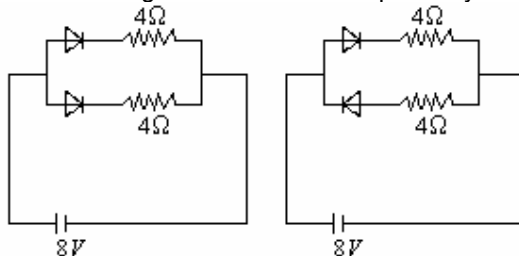


SEMICONDUCTOR DEVICES

PREVIOUS EAMCET BITS

ENGINEERING

1. Current flowing in each of the following circuits A and B respectively are: (2009 E)



(Circuit A)

(Circuit B)

- 1) 1A, 2A 2) 2A, 1A 3) 4A, 2A 4) 2A, 4A

Ans:3

Sol: In circuit 'A'

$$i = \frac{V}{R} = \frac{8}{2} = 4A$$

[both the 4Ω, resistors are in parallel and both the p-n junction diodes are forward biased] in circuit 'B'

$$i = \frac{V}{R} = \frac{8}{4} = 2A$$

[one p-n junction diode is in reverse bias, hence no current flows through this diode]

2. Among the following one statement is not correct when a junction diode is in forward bias (2008 E)
- 1) the width of depletion region decreases
 - 2) free electron on n- side will move towards the junction
 - 3) holes on p -side move towards the junction
 - 4) electron on n- side and holes on p-side will move away from junction

Ans: 4

Sol. Electrons on n-side and holes on p-side will move towards junction

3. In a n - type semiconductor , the fermi energy level lies (2007 E)
- 1) in the forbidden energy gap nearer to the conduction band.
 - 2) in the forbidden energy gap nearer to the valence band.
 - 3) in the middle of forbidden energy gap
 - 4) outside the forbidden energy gap

Ans: 1

4. Consider a p-n junction as a capacitor, formed with p and n material acting as thin metal electrodes and depletion layer width acting as separation between them. Basing on this assume that a n-p-n transistor is working as a amplifier in CE configuration. If C_1 and C_2 are the base-emitter and collector emitter junction capacitances, then : (2006 E)

- 1) $C_1 > C_2$ 2) $C_1 < C_2$ 3) $C_1 = C_2$ 4) $C_1 = C_2 = 0$

Ans: 1

5. An n-pn transistor power amplifier in C-E configuration gives (2005 E)
- 1) Voltage amplification only
 - 2) Current amplification only
 - 3) Both current and voltage amplification

4) Only power gain of unity

Ans: 3

6. In n-p-n transistor, in CE configuration: (2004E)

(a) The emitter is heavily doped than the collector

(b) Emitter and collector can be interchanged

(c) The base region is very thin but is heavily doped

(d) The conventional current flows from base to emitter

1. (a) and (b) are correct

2. (a) and (c) are correct

3. (a) and (d) are correct

4. (b) and (c) are correct

Ans: 3

Sol. a) In transistor emitter is heavily doped than collector.

b) Conventional current is opposite to the direction of flow of electrons.

7. When n - p - n transistor is used as an amplifier: (2003 E)

1. electrons move from base to collector

2. holes moves from emitter to base

3. holes move from collector to base

4. holes move from base to emitter

Ans: 1

8. In a transistor circuit, when the base current is increased by 50micro-amperes keeping the collector voltage fixed at 2 volts, the collector current increases by 1mA. The current gain of the transistor is

1) 20

2) 40

3) 60

4) 80

Ans: 1

Sol: Current gain of transistor $\beta = \frac{\Delta I_C}{\Delta I_B} = \frac{1 \times 10^{-3}}{50 \times 10^{-6}} = 20$

9. A common emitter transistor amplifier has a current gain of 50. If the load resistance is 4k, and input resistance is 500, the voltage gain of amplifier is (2001 E)

1) 100

2) 200

3) 300

4) 400

Ans :4

$$\text{Voltage gain} = 50 \times \frac{4000}{500} = 400$$

10. Consider the following statements A and B identify the correct of the give answer. (2000 E)

A) The width of the depletion layer in a p-n junction diode increases in forward biads.

