Semiconductor Electronics - Materials, Devices and Simple Circuits

1. Assertion (A): NPN transistor is preferred over PNP transistor.

Reason (R): Mobility of hole is more than free electron.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- 2. Assertion (A): The number of electrons in n-type semiconductor is higher than the number of electrons in a pure silicon semiconductor.

Reason (R): The law of mass action is applicable only to n-type semiconductors.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **3. Assertion (A):** A transistor amplifier in common emitter configuration has a low input impedance.

Reason (R): The base to emitter region is forward biased.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **4. Assertion (A):** In solid each electron will have a different energy level.

Reason (R): In solid crystal each electron has a unique position and no two electrons see exactly the same pattern of surrounding charges.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

5. Assertion (A): The conductivity of an intrinsic semiconductor depends on its temperature.

Reason (R): No important electronic device can be developed using intrinsic semi conductor.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **6. Assertion (A):** Width of depletion region is reduced in forward bias.

Reason (R): In forward bias external battery reduced the internal electric field in depletion layer.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- 7. Assertion (A): Bridge full wave rectifier is more used than centre tap full wave rectifier

Reason (R): In bridge full wave rectifier four diodes are used.

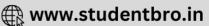
- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **8. Assertion (A):** The semiconductor used for fabrication of visible LED must at least have a band gap of 1.8 eV.

Reason (R): The spectral range of visible light is from 0.4 eV to 1.8 eV.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false







9. Assertion (A): In an OR gate if any of the input is high the output is high.

Reason (R): OR gate is the basic gate.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **10. Assertion (A):** In an oscillator, the feedback is in the same phase which is called as positive feedback.

Reason (R): If the feedback voltage is in opposite phase the gain is greater than one.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **11. Assertion (A):** Working principle of photodiode and photocell is same.

Reason (R): Biasing circuit for photodiode and photocell is same.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **12. Assertion (A):** GaAs is preferred for making solar panels.

Reason (R): ΔE_g for GaAs is 1.5 eV and sun's radiation has highest intensity around this energy level.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

13. Assertion (A): In LED e⁻-hole pair recombination gives us photon.

Reason (R): In LED e⁻-hole pair recombination occurs in depletion region.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **14. Assertion (A):** As we increase applied voltage on LED intensity of emitted light first increases then decreases.

Reason (R): We use LED in forward bias.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **15. Assertion (A):** In a N-type semiconductor, the number of holes get reduced.

Reason (R): Rate of recombination of holes would increase due to the increase in the number of electrons
(1) Both (A) & (R) are true and the (R) is

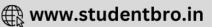
- the correct explanation of the (A)
 (2) Both (A) & (R) are true but the (R) is
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- 16. Assertion (A): Electron hole recombination takes place in P-region and N-region of PN Junction diode except in depletion region.

Reason (R): Electric field in depletion region oppose the diffusion.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false







17. Assertion (A): In a transistor, collector current in active state is almost independent of potential difference of collector and emitter.

Reason (R): Base emitter junction of a transistor is in forward bias in active state

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **18. Assertion (A):** Output frequency of time varying DC voltage in a full wave rectifier is twice of input frequency.

Reason (R): A center tap transformer increases the frequency of input.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **19. Assertion (A):** A NAND gate can be obtained by using NOR gates.

Reason (R): NOR, NAND and XOR gates are called universal gates.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **20. Assertion (A):** Width of depletion region is reduced in forward bias.

Reason (R): In n-type semiconductor majority charge carriers are free electrons while in p-type they are holes.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

21. Assertion (A): Transistor can be used as an amplifier & oscillator.

Reason (R): In transistor, collector is larger in size as compared to the emitter.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **22. Assertion (A):** The drift current in a p-n junction is from n-side to p-side.

Reason (R): The diffusion current in a p-n junction is from p-side to n-side.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- 23. Assertion (A): P-type semiconductor has high density of holes in valence band while N-type semiconductor has high density of electrons in conduction band. Reason (R): In N-type semiconductor, as the density of donor atoms N_D is increased, the fermi energy level shifts towards the valence band.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **24. Assertion (A):** Generally npn transistors are widely used.

Reason (R): In npn transistor the mobility of majority charge carriers is more.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false







25. Assertion (A): Light emitting diode (LED) emits self radiation.

Reason (R): LED are reverse biased p-n junctions.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **26. Assertion (A):** Conductivity of intrinsic semiconductor is less as compared to extrinsic semiconductor.

Reason (R): With increase in temperature conductivity of semiconductor increases.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- 27. Assertion (A): Avalanche breakdown dominates when the doping concentration is high and depletion layer is thin.

Reason (R): Zener breakdown occurs due to the collision of minority charge carrier.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

28. Assertion (A): Semiconductors do not obey Ohm's law.

Reason (R): Electric current is determined by the rate of flow of charge carriers.

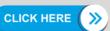
- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- 29. Assertion (A): The temperature coefficient of resistance is positive for metals and negative for semiconductors.

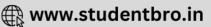
Reason (R): On raising the temperature, in metals drift velocity increases but in semiconductors more charge carriers are released.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **30. Assertion (A):** The temperature coefficient of resistance is positive for p-type semiconductors and negative for n-type semiconductors.

Reason (R): The effective charge carriers in p-type semiconductors are electrons and in n-type semiconductors are holes.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false





- (4) Both (A) and (R) are false
- 31. Assertion (A): The probability of electrons to be found in the conduction band of an intrinsic semiconductor at a finite temperature decreases exponentially with increasing band gap. Reason (R): It is more difficult for the electrons to jump to the conduction band from the valence band if the band gap between them is large.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false
 - (4) Both (A) and (R) are false
- **32. Assertion (A):** The logic gate NOT can not built using diode.
 - **Reason (R):** The output voltage and the input voltage of the diode does not have 180° phase difference.
 - (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
 - (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
 - (3) (A) is true but (R) is false

- (4) Both (A) and (R) are false
- **33. Assertion (A):** Two p-n junction diodes placed back to back, will work as an n-p-n transistor.

Reason (R): The p-region of two p-n junction diodes back to back will form the base of n-p-n transistor.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false
- **34. Assertion (A):** When base region has larger width, the collector current decreases.

Reason (R): In transistor, sum of base current and collector current is equal to emitter current.

- (1) Both (A) & (R) are true and the (R) is the correct explanation of the (A)
- (2) Both (A) & (R) are true but the (R) is not the correct explanation of the (A)
- (3) (A) is true but (R) is false
- (4) Both (A) and (R) are false

	ANSWER KEY																			
Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	3	3	1	1	2	1	2	3	2	3	3	1	3	2	1	2	2	3	3	2
Que.	21	22	23	24	25	26	27	28	29	30	31	32	33	34						
Ans.	2	2	3	1	4	2	4	2	3	4	1	1	4	2						

