SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603203.

DEPARTMENT OF

ELECTRICAL AND ELECTRONICS ENGINEERING

QUESTION BANK

III SEMESTER ECE

1906301 - ELECTRONIC DEVICES AND CIRCUITS

Regulation – 2019

Academic Year 2022 – 23

Prepared by

Ms.R.V.Preetha, Assistant Professor (O. G)

Mr. P.Tamilarasasn, Assistant Professor (O.G)

Mr.S.Venkatesh, Assistant Professor (O.G)

SRM VALLIAMMAI ENGINEERING COLLEGE

(An Autonomous Institution)
SRM Nagar, Kattankulathur – 603203.

DEPARTMENT OF EELCTICAL AND ELECTRONICS ENGINEERING

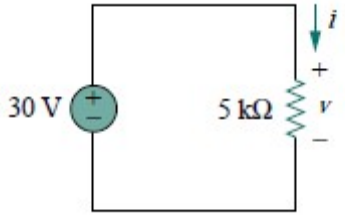
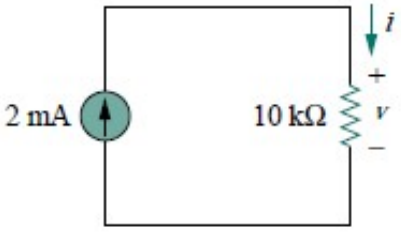
Question Bank

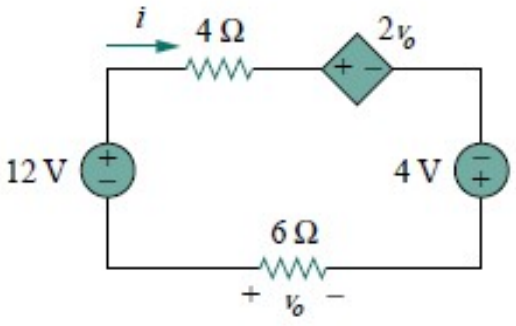
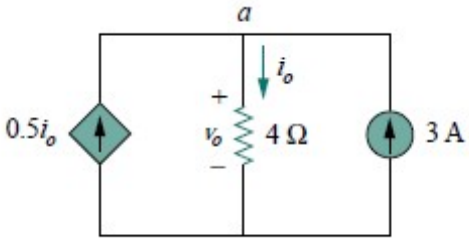
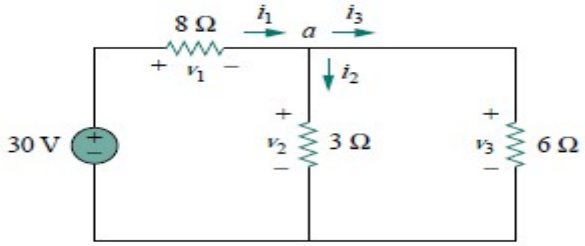
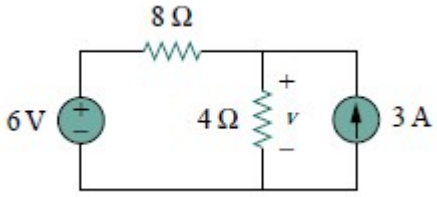
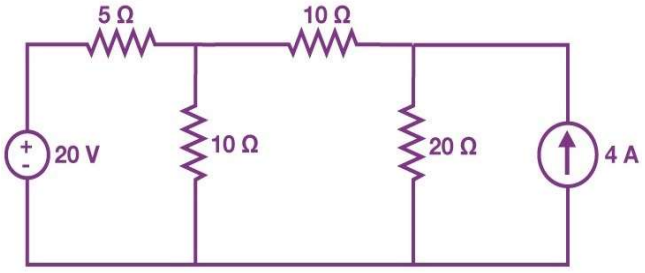
1906301 – ELECTRONIC DEVICES AND CIRCUITS

