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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (2025- 2026)

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:-

- (1.1) Free electrons exist in..... (CO1, K1) 1
- (a) Valence band
- (b) Conduction band
- (c) Free band
- (d) Second band
- (1.2) The C_T and C_D exists inand.....bias. (CO2, K1) 1
- (a) Reverse, Forward
- (b) Forward, Reverse
- (c) Forward, Forward
- (d) Reverse , Reverse
- (1.3) When does the transistor act like an open switch? (CO3, K1) 1
- (a) cut off region
- (b) inverted region
- (c) saturated region
- (d) active region
- (1.4) A MOSFET is sometimes called JFET. (CO4, K1) 1
- (a) many gate
- (b) open gate
- (c) insulated gate
- (d) shorted gate
- (1.5) The ratio between differential gain and common-mode gain is called.....(CO5, K1) 1

- (a) amplitude
- (b) differential-mode rejection
- (c) common-mode rejection
- (d) Phase

2. Attempt all parts:-

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|-------|--|---|
| (2.1) | Define the term doping with reference to semiconductor. (CO1, K1) | 2 |
| (2.2) | Draw full wave rectifier circuit with center-tapped transformer. Draw the waveforms also. (CO2, K2) | 2 |
| (2.3) | Why transistor is called a bipolar device? (CO3, K1) | 2 |
| (2.4) | Prove that in JFET, the product of dynamic drain resistance and transconductance is equal to the amplification factor. (CO4, K2) | 2 |
| (2.5) | Draw the block diagram of op-amp. (CO5, K1) | 2 |

SECTION-B

15

Answer any one of the following:-

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|-------|--|---|
| (3.1) | Explain the behaviour of p-n junction at no bias, forward bias, and reverse bias. Sketch the V-I characteristics of p-n junction diode.(CO1, K1) | 3 |
| (3.2) | Show that the voltage temperature equivalent at room temperature (27°C) is equal to ~26 mV.(CO1, K3) | 3 |

Answer any one of the following:-

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|-------|---|---|
| (3.3) | Draw circuit and explain the working of half wave rectifier. Draw its waveforms also. (CO2, K2) | 3 |
| (3.4) | Explain the transition capacitance of a p-n junction with C-V curve. (CO2, K2) | 3 |

Answer any one of the following:-

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|-------|--|---|
| (3.5) | 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, K3) | 3 |
| (3.6) | Define α and β . How α and β are related to each other? Derive the relation. (CO3, K2) | 3 |

Answer any one of the following:-

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|-------|---|---|
| (3.7) | Explain the construction and working of N type-EMOSFET. Also draw the drain and transfer characteristics. (CO4, K2) | 3 |
| (3.8) | What are the logic gates & types? Explain with the help of algebraic expressions, symbol and truth table.(CO4, K2) | 3 |

