1. Group - A (Short Answer Questions)

S.No	QUESTION	Blooms taxonomy level	Course Outcomes
	UNIT-I **P-N JUNCTION DIODE**		
1	**Define**Electronics?	Remembering	1
2	**Explain** about forward bias of diode?	Understanding	1
3	**Explain** about reverse bias of diode?	Understanding	1
4	**Write** the applications of diode?	Comprehension	3
5	**Draw** the V-I characteristics of diode?	Comprehension	2
6	**List** the differences between ideal diode and practical diode?	Remembering	1
7	Define diffusion capacitance?	Knowledge	2
8	**Define** transition capacitance**?**	Remembering	2
9	**Define**static resistance?	Remembering	2
10	**Define** dynamic resistance	Remembering	2
11	**Explain** the load line analysis of diode?	Understanding	2
12	**Write** the equation of diode current	Remembering	2
13	**Define** Fermi level?	Remembering	1
14	**Sketch** V-I characteristics of a PN diode for the following conditions: R_f= 0,R_r = 0, $V\gamma$ =0	Knowledge	2

S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
15	**Sketch** V-I characteristics of a PN diode for the following conditions: $R_F = 0, R_r = 0, V\gamma = 0.6$	Comprehension	2
16	**Define** reverse saturation current?	Remembering	1
17	**Define** cut-in voltage?	Remembering	1
18	**Write**the differences between avalanche and zener breakdown mechanisms?	Knowledge	1
19	**Define** zener breakdown mechanism?	Remembering	1
20	**Define** depletion region?	Remembering	1
21	**Explain** the temperature dependence of VI characteristics of PN diode?	Understanding	1
22	**Define** doping?	Remembering	1
23	**Explain** about extrinsic semiconductor	Understanding	1
24	**Explain** about unbiased PN junction?	Understanding	1
25	**Write** down the expression for diode current?	Knowledge	1
26	**Define** drift current?	Remembering	1
27	**List** the applications of Zener diode?	Analyzing	1
28	**Define** forbidden energy gap?	Remembering	1
29	**With** appropriate circuit diagram explain the DC load line analysis of semiconductor diode?	Analysis	1
30	**Define** Peak Inverse voltage of a diode?	Remembering	1
31	**What** is the principle of operation of photodiode?	Knowledge	1
32	**Give** the principle of operation of Light Emitting Diode?	Analysis	1
33	**Define** diffusion current?	Remembering	1
34	**List** the applications of LED.	Analyzing	1
35	**Draw** the two transistor equivalent circuit of a SCR	Analysis	1
38	**Define** holding current in a SCR?	Remembering	1
39	**Draw** the V-I characteristics of SCR?	Analysis	2
40	**Explain** why a SCR is operated only in the forward biased condition?	Understanding	2
41	**Explain** how triggering of an SCR can be controlled by the gate signal supplied?		1
42	**List** the applications of varactor diode?	Analyzing	1
43	**Define**photodiode?	Remembering	
44	**Define** DIAC?	Remembering	1
45	**Define** TRIAC?	Remembering	1
	UNIT-II **RECTIFIERS AND FILTERS**		
1	**Define** rectifier?	Remembering	3
2	**Define** ripple factor?.	Remembering	3
3	**Compare** the rectifier and regulator?	Comprehension	3
4	**Define** transformer utilization factor?	Remembering	3
5	**Define** efficiency?	Remembering	3
6	**Define** full wave rectifier?	Remembering	3

