Printed Page:-03 Subject Code:- BCSBS0202

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (2024-2025)

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. An intrinsic semiconductor at absolute zero _____ (CO1, K2) 1

(a) becomes p-type extrinsic semiconductor

(b) behaves like an insulator

(c) becomes n-type extrinsic semiconductor

(d) becomes superconductor

1-b. Varactor diode is a semiconductor diode in which the _____ can be varied as a function of reverse voltage of the diode. (CO2, K2) 1

(a) junction resistance

(b) junction capacitance

(c) junction impedance

(d) none of the mentioned

1-c. The transfer of a signal in a transistor is from_____ (CO3, K2) 1

(a) low to high resistance

(b) high to low resistance

(c) collector to base junction

(d) emitter to base junction

1-d. The input impedance of a JFET is_____that of an ordinary transistor. (CO4, K2) 1

(a) equal to

(b) less than

(c) more than

(d) none of the above

1-e. In which configuration is an op-amp typically used for voltage amplification? (CO5, K2) 1

(a) inverting amplifier

(b) non-inverting amplifier

(c) voltage folllower

(d) both (a) and (b)

2. Attempt all parts:-

2.a. Define the term: Diffusion current and Drift current. (CO1, K2) 2

2.b. Compare Zener and Avalanche breakdowns. (CO2, K2) 2

2.c. Why BJT is a current controlled device? (CO3, K2) 2

2.d. Define transconductance and amplification factor in reference to JFET. (CO4, K2) 2

2.e. Define CMRR and Slew Rate in reference to op-amp. (CO5, K2) 2

SECTION-B 15

3. Answer any three of the following:-

3-a. Explain the formation of space charge region and barrier potential in reference to p-n junction diode. (CO1, K2) 5

3-b. Define rectification. Draw circuit and explain the working of center tapped rectifier. Draw its waveforms also. (CO2, K4) 5

3.c. Draw and explain the input and output characteristics of common base (CB) configuration using NPN bipolar junction transistor. Indicate all the region of operations also. (CO3, K2) 5

3.d. Explain the construction and working of N type-EMOSFET. Also draw the drain and transfer characteristics. (CO4, K2) 5

3.e. Derive expression for inverting configuration of OPAMP. An inverting operational amplifier has an input voltage of 1V. The input resistance (R_1) = 5KΩ and feedback resistance (R_f) is 50KΩ. Find the output voltage (V_o)and voltage gain (A_v) of the amplifier. (CO5, K4) 5

SECTION-C 20

4. Answer any one of the following:-

4-a. Write down Shockley diode current equation and explain each term. The reverse saturation current through Si diode is 0.2mA at room temperature 300 ^oK. The corresponding forward voltage is 0.7V. Calculate the forward current through diode. Given thermal voltage is 26mV and emission coefficient 2. (CO1, K4) 4

4-b. Draw and explain the V-I characteristics of p-n junction diode. (CO1, K2) 4

5. Answer any one of the following:-

5-a. Explain the transition capacitance (C_T) of a p-n junction diode. (CO2, K4) 4

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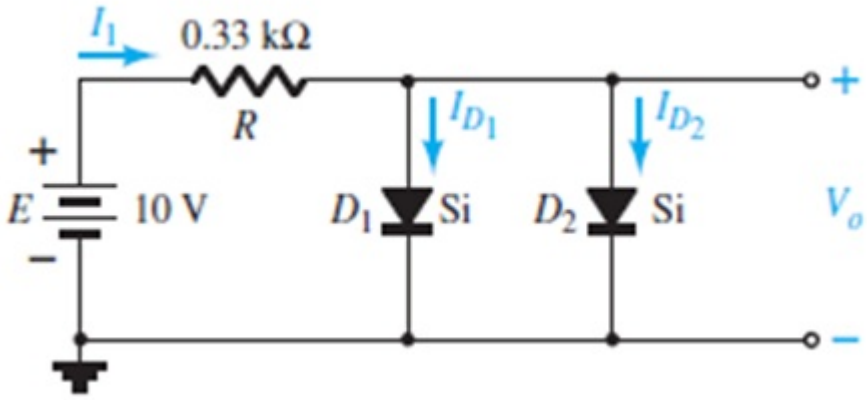
5-b. Determine V_o, I_1, I_{D1} and I_{D2} for the parallel diode configuration shown in figure. (CO2, K4) 4



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

6-a. Define current amplification factors α and β in reference to BJT. How α and β are related to each other? Derive their relation. (CO3, K2) 4

6-b. What do you understand by transistor action? Explain working principal of NPN BJT in brief. (CO3, K2) 4

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

7-a. What are the advantages of FET over BJT? How is an FET used as a Voltage Variable Resistance? (CO4, K4) 4

7-b. What is Full-Subtractor? Explain with the help of truth table and logic circuit diagram. (CO4, K4) 4

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

8-a. Define differential gain, common mode gain for differential amplifier and calculate the output voltage. (CO5, K2) 4

8-b. Define non-inverting configuration. In a non-inverting amplifier, if the input voltage (V_{in}) is 1.5V, and the feedback resistor is 20KΩ while the input resistor is 5KΩ, what is the output voltage (V_o)? (CO5, K4) 4