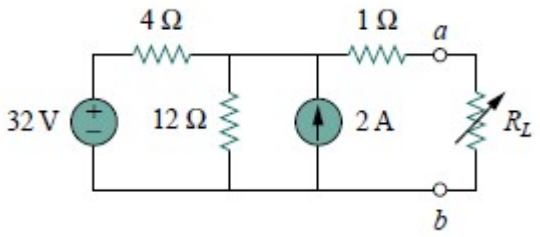
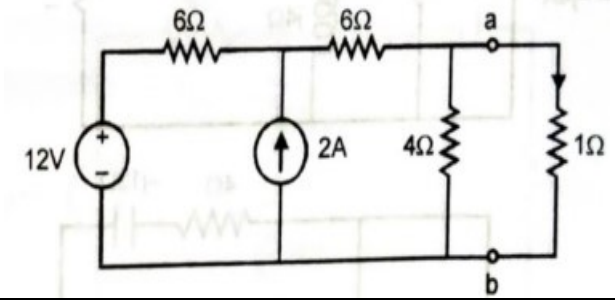
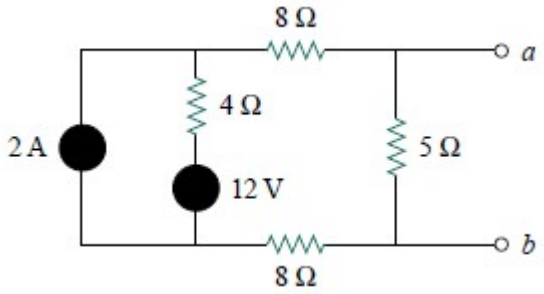
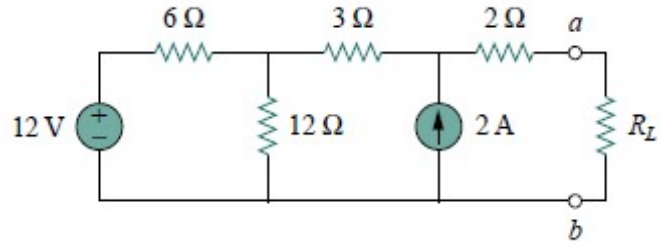
UNIT – I: CIRCUIT THEOREMS AND SEMICONDUCTOR DIODE			
Ohm's Law – Kirchhoff's laws – Superposition theorem, Thevenin's theorem, Norton's theorem, Reciprocity theorem and Maximum power transfer theorem. PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes.			
PART – A			
Q. No.	**Questions**	**BT Level**	**Competence**
1.	Define Voltage, Power and Energy.	BTL 1	Remembering
2.	Write relationship between current, charge and time.	BTL 3	Applying
3.	State Ohm's Law. Mention the limitations of Ohm's Law.	BTL 1	Remembering
4.	Define Kirchhoff's laws.	BTL 1	Remembering
5.	Derive the expression for Voltage division rule and Current division rule.	BTL 6	Creating
6.	Write about Superposition theorem.	BTL 2	Understanding
7.	Distinguish between series and parallel circuit.	BTL 2	Understanding
8.	Two resistances when connected in series, the effective value of resistance are 100 Ohms. When connected in parallel the effective value is 24. Formulate the value of resistance R_1 and R_2.	BTL3	Applying
9.	State Thevenin's theorem.	BTL 1	Remembering
10.	State the concept of Norton's theorem.	BTL 2	Understanding
11.	State Reciprocity theorem.	BTL 1	Remembering
12.	State the concept of Maximum Power Transfer theorem.	BTL 2	Understanding
13.	Differentiate between diffusion current and drift current.	BTL 3	Applying
14.	Mention the expression for drift current density.	BTL 4	Analyzing

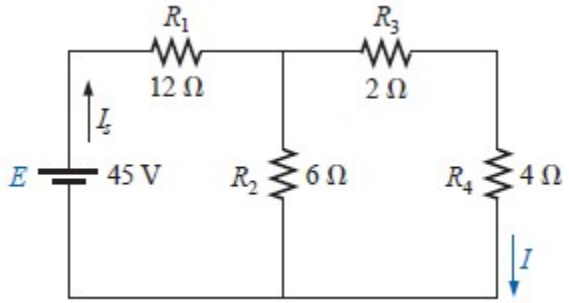
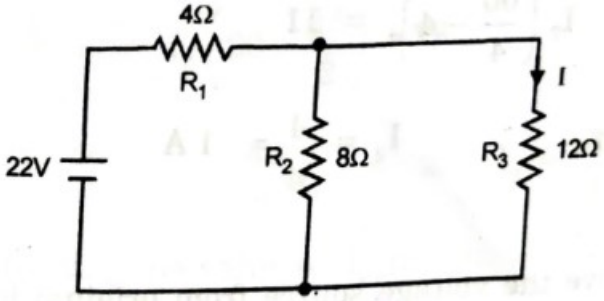
15.	Give the diode current equation.	BTL 1	Remembering
16.	Write the difference between PN junction diode and zener diode.	BTL 4	Analyzing
17.	What are the applications of PN junction diode?	BTL 5	Evaluating
18.	Distinguish between avalanche and Zener breakdown.	BTL 3	Applying
19.	Summarize the limiting values of PN junction diode.	BTL 2	Understanding
20.	A Ge diode has a saturation current of 10μA at 300^{o} K. Determine the saturation current at 400K.	BTL 5	Evaluating
21.	State the mathematical equation which relates voltage applied across the PN junction diode and current flowing through it and list the PN diode parameters.	BTL 2	Understanding
22.	Examine the energy band structure of PN junction diode.	BTL 4	Analyzing
23.	What is diffusion capacitance of PN junction diode?	BTL 2	Understanding
24.	A silicon diode has a saturation current of 7.5μA at room temperature 300K. Calculate the saturation current at 400K.	BTL 5	Evaluating