7	**What** are the merits of full wave rectifier?	Application	3
S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
8	**List** the disadvantages of full wave rectifier?	Analyzing	3
9	**Draw** the block diagram of shunt voltage regulator?	Knowledge	3
10	**Draw** the block diagram of series voltage regulator?	Knowledge	3
11	**Define** regulator?	Remembering	3
12	**Draw** the circuit diagram of half wave rectifier?	Synthesis	4
13	**Draw** the circuit diagram of full wave rectifier?	Evaluation	4
14	**Define** line regulation and load regulation?	Remembering	4
15	**Give** the advantages and disadvantages of HWR and FWR?	Knowledge	4
16	**What** is the need for a filter in rectifier?	Knowledge	4
17	What is the need for voltage regulators? What are the drawbacks of unregulated power supply?	Knowledge	4
18	**Draw** the circuit diagram of π-section filter?		4
19	Explain about zener regulator?	Comprehension	4
20	Draw the circuit diagram of L-section filter?	Comprehension	4
	UNIT-III **BIPOLAR JUNCTION TRANSISTOR AND UJT**		
1	Define Transistor?	Remembering	5
2	What is meant by operating point Q?	Comprehension	5
3	Draw the symbols of NPN and PNP transistor?	Comprehension	5
4	Explain the operation of BJT and its types?	Understanding	5
5	Explain the breakdown in transistor?	Understanding	5
6	Explain the transistor switching times?	Understanding	5
7	Define Transistor current?	Remembering	5
8	Define early effect or base width modulation?	Remembering	5
9	Explain about transistor amplifier?	Understanding	5
10	Define current amplification factor?	Remembering	5
11	When does a transistor act as a switch?	Comprehension	5
12	Explain about the various regions in a transistor?	Understanding	5
13	Draw the small signal model of a CE configuration?	Knowledge	6
14	Draw the output characteristics of NPN transistor in CE configuration?	Comprehension	6
15	Define h_{ie} and h_{fe} in CE configuration?	Remembering	6
16	Define hoe and h_{re} in CB configuration?	Remembering	6
17	Define saturation region?	Remembering	6
18	Write the relation between I_C, β, I_B and I_{CBO} in a BJT?	Knowledge	6
19	Define cutoff region?	Remembering	6
20	Define active region?	Remembering	6
21	Describes the various current components in a BJT?	Knowledge	6
22	Define amplifier?	Remembering	6
23	Draw the hybrid model of a CB configuration?	Knowledge	6

24	Write a note on transistor construction?	Comprehension	6
S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
25	What are the differences between BJT and UJT?	Comprehension	6
26	Draw the equivalent circuit of a UJT	Comprehension	6
27	Draw the V-I characteristics of UJT?	Analyzing	6
28	What do you mean by regeneration in UJT?	Understanding	6
29	Explain the terms peak voltage and valley current in UJT?	Understanding	6
30	Write down applications of UJT?	Remembering	6
UNIT-IV TRANSISTOR BIASING AND STABILIZATION			
1	Define biasing?	Remembering	7
2	Why biasing is necessary in BJT amplifiers?	Knowledge	7
3	Define Q-point?	Remembering	7
4	Explain the concept of dc load line with the help of neat diagram?	Knowledge	7
5	Draw and explain the ac load line?	Evaluation	7
6	Define three stability factors?	Remembering	7
7	Which biasing method provides more stabilization amongst the three types of biasing methods?	Application	7
8	Compare the advantages and disadvantages of biasing schemes?	Knowledge	7
9	Draw the circuit diagram of a collector to base bias circuit of CE amplifier?	Evaluation	8
10	Write down advantages of fixed bias circuity?	Comprehension	7
11	Draw the circuit diagram of a fixed bias circuit of CE amplifier?	Knowledge	8
12	Draw a circuit employing a sensistor compensation?	Application	8
13	Write down disadvantages of fixed bias circuit?	Application	8
14	Define thermal runaway?	Remembering	7
15	Define thermal resistance?	Remembering	7
16	Define stability factors s' and s''?	Remembering	7
17	Define thermal stability	Remembering	7
18	Draw the circuit diagram of a self bias circuit of CE amplifier?	Analysis	8
19	Draw the circuit diagram of a emitter feedback bias circuit of CE amplifier?	Application	8
20	List out the different types of biasing methods?	Analyzing	8
21	A Ge transistor having β=100 and Vbe=0.2v is used in a fixed bias amplifier circuit where vcc=16v,Rc=5 KΩ and R_B= 790 KΩ determine its operating point.	Analyzing	8
22	Differentiate biase stabilization and compensation techniques?	Evaluation	8
UNIT-V Field Effect Transistor and FET Amplifiers			
1	Why FET is called a voltage operated device?	Evaluation	9
2	List the important features of FET?	Knowledge	9

3	Draw the functional diagram of JFET?	Knowledge	9
S.No	**QUESTION**	**Bloomstaxonomy level**	**Course Outcomes**
4	Write short notes on millers theorem?	Knowledge	9
5	Give the classifications of FETs and their application areas?	Knowledge	9
6	Define pinch off voltage?	Comprehension	9
7	Draw the structure of an n-channel JFET?	Knowledge	9
8	Define rd and Gm?	Remembering	9
9	Draw the static characteristics curves of an n-channel JFET?	Comprehension	9
10	Draw the drain characteristics of depletion type MOFET?	Knowledge	9
11	Draw the small signal model of JFET?	Knowledge	9
12	Draw the transfer characteristics for P-channel JFET?	Comprehension	10
13	Draw the Drain V_I characteristics for p-channel JFET?	Knowledge	10
14	Explain about ohmic and saturation regions?	Understanding	10
15	Draw the drain characteristics of an n-channel enhancement type MOSFET?	Knowledge	10

