Code No: R203104O **R20** SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, December -2023
BASIC ELECTRONICS
(Com to EEE,ME,CSE,IT,CSE(AI),CSE(AIML),CSE(CS),CSE(IOT),CSE(DS),AIML,AIDS,CS)
Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Describe the formation of P-N junction diode. [7M]
   b) Sketch the energy level diagrams for conductors and semiconductors. [7M]

(OR)

2. a) Describe the formations of P-type and N-type semiconductor materials and compare them. [7M]
   b) Discuss about the V-I characteristics of a p-n junction diode, and its temperature dependence. [7M]

UNIT-II

3. a) Write a short notes on varactor diode and its applications. [7M]
   b) The current through silicon diode is If =50 mA in a forward bias of Vf =0.6 V. Calculate the static resistance. [7M]

(OR)

4. a) Explain the tunneling mechanism with the suitable energy band diagrams in tunnel diode. [7M]
   b) Explain V-I characteristics of Zener diode. [7M]

UNIT-III

5. a) Draw and explain the input and output characteristics of a transistor in CE configuration. [7M]
   b) Derive the equations for voltage gain, current gain, input impedance and output admittance for a BJT using low frequency h-parameter model for CB configuration. [7M]

(OR)

6. a) Derive the equations for voltage gain, current gain, input impedance and output admittance for a BJT using low frequency h-parameter model for CE configuration. [7M]
   b) Distinguish between the different types of transistor configurations with necessary circuit diagrams. [7M]

UNIT-IV

7. a) Explain the working of a P channel JFET and draw the V-I characteristics of it. [7M]
   b) Explain the working of a depletion type MOSFET with a neat construction diagram and its characteristics. [7M]

(OR)

8. a) Explain the FET Common Drain Amplifier. [7M]
   b) Draw and explain drain and transfer characteristics of depletion type MOSFET. [7M]

UNIT-V

9. a) Mention the mode of operation of IGBT and mention the applications of power IGBT [7M]
   b) With neat sketch, explain the characteristics of Silicon Controlled Rectifiers. [7M]

(OR)

10. a) With neat sketch, explain the characteristics of Unijunction Transistor. [7M]
    b) With neat sketch, explain the characteristics of Silicon Controlled Rectifiers. [7M]

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Code No: R203104O **R20** SET - 2

III B. Tech I Semester Regular/Supplementary Examinations, December -2023
BASIC ELECTRONICS
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Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Draw the circuit diagram for full-wave bridge rectifier and explain its principle of operation [7M]
   b) Calculate the percentage ripple for the voltage developed across a 120 μF capacitor when providing a load current of 80 mA. The full-wave rectifier operating from the 50Hz supply develops a peak rectified voltage of 24 V. [7M]

(OR)

2. a) Discuss about Fermi level in intrinsic and extrinsic semiconductor materials. [7M]
   b) Determine the concentration of free electrons and holes in a sample of Ge at 3000K which has a concentration of donor atoms equal to 2×10^{14} atoms/cm3 and a concentration of acceptor atoms equal to 3×10^{14} atoms/ cm^3 [7M]
   Is this p –or n –type Germanium? Justify your answer.

UNIT-II

3. a) What is photo diode? Explain its construction and operation. [7M]
   b) Explain principle of operation of LED, and PIN diodes. [7M]

(OR)

4. a) Give the quantitative theory of p-n diode currents and hence deduce the diode equation. [7M]
   b) With suitable sketches explain the principle of operation of Tunnel Diode. [7M]

UNIT-III

5. a) Explain the operation of CC Configuration of BJT and its input and outputcharacteristics briefly. [7M]
   b) What is Biasing? Explain the need of it. List out different types of biasing methods. [7M]

(OR)

6. a) Write the current components of NPN transistor. [7M]
   b) A transistor has the leakage current is 0.1 μA in Common Base configuration, while it is 16μ A when it is connected in CE configuration. Calculate α and β. [7M]

UNIT-IV

7. a) Describe the operation of common drain FET amplifier and derive the equation for voltage gain. [7M]
   b) Differentiate between BJT and JFET. [7M]

(OR)

8. a) Draw and explain drain and transfer characteristics of depletion type MOSFET. [7M]
   b) Describe the operation of common drain FET amplifier and derive the equation for voltage gain. [7M]

UNIT-V

9. a) Draw the Volt – amp characteristics of SCR for different value of Gate – Currents. [7M]
   b) Explain principle of operation of power IGBT and mention their ratings. [7M]

(OR)

10. a) Explain Light Activated SCR? [7M]
    b) With neat sketch, explain the characteristics of Unijunction Transistor. [7M]

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Code No: R203104O **R20** SET - 3