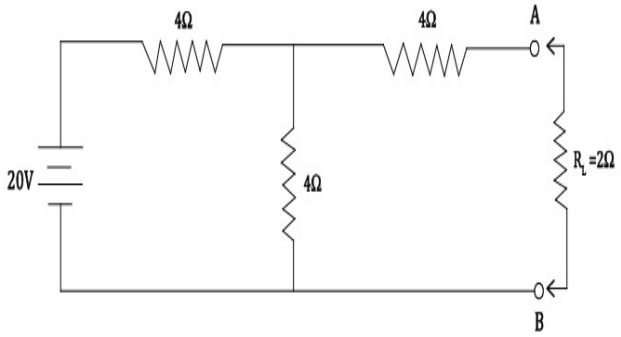
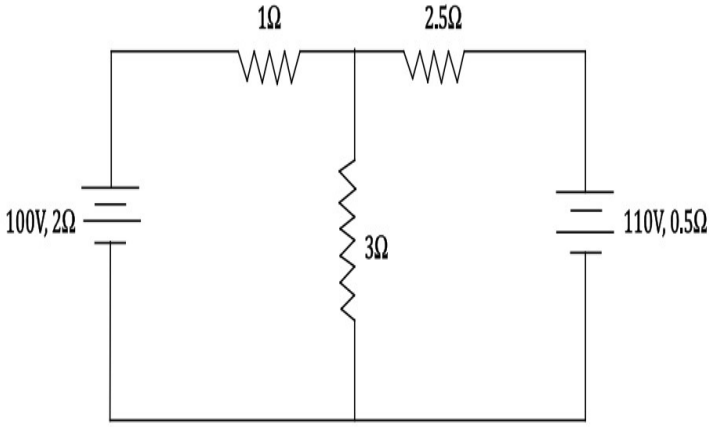
PART – B

Q. No.	**Questions**	**BT Level**	**Competence**
1.	(i) In the circuit as shown in figure, Calculate the current i, the conductance G and the power p. (7)  (ii) For the Circuit Shown in figure, Calculate voltage v, the conductance G and the power p. (6) 	BTL 5	Evaluate
2.	(i) Determine V_0 and i in the circuit shown in figure. (7)	BTL 5	Evaluating

	 (ii) Find the current i_0 and voltage v_0 in the circuit shown in figure. (6) 		
3.	Calculate the currents and voltages in the circuit shown in figure. (13) 	BTL 3	Applying
4.	Find the magnitude of 'v' by applying Superposition theorem for the given circuit. (13) 	BTL 4	Analyzing
5.	Find the current flowing through 20 Ω using the superposition theorem. (13) 	BTL 4	Analyzing

6.	Find the Thevenin equivalent circuit of the circuit shown in figure to the left of the terminal a-b. Also find the current through R_L= 6, 16 and 36Ω. (13) 	BTL 2	Understanding
7.	Using Thevenin's theorem find the equivalent circuit and current through 1Ω resistor shown in figure. (13) 	BTL 2	Understanding
8.	Determine the Norton equivalent of the circuit at terminals a-b. (13) 	BTL 2	Understanding
9.	Calculate the value of R_L for maximum power transfer in the given circuit and also find the maximum power. (13) 	BTL 2	Understanding
10.	By using Reciprocity theorem, find the current I due to voltage source E. (13)	BTL 6	Creating

			
11.	Find the current I using Reciprocity theorem in the network shown in figure.  (13)	BTL 3	Applying
12.	Derive the expression for PN junction diode forward and reverse currents with suitable diagram and necessary explanation. (13)	BTL 3	Applying
13.	i) Show the position of Fermi level in N type and P type semiconductors. (5) ii) Write notes on classification of semiconductors. (8)	BTL 1	Remembering
14.	Describe about the switching characteristics of PN junction diode with suitable diagrams. (13)	BTL 1	Remembering
15.	Explain about the drift and diffusion current densities and obtain the current density for P type and N type. (13)	BTL 4	Analyzing
16.	Describe about the quantitative theory of PN diode currents and obtain the diode current equation. (13)	BTL 1	Remembering
17.	(i) Derive the current equations of PN junction diode. (7) (ii)Discuss in detail about energy band diagram of PN diode. (6)	BTL 6	Creating
	PART – C		
Q.No.	**Questions**	**BT Level**	**Competence**

