the reverse recovery time is nearly zero.

- a. Diode
- b. Tunnel Diode
- c. Schottkey Diode
- d. PIN Diode

10. In which of the following diodes, the negative resistance region exists, in v-I characteristics

- a. PIN diode
- b. Schottkey diode
- c. Tunnel diode
- d. Zener diode

11. The of doped regions in PIN diode are

- a. 1
- b. 2
- c. 3
- d. 4

12. Which of the following diode is a voltage controlled capacitor

- a. Zener diode
- b. p n diode
- c. Varactor diode
- d. LED

13. In LED light is emitted because

- a. Recombination of charge carriers take place
- b. Diode gets heated up
- c. Light falling on gets amplified
- d. Light gets reflected due to lens action

14. GaAs LED emits radiation in

- a. Ultraviolet region
- b. Violet, blue, green, range of visible region

- c. Visible region
- d. Infrared region

15. Which of these diodes is used in seven segment display

- a. PIN diode
- b. LED
- c. Photo diode
- d. Tunnel diode

16. The barrier potential of Schottky diode is

- a. 0.25V
- b. 0.7V
- c. 0.3V
- d. 1.7V

17. The diode which has zero breakdown voltage is

- a. Zener diode
- b. Schottky diode
- c. Breakdown diode
- d. Tunnel diode

18. The I- V characteristic solar cell lies in

- a. I quadrant
- b. II quadrant
- c. III quadrant
- d. IV quadrant

19. The light emitted by LASER diode is

- a. Monochromatic
- b. Coherent
- c. Visible
- d. Both (a) and (b)

20. The LASER diode sources require

- a. Spontaneous emission
- b. Absorption
- c. Stimulated emission
- d. None of the above

21. Group I lists four different semiconductor devices. Match each device in Group I with its characteristic property in Group II.

**Group I**

- P. BJT
- Q. MOS capacitor
- R. LASER diode
- S. JEET

**Group II**

1. Population inversion
2. Pinch-off voltage
3. Early effect
4. Flat-band voltage
  - a. P-3, Q-1, R-4, S-2
  - b. P-1, Q-4, R-3, S-2
  - c. P-3, Q-4, R-1, S-2
  - d. P-3, Q-2, R-1, S-4

[GATE 2007]

22. SOLAR cells are based on the principle of
- a. Population inversion
  - b. Stimulated emission
  - c. Photovoltaic
  - d. Emission

23. Solar cells provide electrical power at
- a. Low cost
  - b. Height cost
  - c. Low installation cost
  - d. Low operating cost

24. Solar cells operate in
- |                 |                      |
|-----------------|----------------------|
| a. Forward bias | b. Revers bias       |
| c. No bias      | d. None of the above |

25. LCD displays are preferred duce to
- a. High decay time
  - b. Reflective
  - c. Transmittive
  - d. Low power consumption

26. The sensitivity of a photo diode depends on
- a. Light intensity & depletion region width
  - b. Depletion region width and excess carrier lifetime

- c. Excess carrier life time and forward bias current
- d. Forward bias current and light intensity

27. P-N junction photodiode has to be

- |                   |                   |
|-------------------|-------------------|
| a. Reverse biased | b. Forward biased |
| c. Switched on    | d. Switched off   |

28. Group I lists four types of p-n junction diodes. Match each device in Group I with one of the options in Group II to indicate the bias condition of that device in its normal mode of operation.

**Group I**

- P. Zener Diode
- Q. Solar cell
- R. LASER Diode
- S. Avalanche Photodiode

**Group II**

- 1. Forward bias
- 2. Reverse bias

- a. P-1, Q-2, R-4, S-2
- b. P-2, Q-1, R-1, S-2
- c. P-2, Q-2, R-2, S-1
- d. P-3, Q-1, R-2, S-2

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**[GATE 2007]**

29. Find the correct match between Group I and Group II

**Group I**

- E. Varactor diode
- F. PIN diode
- G. Zener diode
- F. Schottkey diode

**Group II**

- 1. Voltage reference
- 2. High-frequency switch
- 3. Tuned circuit
- 4. Current controlled attenuator

- a. E-4, F-2, G-1, H-3

- b. E-2, F-4, G-1, H-3
- c. E-3, F-4, G-1, H-2
- d. E-1, F-3, G-2, H-4

[GATE 2006]

30. Match items in **Group I** with items in **Group II**, most suitably.

**Group I**

- P. LED
- Q. Avalanche Photodiode
- R. tunnel diode
- S. LASER

**Group II**

- 1. Heavy doping
- 2. Coherent radiation
- 3. Spontaneous emission
- 4. Current gain
  - a. P-1, Q-2, R-4, S-3
  - b. P-2, Q-3, R-1, S-4
  - c. P-3, Q-4, R-1, S-2
  - d. P-2, Q-1, R-1, S-3

[GATE 2003]

31. Choose proper substitutes for X and Y to make the following statement correct Tunnel diode and Avalanche photodiode are operated in X bias and Y bias respectively.

- a. X: reverse, Y: reverse
- b. X: reverse, Y: forward
- c. X: forward, Y: reverse
- d. X: forward, Y: forward

[GATE 2003]

32. For a PN junction match the type of breakdown with phenomenon

- 1. Avalanche breakdown
- 2. Zener breakdown
- 3. Punch through
- A. Collision of carriers with crystal ions
- B. Early effect
- C. Rupture of covalent bond due to strong electric field.
 

a. 1-B, 2-A, 3-C	b. 1-C, 2-A, 3-B
c. 1-A, 2-B, 3-C	d. 1-A, 2-C, 3-B

[GATE 1988]

## Answers Key

1. (b)      2. (c)      3. (b)      4. (b)

5. (c)      6. (c)      7. (a)      8. (d)

9. (c) In Schottky diode there no charge storage due to semiconductor metal junction. So they have almost zero reverse recovery time

10. (a)      11. (b)      12. (c)      13. (a)

14. (d)      15. (b)      16. (a)      17. (d)

18. (d)      19. (d)      20. (c)      21. (c)

22. (c)      23. (d)      24. (a)      25. (d)

26. (a)      27. (a)      28. (b)      29. (c)

30. (c)      31. (c)      32. (d)

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