III B. Tech I Semester Regular/Supplementary Examinations, December -2023
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Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1.	a)	Find the concentration of holes & electrons in the P-type silicon at 3000Kassuming its resistivity as 0.02Ω-cm, μp=475cm2 /vs , ηi=1.45×1010/cm3	[7M]
	b)	Describe the Fermi level in intrinsic and extrinsic semiconductors.	[7M]
		(OR)	
2.	a)	Derive an expression for ripple factor for a full-wave rectifier with capacitor filter	[7M]
	b)	A diode whose internal resistance is 20ohms is to supply power to a load of 1KΩ from 110 V (rms) source of supply. Calculate i). Peak load current ii). DC load current iii). AC load current iv). DC diode voltage v). Total input power vi). Peak Inverse voltage vii). Efficiency for full wave rectifier.	[7M]

UNIT-II

3.	a)	Explain the terms 'Avalanche breakdown' and 'Zener breakdown and give examples.	[7M]
	b)	Discuss about working principle of Varactor diode and photo diode with neat sketches.	[7M]
		(OR)	
4.	a)	Define tunneling phenomenon. Explain how tunnel diode operates under different operating conditions	[7M]
	b)	Explain the current components in a PN junction diode. Derive the diode current equation.	[7M]

UNIT-III

5.	a)	Explain input and output characteristics of transistor in CB configuration with neat diagram.	[7M]
	b)	Why self bias circuit is preferred than other biasing circuits? Derive the expression for stability factor of self bias circuit.	[7M]
		(OR)	
6.	a)	What is the need for biasing? Explain the types of biasing techniques with neat circuit diagrams?	[7M]
	b)	What is the condition for avoiding thermal runaway problem?	[7M]

UNIT-IV

7.	a)	a) Draw the small signal model for a common- drain FET amplifier.	[7M]
	b)	A FET amplifier in the common-source configuration uses a load resistance of 300 kΩ. The ac drain resistance of the device is 100kΩ and the transconductanceis 0.5mAV-1 .Find the Voltage gain of the amplifier.	[7M]
		(OR)	
8.	a)	Describe the construction and working principle of Enhancement mode and depletion mode MOSFET and draw its characteristics.	[7M]

b) Given a depletion type MOSFET with IDSS = 6 mA and Vp = - 3V, determine the drain current at VGS = - 1 V, 0 V, 1V, and 2 V. Compare the difference in current levels between -1 and 0 V with the difference between 1 and 2 V. In the positive VGS region, does the drain current increase at a significantly higher rate than for negative values? Is there a linear or nonlinear relationship between ID and V_{GS}? Explain [7M]

UNIT-V

9. a) Explain working of two transistor model of an SCR and Draw the SCR Characteristics. [7M]

b) Explain principle of operation of power IGBT and mention their ratings. [7M]

(OR)

10. a) Explain SCR Applications? [7M]

b) With neat sketch, explain the characteristics of Unijunction Transistor. [7M]

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Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) With appropriate circuit diagram explain the DC load line analysis of semi conductor diode. [7M]
   b) In a full wave rectifier, the input is from 30-0-30V transformer. The load and diode forward resistances are 100Ω and 10Ω respectively. Calculate the average voltage, dc output power, ac input power, rectification, efficiency and percentage regulation. [7M]

(OR)

2. a) With a neat circuit diagram and waveforms explain the working of full wave bridge rectifier and show that its ripple factor is 0.48. [7M]
   b) Distinguish between intrinsic and extrinsicsemiconductors. [7M]

UNIT-II

3. a) Draw the block diagram of series voltage regulator and explain the operation of shunt voltage regulator. [7M]
   b) Draw the circuit diagram of CE amplifier using Hybrid parameters .Derive the expressions A_I,A_V [7M]

(OR)

4. a) Draw the V-I characteristics of PN junction Diode. Show the effect of temperature on its V-I characteristics. [7M]
   b) What are the differences between Zener breakdown and Avalanche breakdown? [7M]

UNIT-III

5. a) Derive all hybrid parameters of a CE transistor amplifier circuit with emitter resistor. [7M]
   b) Derive the expressions for Z i, Zo , Av and Avs for CE amplifier. [7M]

(OR)

6. a) For a give BJT ∝dc = 0.92, ICEO = 10μA, IB = 30μA Determine the values of IE and IC. [7M]
   b) Determine the h-parameters for common emitter configuration from the characteristic curves. [7M]

UNIT-IV

7. a) Draw the circuit diagram of a Common Source amplifier circuit and explain the importance of each component. [7M]
   b) Draw the small signal model of JFET. [7M]

(OR)

8. a) Explain the principle of operation of a n-channel JFET and draw its ID / VGS characteristics. [7M]
   b) Explain MOSFET in enhancement and depletion mode with the required figures. [7M]

UNIT-V

9.	a)	With neat sketch, explain the characteristics of Silicon Controlled Rectifiers.	[7M]
	b)	Explain principle of operation of power IGBT and mention their ratings.	[7M]
		(OR)	
10.	a)	Explain Light Activated SCR?	[7M]
	b)	With neat sketch, explain the characteristics of Unijunction Transistor.	[7M]