

ENGINEERING

Part-I

Q1 Answer the following questions: (2 x 10)

- a) Draw the equivalent circuit diagram of a transistor.
- b) Draw V-I characteristics of the ideal diode.
- c) What are the applications of CC configuration of transistor?
- d) Define CMRR.
- e) Distinguish between BJT and FET.
- f) Draw the circuit diagram of an Op-amp differentiator.
- g) Write the characteristics of ideal op-amp.
- h) Draw logic gate symbols for NOR & NAND gates.
- i) Draw the NOR gate using NAND gates only.
- j) $(155)_{10} = (?)_8$ and $(101110)_2 = (?)_{16}$.

Part-II

Q2 Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve) (6 × 8)

- a) Explain the forward and reverse characteristics of a silicon diode.
- b) With respect to BJT, describe the concept of obtaining the DC load line.
- c) With a neat circuit diagram and waveforms explain the working of full wave bridge rectifier and find its ripple factor.
- d) Explain how a Zener diode can be used as voltage regulator by considering the no load and loaded condition.
- e) Explain the Enhancement type MOSFET along with the drain characteristics.
- f) Explain the working of an n-channel JFET.
- g) Design a circuit which produces the output voltage $V_0 = -(V_1 - 2V_2 + 3V_3)$ using OpAmp with minimum resistance value $60K\Omega$.

h) Describe the block diagram representation of an Op-Amp. Also describe its operational behavior with an equivalent circuit.

i) Derive the output voltage of a differentiator circuit using Op-Amp.

j) Design a half adder using NOR gates only.

k) Design an EX-NOR gate using minimum number of NAND gates.

l) Design Full Adder and Implement it using two half adders.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 Explain various types of diodes, its constructional details, and input output characteristics. (16)

Q4 Explain in detail about various types of FETs, its constructional details, merits, and applications. (16)

Q5 Explain how Op-Amp can be used as i) Integrator ii) Inverting Summer and iii) Voltage Follower (16)

Q6 Design a half adder, full adder, half subtractor with NOR gates only. (16)