1.	Prove Thevenin's theorem and Norton's theorem for the in the network shown in figure. (15) 	BTL 6	Creating
2.	By Superposition theorem and Reciprocity theorem find the current flow through 3 Ohm resistor as shown in fig. (15) 	BTL 5	Evaluating
3.	(i) If two similar Germanium diodes are connected back to back and the voltage V is impressed upon, calculate the voltage across each diode and current through each diode. Assume similar value of I_o = 1 μA for both the diodes and η = 1. (8) (ii) A PN-junction diode has a reverse saturation current of 30 μA at a temperature, of 125°C. At the same temperature, find the dynamic resistance for 0.2 V bias in forward and reverse directions. (7)	BTL 5	Evaluating
4.	With neat graph, explain the forward and reverse bias characteristics of a PN junction diode. (15)	BTL 6	Creating
5.	Discuss in detail about transition and diffusion capacitances in semiconductor diode. (15)	BTL 5	Evaluating

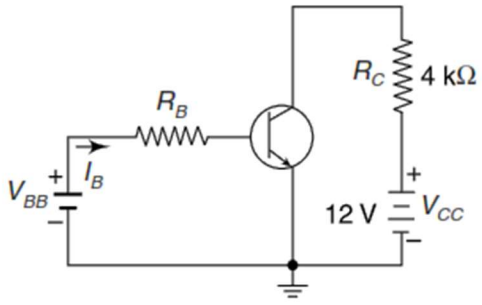
UNIT – II: BIPOLAR JUNCTION TRANSISTORS

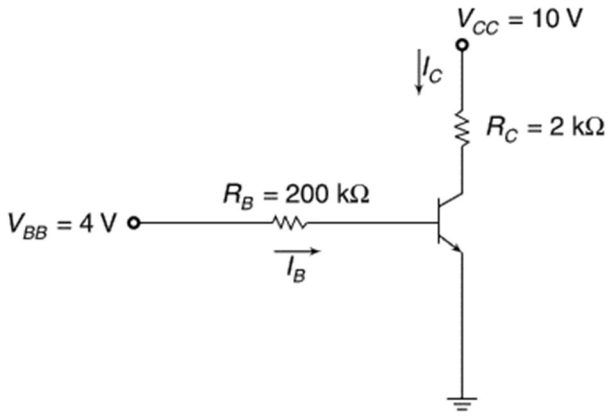
NPN -PNP -Operations-Early effect-Current equations – Input and Output characteristics of CE, CB, CC - Hybrid -π model - h-parameter model, Ebers Moll Model- Gummel Poon-model, Multi Emitter Transistor.

PART – A

Q. No.	Questions	BT Level	Competence
1.	Define Early Effect.	BTL 1	Remembering
2.	Mention the need for biasing?	BTL 1	Remembering
3.	List the transistor parameters.	BTL 1	Remembering
4.	Write the relationship between α and β	BTL 4	Analyzing
5.	What is Bipolar Junction Transistor	BTL 2	Understanding
6.	Express the the operation of NPN and PNP Transistor	BTL 6	Creating
7.	Give the input and output characteristics of a transistor in CB configuration	BTL 2	Understanding
8.	Describe the two types of breakdown in transistor	BTL 4	Analyzing
9.	Give the other name of early effect and explain the same	BTL 2	Understanding
10.	Draw the diode equivalent model of a transistor.	BTL 6	Creating
11.	What is "Thermal runaway" in transistors and mention how it can be avoided?	BTL 4	Analyzing
12.	Give the relationship between currents in NPN transistor.	BTL 2	Understanding
13.	A BJT has a base current of 200μA. Determine the collector current and β.	BTL 5	Evaluating
14.	Find the value of β if a transistor has α = 0.97.Also find α if β=200.	BTL 5	Evaluating
15.	What is Gummel number?	BTL 1	Remembering
16.	Why BJT is called as current controlled device?	BTL 3	Applying
17.	Define Ebers-Moll model	BTL 1	Remembering
18.	Draw the Hybrid pi model for CE configuration.	BTL 6	Creating
19.	Mention the benefits of h parameters.	BTL 3	Applying
20.	What is high level injection effect?	BTL 1	Remembering
21.	Explain about multi emitter transistor.	BTL 2	Understanding
22.	List the advantages of multi emitter transistor.	BTL 3	Applying

