Printed Page:- 03 **Subject Code:- ACSBS0202**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (2022-2023)

Subject: Principles of Electronics

Time: 2 Hours **Max. Marks: 50**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* **three Sections -A, B, & C.** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION A **15**

1. Attempt all parts:-

1-a. A semiconductor has..... temperature coefficient of resistance. (CO1) 1

(a) Positive

(b) Negative

(c) Both may be possible

(d) None of the above

1-b. PN junction is formed by combining p and n-type semiconductors with a special type of.....bonding. (CO2) 1

(a) chemical

(b) mechanical

(c) physical

(d) None of the mentioned

1-c. Which of the following are true for a PNP transistor? (CO3) 1

(a) the emitter current is less than the collector current

(b) the collector current is less than the emitter current

(c) the electrons are majority charge carriers

(d) the holes are the minority charge carriers

1-d. A JFET is also called ..... transistor. (CO4) 1

(a) unipolar

(b) bipolar

(c) unijunction

(d) none of the above

1-e. If the original input signal and the feedback signal are.....then it is negative feedback. (CO5) 1

(a) in phase

(b) 180 degree out of phase

(c) 90 degree out of phase

(d) 60 degree out of phase

2. Attempt all parts:-

2.a. Define the term: Diffusion current and Drift current (CO1) 2

2.b. Why does Ge diode produce higher reverse saturation current? (CO2) 2

2.c. A 2N 3298 transistor has a typical β_{dc} of 90. If the collector current is equal to 15 mA, calculate (approximate values) base current and emitter current. (CO3) 2

2.d. Justify JFET is voltage controlled device. (CO4) 2

2.e. Mention any four characteristics of ideal and practical op-amp. (CO5) 2

SECTION B **15**

3. Answer any <u>three</u> of the following:-

3-a. Differentiate between n-type and p-type semiconductor . (CO1) 5

3-b. A Ge diode carries a current of 1mA at room temperature when a FB of 0.15V is applied. Estimate the reverse saturation current at room temperature. (CO2) 5

3.c. Derive the expression for current relations in CE configuration . (CO3) 5

3.d. Determine r_d , g_m, and μ for a JFET and explain how to obtain them from the characteristics . (CO4) 5

3.e. Draw and explain unity gain amplifier and non-inverting amplifier and find the output voltages in terms of input voltage. Explain why the operational amplifier is called operational amplifier. (CO5) 5

SECTION C **20**

4. Answer any <u>one</u> of the following:-

4-a. Why intrinsic semiconductors behave like insulators at low temperature? (CO1) 4

4-b. Explain Plasticity, Malleability, Brittleness, and Weldability with examples. (CO1) 4

5. Answer any <u>one</u> of the following:-

5-a. What you mean by dynamic resistance? Derive an expression for the dynamic resistance of a diode. (CO2) 4

5-b. What are the various breakdown mechanisms in junction diode? Explain (CO2) 4

6. Answer any <u>one</u> of the following:-

6-a. The collector and base current of n-p-n transistor are measured as I_C = 5mA, I_B = 50 μA and I_{CBO} = 1 μA. (CO3) 4

(i) Determine α, β, and I_E.

(ii) Determine the new level of I_B required to produce I_C = 10 mA.

6-b. Explain the operation of p-n-p Transistor in the active region. (CO3) 4

7. Answer any <u>one</u> of the following:-

7-a. Draw and explain the transfer and drain characteristics of a n-channel enhancement MOSFET. (CO4) 4

7-b. Define the term Transconductance . Also derive the expression (CO4) 4

$$g_m = \frac{-2I_{DSS}}{V_P}\left[1 - \frac{V_{GS}}{V_P}\right]$$

8. Answer any <u>one</u> of the following:-

8-a. Explain the terms in op-amp. (i) Slew rate (ii) CMRR (CO5) 4

8-b. Explain the operation of differentiator and derive output expression with neat sketch. (CO5) 4