



इलेक्ट्रॉनिक्स एवं संचार अभियंत्रिकी विभाग
राष्ट्रीय प्रौद्योगिकी संस्थान
हमीरपुर - १७७००५ (हि.प्र.) भारत

Basic Electronics Engineering(EC-101)

End term Examination

[Time Duration: 3 hours]

Roll No.:

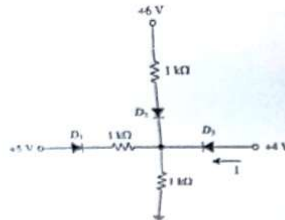
March 1, 2023

Max. Marks

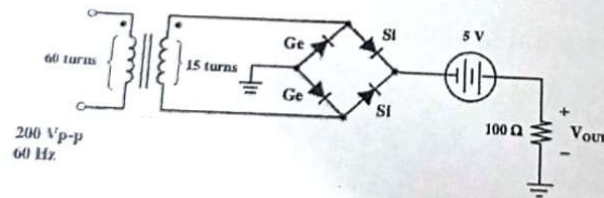
[50 Marks]

Note: Attempt any ten questions. Take suitable assumptions wherever required. Use of calculator is allowed.

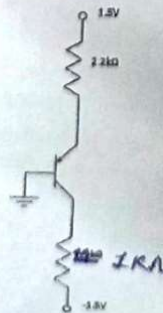
1. The resistivity of a uniformly doped n-type silicon sample is $0.5 \Omega - cm$. If the electron mobility (μ_n) is $1250 cm^2/(V - sec)$. Find the donor impurity concentration (N_D) in the sample. [5 marks]
2. For the diode circuit below, determine the current, I (indicated in the graph), using the constant voltage model with $V_{on} = 0.7V$? [5 marks]



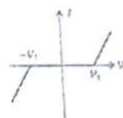
3. Consider the figure in the circuit below. Sketch the output waveform of the voltage across R_L , i.e. V_{OUT} ? [5 marks]



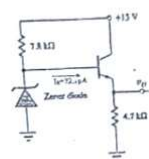
4. Draw Input and Output characteristics of BJT in CE configuration using suitable graphs. How it can be used as an amplifier? [5 Marks]
5. For the silicon transistor used in the circuit below, find the value of V_{EC} , I_B , I_C and I_E . Take the value of β equal to 50 and $V_{BE} = 0.7V$. [5 marks]



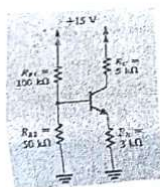
6. Design a circuit using diodes which exhibit terminal characteristics as shown in figure? You can assume diodes to be ideal and any value of voltage source, resistance or any other component as per requirement? [5 Marks]



7. Find the V_o and I_E of the circuit shown below. Take the value of β equal to 50 and $V_{BE} = 0.7V$. For Zener diode $V_z = 6V$, $R_z = 0$ and $I_s = 10^{-16}A$. Also Identify the role of the circuit. [5 marks]

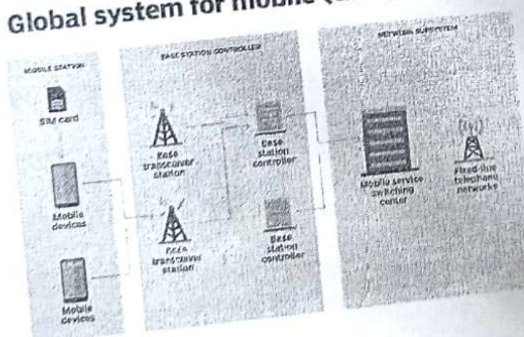


8. JFET is a current or Voltage controlled device? Explain the working of a JFET using suitable circuit, graph and mathematical relations? [5 marks]
9. In the circuit below identify the biasing technique? Also find the operating point where $\beta = 100$ and $V_{BE} = 0.7V$. How change in temperature from $25^\circ C$ to $45^\circ C$ affects the operating point? [5 marks]



10. The diagram of a mobile communication system is shown below. Explain working of the system and identify the transmitter, receiver and channel from the diagram. [5 marks]

Global system for mobile (GSM) network



11. (a) Explain clipper circuit using an application? [1 Marks]
 (b) Why Photo diode operates in the reverse bias only? [1 Marks]
 (c) How temperature affects stability of the operating points of a BJT? [1 Marks]
 (d) Can two discrete diodes connected back to back can work as a transistor? comment. [1 Marks]
 (e) In a buffer circuit, input resistance required is very high. Which semiconductor device you will prefer for high input resistance and why? [1 Marks]



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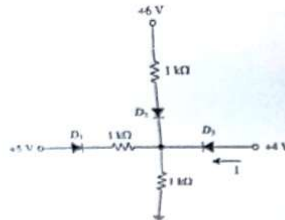
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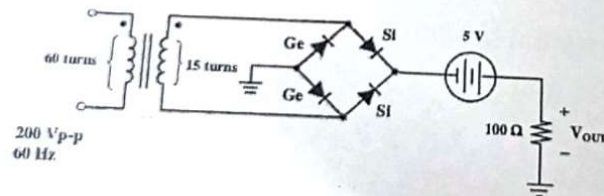
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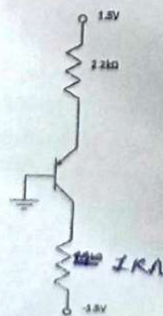
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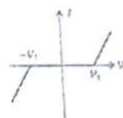
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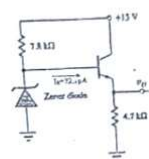
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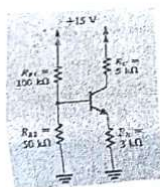
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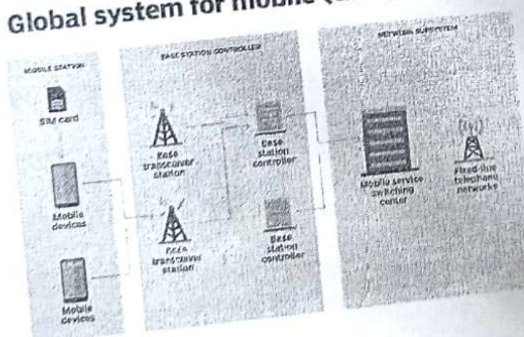


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