23.	What is base spreading resistance?	BTL 2	Understanding
24.	Write the conversion formula of h parameter from CE to CB.	BTL 4	Analyzing
25.	Draw the Ebers-Moll model for a NPN Transistor.	BTL 4	Analyzing
	PART – B		
Q. No.	**Questions**	**BT Level**	**Competence**
1.	Explain the configurations and the principle of operation of BJT. (13)	BTL 1	Remembering
2.	(i) Describe the input and output characteristics of a transistor in CC configuration. (8) (ii) Derive the relationship among α, β, γ. (5)	BTL 1	Remembering
3.	With neat diagram explain the input and output characteristics of a transistor in CE configuration. (13)	BTL 1	Remembering
4.	(i) The reverse leakage current of a transistor when connected in CB configuration is 0.2 μA and it is 18 μA when the same transistor is connected in CE configuration calculate α, β. (5) (ii) Describe early effect with relevant expressions and diagram. (8)	BTL 1	Remembering
5.	(i) Justify transistor as an amplifier. (5) (ii) Compare and contrast between CE, CB and CC configurations. (8)	BTL 2	Understanding
6.	Define the input and output characteristics of a transistor in CB configuration. (13)	BTL 2	Understanding
7.	A Transistor is operating CB configuration has Ic=2.98mA, I_E= 3 mA and Ico= 0.01 mA. Calculate the collector and emitter. What current will Flow in collector circuit of this transistor when connected in CE configuration with base current of 30 μA. (13)	BTL 3	Applying
8.	Describe hybrid parameters for all three configurations and relations between them. (13)	BTL 3	Applying
9.	(i) Analyze the working mechanism of CB configuration of BJT. (8) (ii) Distinguish between h and π model. (5)	BTL 4	Analyzing
10.	Describe the Eber's Moll model for a NPN transistor. (13)	BTL 4	Analyzing
11.	Derive the expression for f_β and Draw the hybrid π model of BJT? (13)	BTL 4	Analyzing
12.	Explain the Eber's Moll model for a PNP transistor. (13)	BTL 5	Evaluating
13.	Derive the expression of Gummel Poon-model with neat circuit diagram and obtain the Gummel number. (13)	BTL 6	Creating

14.	(i) Explain the working of multi emitter transistor with neat diagram. (5) (ii) The h parameters for the transistor are h_{ie}=1.1kΩ, h_{fe}=99, h_{re}=2.5* 10^{-4} and hoe=25 μA/V. Find the h parameters for common base and common collector configurations. (8)	BTL 2	Understanding
15.	Describe the input and output characteristics of a transistor in CE configuration. (13)	BTL 2	Understanding
16.	Given an NPN transistor for which α=0.98,Ico =2 μA and I_{EO}=1.6 μA.A common emitter connection is used and Vcc=12V and R_L=40 kΩ.What is the minimum base current required in order that transistor enter in to saturation region. (13)	BTL 5	Evaluating
17.	For transistor has I_B=100 μA and Ic =2 μA .Find a) β of the transistor ,b) α of the transistor ,c) emitter current I_B, d) if I_B Changes by +25 μA and Ic chnges by +0.6mA,find the new value of β. (13)	BTL 5	Evaluating
	PART – C		
Q.No.	**Questions**	**BT Level**	**Competence**
1.	With neat diagram explain the input and output characteristics of a transistor in CB and CE configuration. (15)	BTL 5	Evaluating
2.	Design a NPN bipolar transistor CE connection is used in the circuit shown in figure. Let. α=0.98,Ico =2 μA and I_{CEO}=16 μA. A common emitter connection is used and Vcc=12V and R_L=4 kΩ.What is the minimum base current required in order that transistor enter in to saturation region  (15)	BTL 6	Creating
3.	Illustrate the following model with suitable circuits: (i) h-parameter model (8) (ii) Ebers Moll model (7)	BTL 6	Creating

4.	The reverse leakage current of the transistor when connected in CB configuration is 0.2 mA and it is 18 μA when the same transistor is connected in CE configuration. Determine α_{dc} & β_{dc} of the transistor. Assume I_B =30mA. (15)	BTL 5	Evaluating
5.	Determine the base, collector and emitter current and V_{CE} for a CE circuit shown in fig.  (15)	BTL 5	Evaluating

UNIT III: FIELD EFFECT TRANSISTORS			
JFETs – Drain and Transfer characteristics - Current equations - Pinch off voltage and its significance - MOSFET- Characteristics- Threshold voltage -Channel length modulation, D-MOSFET, E-MOSFET- Characteristics – Comparison of MOSFET with JFET.			
PART A			
Q.No	**Questions**	**BT Level**	**Competence**
1.	Write down the Shockley's equation.	BTL 1	Remembering
2.	Tabulate the differences between BJT and FET.	BTL 1	Remembering
3.	Define amplification factor in JFET.	BTL 1	Remembering
4.	Write about drain resistance.	BTL 1	Remembering
5.	List the advantages of MOSFET compared to JFET	BTL 2	Understanding
6.	Define Threshold voltage.	BTL 1	Remembering
7.	Mention the advantages and applications of JFET.	BTL 2	Understanding
8.	What are the two modes of MOSFET?	BTL 2	Understanding
9.	What is meant by Pinch off voltage?	BTL 2	Understanding
10.	What is Transconductance g_m?	BTL 1	Remembering
11.	Give an important reason for which N-Channel FET's are preferred over P-Channel FET's.	BTL 3	Applying