B) In an intrinsic semiconductor the fermi energy level is exactly in the middle of the forbidden gap

1) A is true and B is false

2) Both A and B are false

3) A is false and B is true

4) Both A and B are true

Ans: 3

MEDICAL

11. A full-wave p-n diode rectifier uses a load resistor of 1500 Ω . No filter is used. The forward bias resistance of the diode is 10 Ω . The efficiency of the rectifier is (2009 M)

1) 81.2%

2) 40.6%

3) 80.4%

4) 40.2%

Ans: 1

12. If an intrinsic semiconductor is heated , the ratio of free electrons to holes is (2008 M)

1) greater than one

2) less than one

3) equal to one

4) decrease and becomes zero

Ans: 3

Sol. In an intrinsic semiconductor number of free electron and holes are equal when they are heated because it is a pure semiconductor

13. In a transistor circuit the base current changes from 30 to 90 . If the current gain of the transistor is 30, the change in the collector current is **(2007 M)**

- 1) 4 mA 2) 2 mA 3) 3.6 mA 4) 1.8 mA

Ans : 4

Sol: $\Rightarrow \beta = \frac{\Delta I_C}{\Delta I_B} \Rightarrow 30 = \frac{\Delta I_C}{(90 - 30)\mu A}$

$$\Delta I_C = 30 \times 60 \times 10^{-6} = 1800 \times 10^{-6}$$

$$= 1.8 \text{mA}$$

14. Ap-n-p transistor is said to be in active region of operation, When : **(2006 M)**

- 1) Both emitter junction and collector junction are forward biased
 2) Both emitter junction and collector junction are reverse biased
 3) Emitter junction is forward biased and collector junction is reverse biased
 4) Emitter junction is reverse biased and collector junction is forward biased

Ans: 3

Sol. In an active region emitter junction is forward biased and collector junction is reverse biased.

15. Consider the following statements A and B and identify the correct answer **(2005M)**

- A) : Germanium is preferred over silicon in the construction of zener diode.
 B) : Germanium has high thermal stability than silicon in the construction of Zener diode

- 1) Both (A) and (B) are true
 2) Both (A) and (B) are false
 3) (A) is true but (b) is false
 4) (A) is false but (B) is true

Ans: 2

16. A Zener diode when used as a voltage regulator is connected **(2004 M)**

- (a) in forward bias (b) in reverse bias
 (c) in parallel to the load
 (d) in series to the load

- 1) (a) and (b) are correct 2) (b) and (c) are correct
 3. (a) only is correct 4. (d) only is correct

Ans: 2

Sol. To use Zener diode as a voltage regulator it is connected in reverse bias and parallel to the load.

17. Consider the following statements A and B and identify the correct answer **(2003M)**

- (A) A Zener diode is always connected in reverse bias to use it as voltage
 (B) The potential barrier of a p - n junction lies between 0.1 to 0.3V, approximately

1. A and B are correct 2. A and B are wrong
 3. A is correct but B is wrong 4. A is wrong but B is correct a conductor

Ans: 1

Sol. To use Zener diode as a voltage regulator it is connected in reverse bias and parallel to the load.

18. The current gain of transistor in a common emitter circuit is 40. The ratio of emitter current to base current is **(2002M)**

- 1) 40 2) 41 3) 42 4) 43

Ans :2

Sol: $I_E = I_C + I_B$

$$\Delta I_E = \Delta I_C + \Delta I_B$$

$$\Rightarrow \frac{\Delta I_E}{\Delta I_B} = \frac{\Delta I_C}{\Delta I_B} + 1 = 40 + 1 = 41$$

19. The current gain (β) of a transistor in common emitter mode is 40. To change the collector current by 160mA, the necessary change in the base current is (at constant V_{CE}) **(2001 M)**

- 1) 0.25A 2) 4 A 3) 4mA 4) 40mA

Ans :3

$$\beta = \frac{\Delta I_c}{\Delta I_B} \Rightarrow \Delta I_B = \frac{\Delta I_c}{\beta} = 4mA$$

20. An n-type and p-type silicon can be obtained by doping pure silicon with **(2000 M)**

- 1) Arsenic and phosphorous 2) Indium and aluminium
3) Phosphorous and indium 4) aluminium and boron

Ans: 3

Sol. For obtaining 'n' type semi conductor V group element is doped with silicon.

Ex: Phosphorus

For obtaining 'p' type semiconductor III group element is doped with silicon.

Ex: Indium
