Chapter 16. Semiconductors Devices

MCQ'S (1 Mark Each)

1). In a Bipolar junction transistor, the largest current flows though

(a) in the emitter (b) in the collector (c) in the base (d) through CB junction

Ans: (a) in the emitter

2). A LED emits visible white light when its

(a) junction is reversed biased (b) depletion layer widens

(c) holes and electrons recombine (d) junction becomes hot

Ans: (c) holes and electrons recombine.

3). Solar cell operates on a principle of

(a) diffusion (b) recombination (c) photovoltaic action (d) carrier flow

Ans: (c) photovoltaic action

4). The Boolean expression for Exculsive OR gate (X-OR gate) is

(a) A+B (b) $A \oplus B$ (c) $\overline{A + B}$ (d) A.B

Ans: (b) $A \oplus B$

5). In a common base configuration, the transistor has emitter current of 10 mA and collector current of 9.8 mA. The value of base current is….

(a) 0.1 mA (b) 0.2 mA (c) 0.3 mA (d) 0.4 mA

Ans: (b) 0.2 mA

6). For a transistor $\beta = 75$ and $I_E = 7.5$ mA. The value of α is….

(a) 0.1 (b) 0.66 (c) 0.75 (d) 0.98

Ans: (d) 0.98

7). In a transistor amplifier, $I_C = 5.5$ mA , $I_E = 5.6$ mA. The current amplification factor β is…

(a) 45 (b) 50 (c) 55 (d) 60

Ans : (c) 55

8). For which logic gate the following statement is true

The output is low, if and only if all inputs are low

(a) AND (b) NOR (c) NAND (d) OR

Ans : (d) OR

Very Short Answer (VSA) (1 MARK Each)

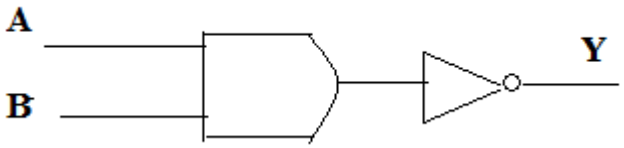
1. State any two special purpose diodes
2. What is the purpose of capacitor filter in regulated power supply?
3. State the logical expression for NAND gate.
4. Which method of biasing is used for operating transistor as amplifier?
5. Draw the circuit symbol of PNP transistor.
6. For a transistor I_C = 15 mA, I_B = 0.5 mA. What is the current amplification factor?

(Hint: $\beta = \frac{I_C}{I_B}$)

7. Give the truth table for NOR gate.
8. What is the need of rectification in regulated power supply?
9. Give circuit symbol of a Zener diode.
10. State any two applications of Zener diode

Short Answer I (SA1) (2 MARKS Each)

1. Draw a neat labelled circuit diagram of full wave rectifier using semiconductor diode.
2. Draw a neat labelled circuit diagram for transistor as common emitter amplifier.
3. State any two advantage and disadvantage of a photodiode.
4. State the advantages of full wave rectifier
5. Define current amplification factor α_{DC} and β_{DC} Obtain the relation between them.
6. Draw the block diagram of a simple rectifier circuit with respective output waveform
7. Give the truth table and Boolean expression for



Short Answer II (SA2) (3 MARKS Each)

1) Draw the circuit diagram of a half wave rectifier. Hence explain its working.
2) Explain the construction and working of solar cell.
3) Explain the working of LED.

4) Explain the principle of operation of a photodiode.
5) What is a logic gate? Draw the symbol and give the truth table for NOT gate. Why NOT gate is called inverter?
6) Explain the working of PNP transistor?
7) Draw the circuit symbol for NPN and PNP transistor. What is the difference in Emitter, Base and Collector regions of a transistor?
8) With neat circuit diagram explain the use of a Zener diode as a voltage regulator.

Long Answer (LA) (4 marks Each)

1) With the help of neat diagram, explain the working of npn transistor?
2) With the help of neat circuit diagram, explain transistor as an amplifier?
3) Define dark current of photodiode. What are the advantages and disadvantages of photodiode?
4) Draw the circuit diagram to study the characteristic of transistor in common emitter mode. Draw the input and output characteristic.