Answer any one of the following:-

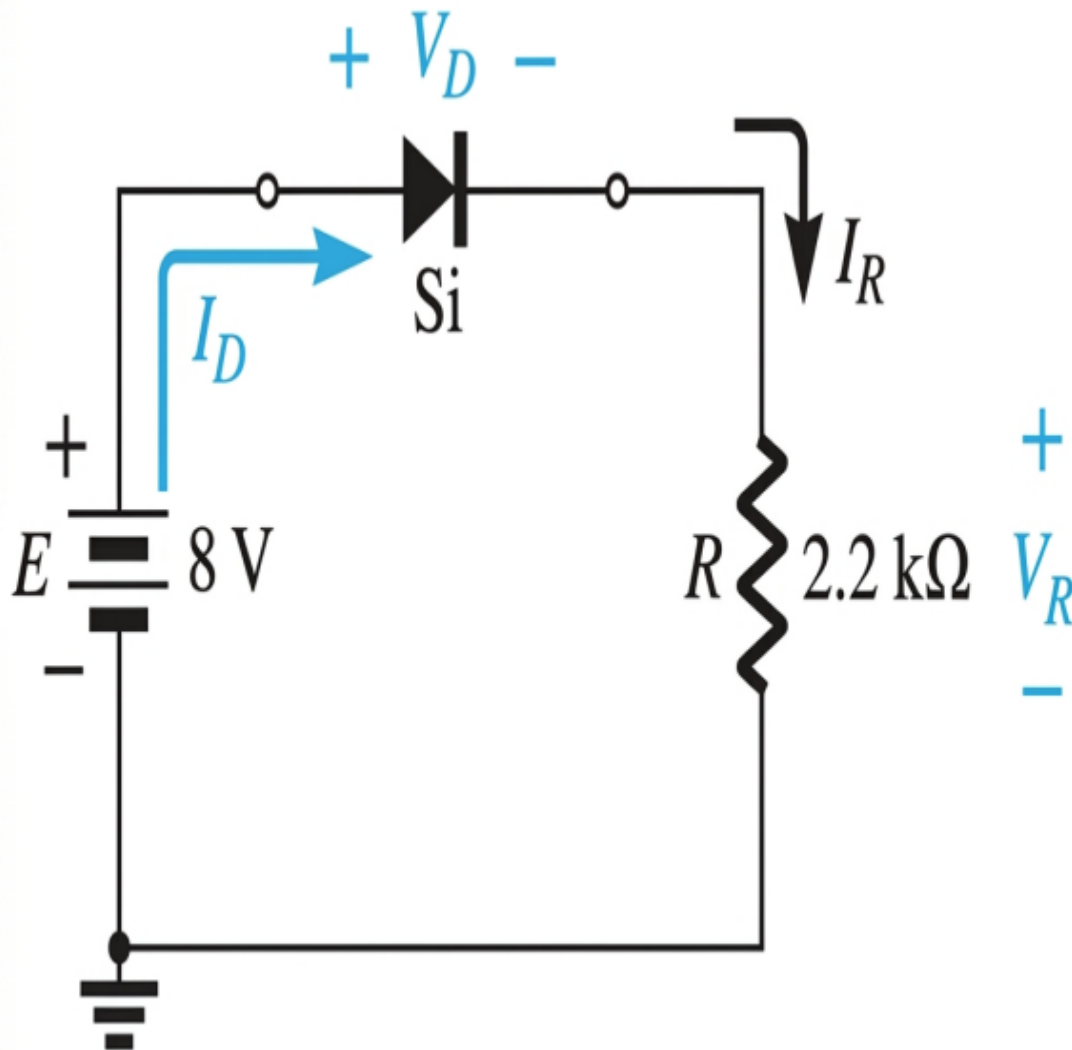
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|--------|---|---|
| (3.9) | Draw and explain the derivative circuits (differentiator) using an Op-Amp. Derive the output expression. (CO5, K2) | 3 |
| (3.10) | Define voltage follower/unity gain (Proportional) and find an expression for its voltage gain. Also, Draw the circuit of voltage follower (Proportional) using inverting amplifier. (CO5, K2) | 3 |

SECTION-C

20

4. Answer any one of the following:-

- (4.1) Define diffusion current and Drift current in a semiconductor. (CO1, K1) 4
- (4.2) The forward current through the Si diode is 10 mA at room temperature (27 degree C). The corresponding forward voltage is 0.75 Volts. Calculate the reverse saturation current I_0 . (CO1, K3) 4
5. Answer any one of the following:-
- (5.1) Draw the circuit diagram of Full Wave Rectifier (Bridge) and explain its operation with output waveforms. (CO2, K3) 4
- (5.2) For the series diode configuration shown in fig. determine V_D , V_R and I_D . (CO2, K3) 4



6. Answer any one of the following:-
- (6.1) Explain the mechanism and principal of operation of BJT in brief. (CO3, K1) 4
- (6.2) Define Current Amplification Factor for CB, CE, CC Configuration. (CO3, K2) 4
7. Answer any one of the following:-
- (7.1) Explain briefly the operation of n channel D MOSFET, When $V_{GS}=0$ Volts. (CO4, K1) 4
- (7.2) What is Full-Adder? Explain with the help of truth table and circuit diagram. (CO4, K2) 4
8. Answer any one of the following:-
- (8.1) Determine the output voltage of an Op-Amp for input voltages of 200 V and 140 V. 4

The amplifier has a differential gain of 6000 and the value of CMRR is 200. (CO5, K3)

(8.2) Explain the concept of Virtual ground and Virtual short in an Op Amp. (CO5, K1)

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