2. Group - II (Long Answer Questions)

S.No	Question	Blooms taxonomy level	Course Outcomes
	UNIT-I **P-N JUNCTION DIODE**		
1	**Define** Fermi level? By indicating the position of Fermi level in intrinsic, n-type and p- type semiconductor, explain its significance in semiconductors?	Remembering	1
2	**Distinguish** between drift and diffusion current in a semiconductor. State continuity equation?	Analyzing	1
3	Sketch the V-I characteristics of p-n junction diode for forward bias voltages. Distinguish between the incremental resistance and the apparent resistance of the diode?	Evaluation	2
4	**What** is potential energy barrier of the p-n junction? How does it arise and what is its order of magnitude?	Remembering	2
5	Explain the temperature dependence of VI characteristics of PN diode?	Comprehension	2
6	**Derive** an expression for total diode current starting from Boltzmann relationship in terms of the applied voltage?	Knowledge	2
7	**Explain** the V-I characteristics of Zener diode and distinguish between Avalanche and Zener Break downs?	Understanding	2
8	**Explain** in detail, the variation of following semiconductor parameters with temperature, i) Energy gap ii) Conductivity.	Understanding	1
9	**Explain** the concept of diode capacitance. Derive expression for transition capacitance?	Understanding	1
10	**Define** depletion region at p-n junction? What is the effect of forward and reverse biasing of p-n junction on the depletion region? Explain with necessary diagrams?	Remembering	1
11	**Explain** Zener and avalanche breakdown mechanisms in detail?	Comprehension	1

S.No	Question	Blooms taxonomy level	Course Outcomes
12	**Differences** between 1.Static and dynamic resistances of a p – n diode. 2.Transition and Diffusion capacitances of a p – n diode	Distinguish	2
13	**Difference** between 1.Volt – Ampere characteristics of a single silicon p – n diode and two indetical silicon p- n diodes connected in parallel. 2.Avalanch and zener break down mechanisms	Distinguish	2
14	**Explain** the tunneling phenomenon. Explain the characteristics of tunnel diode with the help of necessary energy band diagrams?	Understanding	2
15	**What** is the photo diode? Explain its principle of operation and applications in detail?	Remembering	2
16	**Explain** the construction and working of photo diode?	Understanding	2
17	**Explain** about : i) Varactor diode ii) Schottky Barrier diode With necessary sketches.	Understanding [7+8]	2
18	Sketch the static characteristics and firing characteristics of SCR and explain the shape of the curve?		2
19	**Explain**Schottky diode with necessary sketches?	Understanding	2
20	**Explain** how a variable capacitance can be built using a varactor diode?	Understanding	2
21	**Define** the following terms for a PN diode 1. Dynamic resistance 2.Load line. 3. Difference capacitance. 4. Reverse saturation current.	Remembering	2
	UNIT-II **RECTIFIERS AND FILTERS**		
1	Draw the block diagram of a regulated power supply and explain its operation?	Understanding	3
2	Draw the circuit of a half-wave-rectifier and find out the ripple factor, % regulation? Efficiency and PIV?	Analyzing	4
3	Draw the circuit of bridge rectifier and explain its operation with the help of input and output waveforms?	Analyzing	4
4	**With** suitable diagrams, **explain** the working of centre-tapped full wave rectifier. Derive expressions for V_{DC}, I_{DC}, V_{rms} and $I_{rms}$for it?	Understanding	4
5	**Explain** the relative merits and demerits of all the rectifiers?	Understanding	3
6	**Compare** the performance of Inductor filter and capacitor filter?	Understanding	3
7	**Derive** the expression for the ripple factor of π-Section filter when used with a Half-wave-rectifier. Make necessary approximations?	Analyzing	4
8	**Derive** the expression for the ripple factor of π-Section filter when used with a Full-wave-rectifier. Make necessary approximations?	Analyzing	4
9	**Define** Ripple factor and form factor. Establish a relation between them?	Remembering	3
10	**Explain** the necessity of a bleeder resistor in an L – section filter used with a Full Wave filter?	Understanding	4
11	**List** out the merits and demerits of Bridge type Full Wave rectifiers over centre tapped type Full Wave rectifiers?	Analyzing	3
12	**Explain** about multiple L-section and multiple π-section filters?	Understanding	4
13	**Compare** the performance of series inductor,l-section and π-section filters?	Understanding	4

