

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

SET B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester I - 2023

Course Code : ECE1006

Course Name : Basic Electronics Engineering

Program : B.Tech.

Date : 12-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

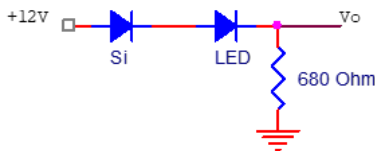
ANSWER ALL THE QUESTIONS

5 X 2M = 10M

1. Impurities into a semiconductor are added to actually increase the electric conductivity. The process of adding an impurity into the semiconductor is known as doping. What are the penta-valent and trivalent impurities?

(CO1) [Knowledge]

2. Series connection of diode increases the resultant forward voltage and reverse blocking capabilities. Determine V_o and I . Given $V_{LED}=1.8V$.



(CO1) [Knowledge]

3. A bipolar junction transistor is a three-terminal semiconductor device which is capable to amplify the input signal. A transistor has $I_B=100\mu A$ and $I_C=2mA$. Find α and β of the transistor.

(CO2) [Knowledge]

4. An amplifier is an electronic device that increases the voltage, current, or power of a signal. Differentiate between voltage and Power Amplifier.

(CO3) [Knowledge]

5. MOSFET is a simple electronic switch that connects two of its terminals when a control voltage on a third terminal is high enough. What is the difference between E-MOSFET and D-MOSFET.

(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

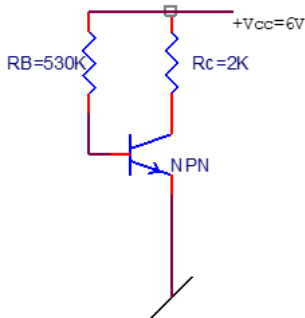
5 X 10M = 50M

6. (a) The movement of charge carriers inside the P-N junction is the reason behind the current flow in the diode on applying the voltage across it. Draw and explain the V-I Char of Diode and also show the effect of temp on V-I characteristics of diode. (5 Marks)

(b) A voltage multiplier is an electrical circuit that converts AC electrical power from a lower voltage to a higher DC voltage, typically using a network of capacitors and diodes. Explain the full wave voltage Doubler with diagram. (5 Marks)

(CO1) [Comprehension]

7. (a) The proper flow of zero signal collector current and the maintenance of proper collector emitter voltage during the passage of signal is known as **Transistor Biasing**. Figure shows a fixed bias circuit. Determine I_B , I_C , V_{CE} , V_{BC} for $\beta=100$. . Given $R_B=530K\Omega$, $R_C=2K\Omega$, $V_{cc}=6V$. (5 Marks)



(b) A transistor is a semiconductor device which transfers a weak signal from low resistance circuit to high resistance circuit. Explain the Input and output characteristics of a common base configuration indicating saturation, cut-off and active region. (5 Marks)

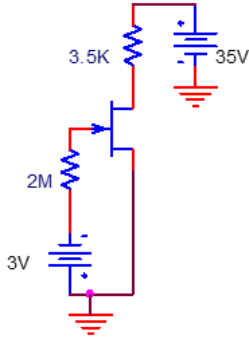
(CO2) [Comprehension]

8. (a) Power amplifier is an amplifier that has a high-power-output stage. A power amplifier is a type of amplifier created to boost the strength of an input signal. Explain the Complementary Symmetry Push-Pull Class B Amplifier with circuit diagram. (5 Marks)

(b) Power amplifiers boost the input signal's strength to a level that may drive numerous output devices, including speakers, headphones, RF transmitters, etc. Explain the Block Diagram of Power Amplifier. (5 Marks)

(CO3) [Comprehension]

9. (a) Biasing is known as setting of initial operating conditions of an active device in an amplifier. Determine V_{GSQ} , I_{DQ} , V_{DS} , V_S , V_G , V_D for a JFET. Given $I_{DSS}=12\text{mA}$, $V_P=-6\text{V}$, $R_D=3.5\text{K}\Omega$, $R_G=2\text{M}\Omega$, $V_{DD}=35\text{V}$, $V_{GG}=-3\text{V}$.



(5 Marks)

- (b) The Junction Field Effect Transistor is a unipolar device in which current flow between its two electrodes is controlled by the action of an electric field at a reverse biased pn-junction. Prove that $g_m = g_{m0} \left(1 - \frac{V_{GS}}{V_P}\right)$ in JFET. (5 Marks)

(CO4) [Comprehension]

10. A MOSFET is a field-effect transistor with an insulated gate where the voltage determines the conductivity of the device. Deduce the expression for overall voltage gain, input and output impedance in common Source amplifier in MOSFET.

(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 20M = 40M

11. BJT amplifier is basically a bipolar junction transistor operated in the active region. It increases the strength of the input signal and produces an amplified output. Explain the frequency response of CE amplifier in LF, HF and mid- band with cut off frequency. Derive the expression of external capacitors on frequency response.

(CO3,CO2) [Application]

12. MOSFETs are used as an amplifiers, they should be operated in ohmic region where the current flow throughout the device increases when the applied voltage is increased. Deduce the expression for overall voltage gain, input and output impedance in common gate amplifier in MOSFET.

(CO4) [Application]