12.	Explain how JFET act as VVR?	BTL 3	Applying
13.	Examine why Depletion MOSFET is commonly known as "Normally-ON" MOSFET?	BTL 3	Applying
14.	Draw the current voltage relationship of the D-MOSFET and E-MOSFET	BTL 6	Creating
15.	Differentiate between current voltage relationship of N-channel and P-channel MOSFET.	BTL 4	Analyzing
16.	Analyze in which region JFET acts as a resistor and why?	BTL 4	Analyzing
17.	What is JFET and list its modes of operation?	BTL 4	Analyzing
18.	Compare JFET and MOSFET.	BTL 3	Applying
19.	Draw the V-I characteristic curve of MOSFET.	BTL 6	Creating
20.	Explain Channel length modulation.	BTL 2	Understanding
21.	Sketch the symbol of E-MOSFET.	BTL 3	Applying
22.	Write down what happens during MOSFET'S saturation region?	BTL 1	Remembering
23.	Formulate drain current equation in MOSFET.	BTL 6	Creating
24.	Write down the applications on MOSFET.	BTL 1	Remembering
	PART B		
1.	(i). Describe the construction and working of a JFET. (7) (ii). Derive an expression for pinch off voltage in FET. (6)	BTL 1	Remembering
2.	List the classification of FET family and explain each component in detail. (13)	BTL 1	Remembering
3.	Illustrate the construction and operation of n-channel JFET with neat diagrams. (13)	BTL 1	Remembering
4.	Illustrate the construction and operation of p-channel JFET with neat diagrams. (13)	BTL 1	Remembering
5.	Derive an expression for drain current of FET in pinch off region with necessary diagram. (13)	BTL 5	Evaluating
6.	Draw a circuit for obtaining drain and transfer characteristics of an n channel JFET. (13)	BTL 6	Creating
7.	Explain the drain and transfer characteristics of an p channel JFET. (13)	BTL 3	Applying
8.	Explain on characteristic curves of JFET. (13)	BTL 3	Applying
9.	Differentiate between n-channel MOSFET and p-channel MOSFET. (13)	BTL 4	Analyzing
10.	Describe the construction and principle of operation of Enhancement mode MOSFET with the help of suitable diagram. (13)	BTL 2	Understanding
11.	Explain the construction and principle of operation of Depletion mode MOSFET with the help of suitable	BTL 3	Applying

	diagram. (13)		
12.	With neat sketch, Describe the working principle, operation and characteristics of the n-channel Enhancement mode MOSFET. (13)	BTL 4	Analyzing
13.	Explain the construction, operation and characteristics of n- Channel depletion type MOSFET. (13)	BTL 4	Analyzing
14.	Compare the operation and characteristics of depletion MOSFET with enhancement mode MOSFET. (13)	BTL 3	Applying
15.	(i). Describe the effect of channel length modulation. (7) (ii). Analyse the effect of temperature on MOSFET. (6)	BTL 4	Analyzing
16.	(i). Explain the concept of threshold voltage in a MOSFET. (7) (ii). Give some applications of JFET? (6)	BTL 2	Understanding
17.	Compare JFET and MOSFET in details. (13)	BTL 3	Applying
PART C			
1.	Illustrate the working mechanism of JET with necessary diagram. (15)	BTL 5	Evaluating
2.	Identify and formulate the differences between BJT and FET. (15)	BTL 6	Creating
3.	Describe about MOSFET types, construction, input-output and transfer characteristics. (15)	BTL 4	Analyzing
4.	Compare the difference between JFET & MOSFET. (15)	BTL 4	Analyzing
5.	Explain in detail about enhancement and depletion mode of MOSFET. (15)	BTL 4	Analyzing

UNIT IV: SPECIAL SEMICONDUCTOR DEVICES

Metal-Semiconductor Junction- MESFET, FINFET, PINFET, CNTFET, DUAL GATE MOSFET, Schottky barrier diode-Zener diode-Varactor diode –Tunnel diode- Gallium Arsenide device, LASER diode, LDR.