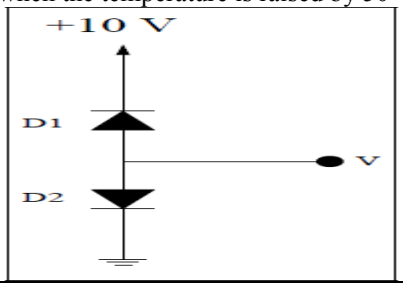
14	**Explain** the operation of inductor filter and derive expression for ripple factor?(FWR)	Understanding	4
S.No	**Question**	**Blooms taxonomy level**	**Course Outcomes**
15	**Explain** the operation of L-section filter and derive expression for ripple factor?(FWR)	Understanding	4
	UNIT-III **BIPOLAR JUNCTION TRANSISTOR AND UJT**		
1	With a neat diagram **explain** the various current components in an NPN bipolar junction transistor & hence derive general equation for collector current, I_C?	Understanding	5
2	**Define** Early-effect; explain why it is called as base-width modulation? Discuss its consequences in transistors in detail?	Remembering	5
3	**How** transistor acts as an amplifier?	Remembering	6
4	**Draw** the input and output characteristics of a transistor in common emitter configurations?	Comprehension	6
5	**Draw** the input and output characteristics of a transistor in common base configurations?	Evaluation	6
6	**Draw** the input and output characteristic of a transistor in common collector configurations?	Comprehension	6
7	**Explain** the constructional details of Bipolar Junction Transistor?	Understanding	6
8	**Derive** the relation among α, β and γ?	Evaluation	6
9	**What** is thermal runaway in transistors? Obtain the condition for thermal stability in transistors?	Remembering	6
10	**Describe** the significance of the terms, 'α' and 'β'. Establish a relation between them?	Evaluation	6
11	**Explain** how the UJT can be used as a negative-resistance device with the aid of static characteristics?	Understanding	6
12	**Give** the construction details of UJT & **explain** its operation with the help of equivalent circuits?	Understanding	6
13	**Explain** any two construction techniques of construction of transistor**?**	Understanding	6
14	**Explain** the application of a UJT as a relaxation oscillator?	Comprehension	6
15	With reference to bipolar junction transistors, **define** the following terms and explain. i) Emitter efficiency. ii) Base Transportation factor. iii) Large signal current gain.	Comprehension	6
	UNIT-IV **TRANSISTOR BIASING AND STABILIZATION**		
1	**Define** biasing? Draw the fixed bias circuit and obtain the expression for the stability factor?	Remembering	8
2	**Draw** the collector-emitter feedback bias circuit and obtain the expression for the stability factor?	Comprehension	8
3	**Draw** the self bias circuit and obtain the expression for the stability factor. Discuss the advantages and disadvantages of self biasing?	Knowledge	8
4	**Draw** the emitter feedback bias circuit and obtain the expression for the stability factor?	Comprehension	8
5	**Define** 'Thermal Runaway' in transistors? Derive the condition to	Remembering	8

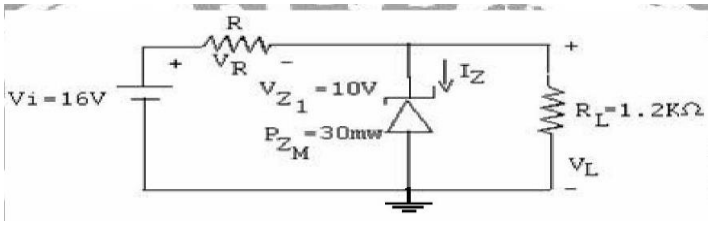
[9+6]

