(b) What is a flip-flop ? What are different types of flip-flops ? Design a 3-bit counter using flip-flops.

(c) Explain with a neat diagram, the working of a bridge rectifier.

(d) What is shift register ? What are the applications of shift register ? Design a shift register using flip-flops.

5. Write short notes on ***any two*** of the following : 5×2=10

(a) Universal logic gates

(b) Capacitors

(c) Multiplexer

(d) Oscillators

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2024

BASIC ELECTRONICS

Paper : BCA–HG–2016

Full Marks : 80

Time : Three hours

The figures in the margin indicate full marks for the questions.

1. Fill in the blanks : 1×8=8

(a) The binary number 10101 is equivalent to decimal number _____.

(b) The unit of resistances is _____.

(c) The knee voltage for silicon *p-n* junction is _____ volt.

(d) Diode is used as a _____.

(e) The octal number system has a base of _____.

(f) Oscillator employs _____ feedback.

(g) The main function of a capacitor is _____.

(h) A transistor has _____ terminals.

2. Answer the following questions in short : 2×6=12

(a) Write *two* properties of semiconductor materials.

(b) What do you mean by forward and reverse biasing of a *p-n* junction diode ?

(c) Draw the symbol of NPN transistor and specify the terminals.

(d) Write *two* applications of flip-flop.

(e) Write the truth table of an exclusive OR (XOR) gate.

(f) How will you obtain NOT gate from NAND gate ?

3. Answer ***any four*** questions from the following : 5×4=20

(a) Draw and explain the V-I characteristic of a *p-n* junction diode.

(b) Explain the basic laws of Boolean algebra.

(c) What do you mean by minterm and maxterm ? Draw the logic diagram of the following :

$$Y = (A + BC)(B + \bar{C}A)$$

(d) Design a S-R flip-flop using NAND gates. Write its truth table.

(e) Mention some advantages of negative feedback.

(f) Describe briefly different types of filters.

(g) Explain briefly the working of a NPN transistor.

(h) Simplify the Boolean function :

$f(A,B,C,D) = \sum m(0,1,2,3,5,7,8,9,11,14)$

4. Answer ***any three*** of the following questions : 10×3=30

(a) What are different transistor configuration ? Explain CE configuration with neat diagram.