PART A

Q. No	Questions	BT Level	Competence
1.	What is metal Semiconductor junction?	BTL 2	Understanding
2.	Explain the working principle of Light Dependent Resistor.	BTL 1	Remembering
3.	Differentiate CNTFET structure and traditional MOSFET structure.	BTL 2	Understanding

4.	What is LASER and LDR?	BTL 1	Remembering
5.	What is zener breakdown voltage?	BTL 4	Analyzing
6.	Explain about FinFET.	BTL 2	Understanding
7.	What is negative resistance in tunnel diode?	BTL 1	Remembering
8.	Discuss the term Tunneling?	BTL 1	Remembering
9.	Differentiate Tunnel diode and PN junction diode.	BTL 2	Understanding
10.	Draw the symbol and structure of Schottky diode.	BTL 1	Remembering
11.	Draw the energy band diagram of metal and semiconductor before and after conduction is made.	BTL 2	Understanding
12.	Write about Gallium Arsenide (GaAs) device.	BTL 3	Applying
13.	Sketch the V-I characteristics curve for Zener diode.	BTL 3	Applying
14.	Explain about CNTFET.	BTL 4	Analyzing
15.	Interpret on dual gate MOSFET.	BTL 3	Applying
16.	Draw the equivalent circuit for tunnel diode.	BTL 1	Remembering
17.	Mention the working principle of varactor diode.	BTL 1	Remembering
18.	Name the applications of the tunnel diode.	BTL 2	Understanding
19.	Summarize the applications of zener diode.	BTL 2	Understanding
20.	Give the basic difference between JFET with MESFET.	BTL 3	Applying
21.	Explain diode capacitance and varactor tuning ratio.	BTL 2	Understanding
22.	Sketch transfer characteristics of CNTFET.	BTL 3	Applying
23.	Write in slope value of MOSFET.	BTL 6	Creating
24.	Draw Laser diode symbol.	BTL 1	Remembering
PART B			
1.	(i) Illustrate the V-I characteristic curve and explain the operation of zener diode. (8) (ii) Compare Avalanche and Zener breakdown. (5)	BTL 1	Remembering
2.	Analyze how zener diode is used in Voltage regulation. (13)	BTL 4	Analyzing
3.	Describe the variable capacitance characteristics of a Varactor diode and analyze its operation in the circuit. (13)	BTL 1	Remembering
4.	Deduce the expression for current voltage relationship in a schottky barrier diode and discuss its operation. (13)	BTL 2	Understanding
5.	Explain the FINFET circuit model with necessary diagrams and parameters. (13)	BTL 1	Remembering

6.	Discuss the concept of dual gate MOSFET. (13)	BTL 6	Creating
7.	Describe the construction details and working principle of LASER diode. (13)	BTL 3	Applying
8.	Write short notes on LDR and list out its applications. (13)	BTL 1	Remembering
9.	Illustrate the working principle of Gallium Arsenide Devices with neat diagram. (13)	BTL 2	Understanding
10.	Explain the working of PINFET and CNTFET with its characteristics. (13)	BTL 5	Evaluating
11.	Discuss the forward biasing and reverse biasing of metal-semiconductor junction along with energy band diagrams. (13)	BTL 4	Analyzing
12.	Explain briefly about Metal n-type and Metal p-type semiconductor contact with suitable diagrams. (13)	BTL 4	Analyzing
13.	(i) illustrate the working of tunnel diode and varactor diode using energy band diagrams. (8) (ii) Explain the operation of conventional p-n junction diode. (5)	BTL 2	Understanding
14.	Explain the structure and operating principle of MESFET. (13)	BTL 3	Applying
15.	Illustrate the working principle of tunnel diode with neat diagram. (13)	BTL 2	Understanding
16.	Discuss in detail about working of LDR with neat diagram. (13)	BTL 5	Evaluating
17.	Explain in detail about construction and characteristics of laser diode. (13)	BTL 4	Analyzing
PART C			
1.	Explain the Principle of tunnel diode with necessary band diagrams. Also illustrate the V-I characteristics and the negative resistance Phenomenon. (15)	BTL 4	Analyzing
2.	Explain the V-I characteristics of PIN photodiode From the energy band diagram. (15)	BTL 4	Analyzing
3.	Illustrate the construction and working mechanism of LASER diode with its characteristic graph. (15)	BTL 3	Applying
4.	Write in detail about construction and working mechanism of LDR with its characteristic graph. (13)	BTL 2	Understanding
5.	Discuss in detail about construction and working of dual band MOSFET with neat diagram. (13)	BTL 5	Evaluating

UNIT V : POWER DEVICES AND DISPLAY DEVICES

UJT, SCR, Diac, Triac, Power BJT- Power MOSFET- DMOS-VMOS. LED, LCD, Photo transistor, Opto-coupler, Solar cell, CCD.