	prevent 'Thermal Runaway' in Bipolar Junction Transistors?		
S.No	**Question**	**Blooms taxonomy level**	**Course Outcomes**
6	**Draw** the circuit diagram & small signal equivalent of CB amplifier using accurate h-parameter model. Derive expressions for A_V, A_I, R_i and R_0?	Application	7
7	**Draw** the circuit diagram of CC amplifier using hybrid parameters and derive expressions for A_I, A_V, R_i, R_O?	Application	8
8	**What** are the compensation techniques used for V_{BE} and I_{CO}. Explain with help of suitable circuits?	Remembering	8
9	**Define** the stability factors with respect to the changes in I_{CO}, V_{BE} and β. Why is the stability with respect to changes in V_{CE} not considered?	Remembering	8
10	**Justify** statement "Potential divider bias is the most commonly used biasing method" for BJT circuits. Explain how bias compensation can be done in such biasing through diodes?	Evaluating	7
11	**Determine** the significance of operating point, DC and AC load lines to ensure active region operation of a BJT in CE amplifier application?	Evaluating	8
	UNIT-V **Field Effect Transistor and FET Amplifiers**		
1	**Explain** the operation of FET with its characteristics and explain the different regions in transfer characteristics?	Comprehension	9
2	**Define** pinch-off voltage and trans conductance in field effect transistors?	Comprehension	9
3	With the help of neat sketches and characteristic curves **explain** the construction & operation of a JFET and mark the regions of operation on the characteristics?	Application	9
4	**Explain** how a FET can be made to act as a switch?	Knowledge	9
5	Bring out the differences between BJT and FET. **Compare** the three configurations of JFET amplifiers?	Knowledge	9
6	**Create** a relation between the three JFET parameters, μ, r_d and g_m?	Creating	10
7	**How** a FET can be used as a voltage variable Resistance (VVR)?	Remembering	10
8	**Explain** the construction & operation of a P-channel MOSFET in enhancement and depletion modes with the help of static drain characteristics and transfer characteristics?	Understanding	9
9	**Sketch** the drain characteristics of MOSFET for different values of V_{GS}& mark different regions of operation.	Comprehension	9
10	**Explain** the principle of CS amplifier with the help of circuit diagram. Derive the expressions for A_V, input impedance and output Impedance?	Understanding	10
11	**Write** the expressions for mid-frequency gain of a FET Common Source?	Knowledge	9
12	Discuss the high frequency response of CD Configuration?	Knowledge	9
13	**What** is the effect of external source resistance on the voltage gain of a common source amplifier? Explain with necessary derivations?	Remembering	10
14	**Draw** the small-signal model of common drain FET amplifier. Derive expressions for voltage gain and output resistance?	Analyzing	10
15	**Draw** the small-signal model of common source FET amplifier.	Analyzing	10

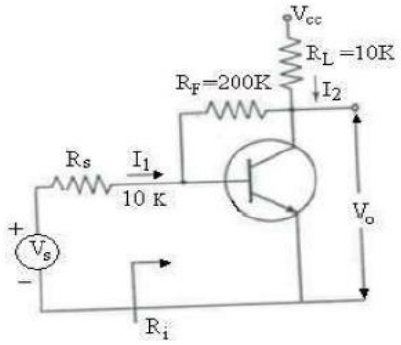
	Derive expressions for voltage gain and output resistance?		
S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
16	**Draw** the small-signal model of common gate FET amplifier. Derive expressions for voltage gain and output resistance?	Analyzing	10
17	**List** any four merits of MOSFET to show that they are more suitable than JFETS in Integrated circuits?	Remembering	9
18	**Compare** enhancement and depletion modes of a MOSFET with the help of its characteristics and construction?	Analyzing	10
19	With a neat schematic, **explain** how amplification takes place in a common drain amplifier?	Understanding	10
20	**Explain** the significance of threshold voltage of a MOSFET. Discuss the methods to reduce threshold voltage, V_T?	Understanding	10
21	Derive the expression for transconductance of MOSFET?	Analyzing	10

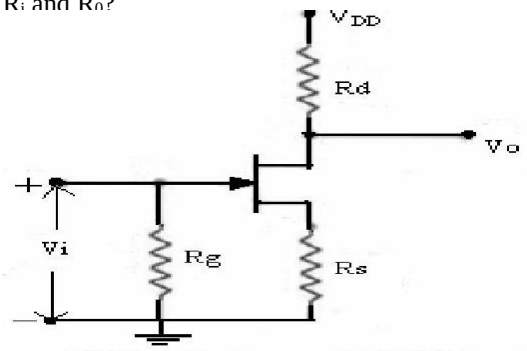
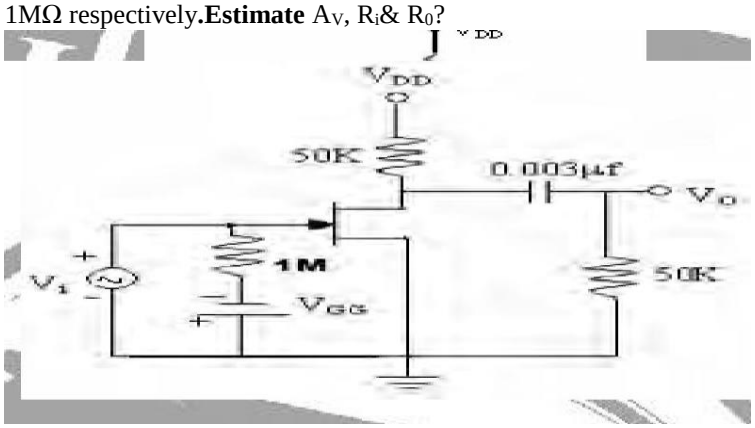
3. Group - III (problems):