PART A

Q. No	Questions	BT Level	Competency
1.	What is SCR? Mention its applications.	BTL 1	Remembering
2.	Why SCR cannot be used as a bidirectional switch?	BTL 2	Understanding
3.	Draw the two transistors equivalent circuit of an SCR.	BTL 5	Evaluating
4.	Compare BJT and UJT.	BTL 4	Analyzing
5.	Define Diac. List out its applications.	BTL 1	Remembering
6.	Write note about Triac and mention its applications.	BTL 1	Remembering
7.	Draw the two transistor equivalent circuit of SCR.	BTL 6	Creating
8.	Draw the Schematic of Diac and Triac.	BTL 1	Remembering
9.	List the applications of UJT.	BTL 2	Understanding
10.	Describe the working principle of an LED and its applications.	BTL 2	Understanding
11.	Sketch the V-I characteristics of UJT.	BTL 3	Applying
12.	How does Triac differ from Diac?	BTL 4	Analyzing
13.	Draw the basic structure of TRIAC and its symbol	BTL 5	Evaluating
14.	Plot the V-I characteristics of Triac.	BTL 2	Understanding
15.	"A solar cell is a PN junction device with no voltage directly applied across the junction". If it is so, how does a solar cell deliver power to load?	BTL 4	Analyzing
16.	Compare Triac with SCR.	BTL 4	Analyzing
17.	Sketch the symbol for n-channel and p-channel MOSFET.	BTL 6	Creating
18.	Compare the merits and demerits of MOSFET.	BTL 1	Remembering
19.	Draw the characteristics of photo transistor.	BTL 1	Remembering
20.	Analyze what happens in DMOS, if a positive voltage is applied to gate?	BTL 4	Analyzing
21.	Mention the types of opto-couplers.	BTL 1	Remembering
22.	Write down the significance of Opto coupler.	BTL 5	Evaluating
23.	Assess the characteristics of the material used in LED.	BTL 2	Understanding
24.	Differentiate the features of CCD and Solar cell.	BTL 3	Applying

PART B

1.	Draw the basic structure of UJT and explain V-I characteristics of UJT with the help of equivalent circuit. (13)	BTL 1	Remembering
2.	(i) Discuss the characteristics and working principle of SCR and list out its applications. (7) (ii) Explain the significance of opto-couplers. (6)	BTL 2	Understanding
3.	Analyze the spectral output curves and radiation pattern of LED. (13)	BTL 4	Analyzing
4.	Explain in detail about power MOSFET and power BJT with neat sketch. (13)	BTL 2	Understanding
5.	Demonstrate the construction, working principle and characteristics of Diac. (13)	BTL 1	Remembering
6.	Demonstrate the construction, working principle and characteristics of Triac. (13)	BTL 2	Understanding
7.	(i) Design a two-transistor model of SCR. (7) (ii) Describe the working of three phase CCD. (6)	BTL 1	Remembering
8.	(i) Draw the structure of Phototransistor and explain its operation. (7) (ii) Write short notes on the modes of operation of LCD. (6)	BTL 1	Remembering
9.	Illustrate the working principle of solar cell and opto-couplers? (13)	BTL 1	Remembering
10.	Describe the operation of a DMOS and VMOS transistor. (13)	BTL 2	Understanding
11.	Describe the operation of UJT relaxation oscillator and R_1 value from the conditions for turn-on and turn-off. (13)	BTL 2	Understanding
12.	Give the detailed construction of UJT and explain its operations with the help of equivalent circuits. (13)	BTL 4	Analyzing
13.	Describe the operation of LED and CCD and list out its application (13)	BTL 1	Remembering
14.	Explain the working principle of SCR with V-I characteristics. (13)	BTL 2	Understanding
15.	(i) Illustrate the construction, symbol and characteristics of photovoltaic cell. (7) (ii) Explain the working of phototransistor and optocoupler. (6)	BTL 3	Applying
16.	With neat diagram, illustrate the working principle of LCD. (13)	BTL 2	Understanding
17.	Write short notes on (i) Solar Cell (7) (ii) CCD (6)	BTL 2	Understanding

PART C			
1.	Explain the various power MOSFET's in detail with suitable diagram. (15)	BTL 5	Evaluating
2.	Illustrate the working principle of SCR and compare its characteristics. (15)	BTL 5	Evaluating
3.	Discuss in detail the operation of Triac with necessary explanation. (15)	BTL 5	Evaluating
4.	Explain about various opto-electronic devices under the display devices category. (15)	BTL 6	Creating
5.	With neat sketch explain Diac and UJT. (15)	BTL 6	Creating