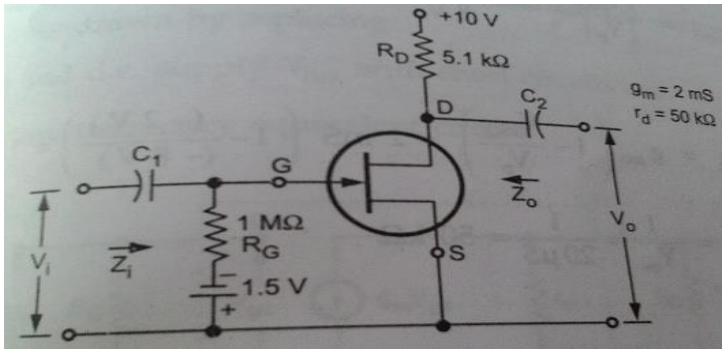
S.No	QUESTION	Blooms taxonomy level	Course Outcomes
	UNIT-I **P-N JUNCTION DIODE**		
1		Application	2
2	**Find** the value of D.C. resistance and A.C resistance of a Germanium junction diode at 25^0 C with reverse saturation current, I_o = 25µA and at an applied voltage of 0.2V across the diode?	Analysis	2
3	The reverse saturation current of a silicon p – n function diode at an operating temperature of 27^0C is 50 nA.**Estimate** the dynamic forward and reverse resistances of the diode for applied voltages of 0.8 V and -0.4 V respectively?	Evaluating	2
4	The circuit shown in Figure (3.2) uses identical diodes for which ID = 1 mA at VD = 0.7 V with n = 1. At 20◦C, voltage V is measured by a very high resistance meter to be 0.1 V. By what factor does the reverse leakage current of these diodes exceed Is? **Estimate** the value of V when the temperature is raised by 50◦C. 	Evaluating	2
5	A P-N junction germanium diode has a reverse saturation current of 0.10 µA at the room temperature of 27^0C.It is observed to be 30µA,when the room temperature is increased. **Evaluate** the room temperature?	Evaluating	2
6	**Find** the factor by which the reverse saturation current of a silicon diode will get multiplied when the temperature is increased from 27^0 C to 82^0C?	Rememberi ng	2
7	**Determine** the values of forward current in the case of P-N junction diode, with I_0=10 µA Vf=0.8V at T=300^0K.Assume silicon diode?	Evaluating	2
8	A p-n junction diode has a reverse saturation current of 30 µA at a temperature of 125^0 C. At the same temperature, **find** the dynamic resistance for 0.2 V bias in forward and reverse direction?	Rememberi ng	2
9	The voltage across a silicon diode at room temperature of 300^0K is 0.7 V when 2 ma current flows through it. If the voltage increases to 0.75 v, **Evaluate** the diode current assuming V_T=26mv.	Evaluating	2
10	**Determine** the dynamic forward and reverse resistance of p-n junction silicon diode when the applied voltage is 0.25 V at T=3000K with give I0=2 µA?	Evaluating	2
	UNIT –II **RECTIFIERS AND FILTERS**		
1	A full wave bridge rectifier having load resistance of 100Ω is fed with 220V, 50Hz through a step-down transformer of turns ratio 11:1. Assuming the diodes ideal, **find** DC output voltage Peak inverse voltage	Evaluating	4

	iii) Rectifier efficiency.		[9+6]
S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
2	**Determine** the ripple factor of an L-section filter comprising a 10H choke and 8μF capacitor, used with a FWR. The DC voltage at the load is 50V. Assume the line frequency as 50Hz?	Evaluating	4
			4
3	A bridge rectifier uses four identical diodes having forward resistance of 5Ω each. Transformer secondary resistance is 5 ohms and the secondary voltage is 30V (rms). **Determine** the dc output voltage for I_{dc} = 200 mA and value of the output ripple voltage?	Evaluating	4
4	A 230 V, 60Hz voltage is applied to the primary of a 5:1 step down, center tapped transformer used in a full wave rectifier having a load of 900Ω. If the diode resistance and the secondary coil resistance together have a resistance of 100 Ω, **determine** i) DC voltage across the load. ii) DC current flowing through the load. iii) DC power delivered to the load. iv) PIV across each diode.	Evaluating	4 [8+7]
5	A HWR circuit supplies 100mA DC current to a 250Ω load. **Find** the DC output voltage, PIV rating of a diode and the r.m.s. voltage for the transformer supplying the rectifier?	Evaluating	4
6	A full wave rectifier circuit uses two silicon diodes with a forward resistance of 20Ω each. A DC voltmeter connected across the load of 1KΩ reads 55.4 volts. **Calculate** i) I_{rms} ii) Average voltage across each diode iii) ripple factor iv) Transformer secondary voltage rating.	Evaluating	4 [7+8]
7	**What** is the ripple factor if a power supply of 220 V, 50 Hz is to be Full Wave rectified and filtered with a 220μF capacitor before delivering to a resistive load of 120Ω? Compute the value of the capacitor for the ripple factor to be less than 15%.	Rememberi ng	4
8	For the Zener diode circuit shown in Figure.1, **determine** V_L, V_R , I_Z& R? 	Evaluating	4
9	In a Zener diode regulator, the supply voltage = 300V, V_z = 220V, I_z = 15mA and load current = 25mA. **Determine** the value of resistor required to be connected in series with the Zener diode?	Evaluating	4
10	A bridge rectifier uses four identical diodes having forward resistance of 5Ω each. Transformer secondary resistance is 5Ω and the secondary voltage of 30V(rms).**Determin**e the dc output voltage for I_{DC}=200mA	Evaluating	4

	and the value of the ripple voltage.		
S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
A UNIT-III	**BIPOLAR JUNCTION TRANSISTOR AND UJT**		
1	**Determine** the values of I_C and I_E for a transistor with α_{dc} = 0.99 and I_{CBO} = 5μA, if I_B is measured as 20 μA?	Evaluating	6
2	**Determine** the collector current and emitter current for a transistor with α = 0.99 and I_{CBO} = 490μA when the base current is 19μA?	Evaluating	6
3	The reverse leakage current of the transistor when connected in CB configuration is 0.2 μA while it is 18 μA when the same transistor is connected in CE configuration. **Determine** α and β of the transistor?	Evaluating	6
4	For an NPN transistor with α_N = 0.98, J_{CO} = 2μA and I_{EO} = 1.6μA connected in Common Emitter Configuration, **Determine** the minimum base current for which the transistor enters into saturation region. V_{CC} and load resistance are given as12 V and 4.0 KΩ respectively?	Evaluating	6
5	If the base current in a transistor is 20μA when the emitter current is 6.4mA, what are the values of α_{dc} and $\beta_{dc?}$ Also **determin**e the collector current?	Evaluating	6
6	In a certain transistor, the emitter current is 1.02 times as large as the collector current. If the emitter current is 12 mA, **find** the base current?	Evaluating	6
7	**A)Find**α_{dc} foreach of the following values of βdc=50 and 190. B)**Find** βdc for each of the following values of $\alpha_{dc=}$0.995 and 0.9765	Evaluating	6
8	In a certain transistor, the emitter current is 1.09 times as large as the collector current. If the emitter current is 10 mA, **find** the base current?	Evaluating	6
UNIT-IV	**TRANSISTOR BIASING AND STABILIZATION**		
1	**Design** a collector to base bias circuit using silicon transistor to achieve a stability factor of 20, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V,Icq=4ma & β=50?	Creating	8
2	**Draw** small signal equivalent circuit of Emitter Follower using accurate h-parameter model. For the emitter follower circuit with R_S = 0.5K and R_L = 5K, calculate R_i, A_V and R_O. Assume, h_{fe} = 50, h_{ie} =1K, h_{oe} = 25 μA/V.		8
3	A silicon NPN transistor has Ico = 20nA and β=150, V_{be} = 0.7V. It is operated in Common Emitter configuration havingVbb = 4.5V,R_b= 150K,R_c = 3K, V_{cc} = 12V. Find the emitter, base and collector currents and also verify in which region does the transistor operate. **What** will happen if the value of the collector resistance is increased to very high values?	Rememberi ng	8
4	**Design** a self bias circuit using silicon transistor to achieve a stability factor of 10, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V, I_{CQ} = 4 mA & β= 50?	Creating	8
5	A bipolar junction transistor with h_{ie} = 1100Ω, h_{fe} = 50, h_{re} = $2.4x10^{-4}$, h_{oe} = 25 μA/V, is to drive a load of 1KΩ in Emitter-Follower arrangement. **Estimate** A_V, A_I, R_i& R_0?	Evaluating	8
6	**Design** an Emitter bias circuit using silicon transistor to achieve a stability factor of 20, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V, I_{CQ} = 4 mA & β= 50.	Creating	8

S.No	QUESTION	Blooms taxonomy level	Course Outcomes
7	A bipolar junction transistor with h_{ie} = 1100Ω, h_{fe} = 50, h_{re} = 2.4x10^{-4}, h_{oe} = 25 µA/V, is to drive a load of 1KΩ in CB amplifier arrangement. **Estimate** A_V, A_I, R_i& R_0?	Evaluating	8
8	**Design** a fixed bias circuit using silicon transistor, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V, I_{CQ} = 4 mA & β= 50?	Evaluating	8
9	**Design** a self bias circuit using silicon transistor to achieve a stability factor of 10, with the following specifications: V_{CC} = 16V, V_{BE} = 0.7V, V_{CEQ} = 8V, I_{CQ} = 4 mA & β = 50?	Evaluating	8
10	**Design** a self bias circuit for the following specifications: V_{CC} = 12 V; V_{CE} = 2V; I_C = 4mA; h_{fe} = 80. Assume any other design required. Draw the designed circuit.	Evaluating parameters	8
11	**Compute** current gain, voltage gain, input and output impedance of the CB amplifier if it is driven by a voltage source of internal resistance Rs=1k.The load impedance is RL=1K. The transistor parameters are hib= 22, hfb= -0.98, hrb=2.9×10−4, hob= 0.5µA/V.	Analysis	8
12	**Determine** AI , AV , RI , R0.of a transistor with hie=1.1K, hfe=50, hre=205X10−4 , hoe=25µA/V is connected in CE configuration as shown in fig. 	Evaluating	8
13	A common collector circuit has the following components R1=27kΩ, R2=27kΩ, Re=5.6kΩ, RL=47kΩ, Rs=600Ω. The transistor parameters are hie=1kΩ, hfe=85 and hoe=2µA/V. **Determine** Ai, Ri, Av, Ro.	Evaluating	8
14	A common Emitter circuit has the following,components.Rs=1k,R1=110K,R2=12K Rc=6K.h-parameters are hie=1.2K,hre=2.5*10^{-4} ,hfe=75,hoe=25uA/V.**Draw** the equivalent hybrid model and calculate Ai,Ri,Ro and Av?		8
15	The h-parameters of a transistor used in a CE circuit are hie = 1.0 K ,hre= 10×10−4, hfe = 50, hoe = 100 K. The load resistancefor the transistor is 1 K in the collector circuit. **Determine**Ri, Ro, AV & Ai in the amplifier stage (Assume Rs = 1000)?	Evaluating	8

S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
	UNIT-V **FIELD EFFECT TRANSISTOR AND FET AMPLIFIERS**		
1	A Common Source FET amplifier circuit shown in Figure.2 with un-bypassed R_S has the following circuit parameters: R_d = 15K, R_S = 0.5K, Rg = 1M, r_d = 5K, g_m= 5mS and V_{DD} = 20 V. Calculate A_V, A_I, R_i and R_0? 		10
2	In an n-channel FET, the effective channel width is 3x 10^{-4}cm and the donor impurity concentration is 10^{15} electrons/cm^3. **Find** the pinch-off voltage?	Evaluating	10
			10
3	In the common source FET amplifier shown in Figure.1, the trans conductance and drain dynamic resistance of the FET are 5mA/V and 1MΩ respectively.**Estimate** A_V, R_i& R_0? 	Evaluating	10
4	A Common Source FET amplifier circuit with un bypassed R_S has the following circuit parameters: R_d = 15K, R_S = 0.5K, Rg = 1M, r_d = 5K, g_m= 5mS and V_{DD} = 20 V. **Determine** A_V& R_O?	Evaluating	10
5	A self biased p – channel JFET has a pinch – off voltage of V_P = 5 V and I_{DSS} = 12 mA. The supply voltage is 12 V. **Determine** the values of R_D and R_S so that I_D = 5 mA and V_{DS} = 6V?	Evaluating	10

S.No	**QUESTION**	**Blooms taxonomy level**	**Course Outcomes**
6	For the circuit shown in fig.**Determine**i) Input impedence II)output impedance and III) voltage gain? 	Evaluating	10
7	The P-channel FET has a $\|I_{DS}\|$=-12mA, |Vp|=5V, V_{GS} is 1.6 V. **Determine**I_D ,G_m and G_{m0} ?	Evaluating	10
8	Data sheet for a JFET indicates that IDS=10mA and V_{GS}(off)= -4V. **Determine** the drain current for V_{GS}=0V, -1V and -4V.	Evaluating	10