INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Name	:	**ELECTRONIC DEVICES AND CIRCUITS**
Course Code	:	**AEC001**
Class	:	**B. Tech III Semester**
Regulation	:	**IARE- R16**
Branch	:	**ECE**
Year	:	**2018 – 2019**
Course Coordinator	:	**Prof. V.R. Seshagiri Rao, Professor, ECE Department**
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I. COURSE OBJECTIVES:

The course should enable the students to:

S.No	Description
I	Acquire knowledge of electrical characteristics of ideal and practical diodes under forward and reverse bias to analyze and design diode application circuits such as rectifiers and voltage regulators.
II	Utilize operational principles of bipolar junction transistors and field effect transistors to derive appropriate small-signal models and use them for the analysis of basic amplifier circuits.
III	Perform DC analysis (algebraically and graphically using current, voltage curves with superimposed load line) and design of CB, CE and CC transistor circuits.
IV	Compare and contrast different biasing and compensation techniques.

II. COURSE LEARNING OUTCOMES

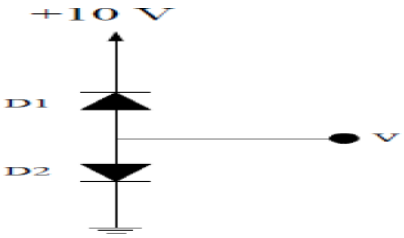
Students, who complete the course, will have demonstrated the ability to do the following

CAEC001.01	Understand and analyze different types of diodes, operation and its characteristics in order to design basic form circuits.
CAEC001.02	Understand the different parameters of transistors such as depletion width and channel width for understanding the functioning and design of this component.
CAEC001.03	Estimate the performance of BJTs on the basis of their operation and working.
CAEC001.04	Distinguish the constructional features and operation of FET and MOSFET and their applications.
CAEC001.05	Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis.
CAEC001.06	Describe amplifier circuits, oscillators and filter circuits employing BJT, FET devices.
CAEC001.07	Construct, and take measurement of various analog circuits to compare experimental results in the laboratory with theoretical analysis.
CAEC001.08	Design full wave rectifier without filter and different filters for the given specifications.
CAEC001.09	Explain the operational characteristics of various special purpose diodes such as zener diode, Tunnel diode, varactor diode and photo diode.
CAEC001.10	Identify the various transistor biasing circuits and its usage in applications like amplifiers.
CAEC001.11	Analyze the performance of FETs on the basis of their operation and working.
CAEC001.12	Discuss and Design small signal amplifier circuits applying the various biasing techniques.
CAEC001.13	Apply small-signal models to devices and determine the voltage gain and input and output impedances.

CAEC001.14	Explain half wave rectifier without filter and with different filters for the given specifications.
CAEC001.15	Explain basic circuits like dc and biasing circuits, small-signal ac circuits with emphasis on single-stage amplifiers.
CAEC001.16	Acquire experience in building and trouble shouting simple electronic analog circuits.
CAEC001.17	Write Use of diodes in typical circuits: rectifiers, regulated power supplies, limiting circuits.
CAEC001.18	Understand the principle of operation and characteristics of silicon controlled rectifier and its application in power supply protection circuit.
CAEC001.19	Design and selection of appropriate filter to meet the requirements of voltage regulation and ripple factor.
CAEC001.20	Explain the operation of Zener diode and its usage in voltage regulating application
CAEC001.21	Analyze various transistor configurations and asses merits and demerits for different applications.
CAEC001.22	Explain the role of temperature variations on the performance of the BJT and necessary measures to be taken in deign to stabilize the amplifier
CAEC001.23	Discuss the construction of MOSFET and steady the VI characteristics, as it is the prime component in VLSI technology.
CAEC001.24	Apply the concept of electronic devices and circuits to understand and analyze real time applications.
CAEC001.25	Acquire the knowledge and develop capability to succeed national and international level competitive examinations.

TUTORIAL QUESTION BANK

UNIT-I SEMICONDUCTOR DIODES			
PART – A (SHORT ANSWER QUESTIONS)			
S. No	**Question**	**Blooms Taxonomy level**	**Course Learning Outcomes**
1	Define Static resistance of Diode?	Remember	CAEC001.01
2	Explain about forward bias of diode?	Understand	CAEC001.01
3	Explain about reverse bias of diode?	Understand	CAEC001.01
4	Write the Applications of diode?	Understand	CAEC001.01
5	Draw the V-I characteristics of diode?	Understand	CAEC001.01
6	List the differences between ideal diode and practical diode?	Remember	CAEC001.01
7	Define diffusion capacitance?	Remember	CAEC001.01
8	Define transition capacitance?	Remember	CAEC001.01
9	Define static resistance?	Remember	CAEC001.01
10	Define dynamic resistance?	Remember	CAEC001.01
11	Explain the load line Analyze of diode?	Understand	CAEC001.01
12	Define Fermi level?	Remember	CAEC001.01
13	Write the equation of diode current.	Remember	CAEC001.01
14	Define cut-in voltage?	Remember	CAEC001.01
15	Write the differences between avalanche and zener breakdown mechanisms?	Understand	CAEC001.03
16	Define depletion region?	Remember	CAEC001.01
17	Explain the temperature dependence of V-I characteristics of PN diode?	Understand	CAEC001.01
18	List the applications of Zener diode?	Remember	CAEC001.20
19	Define zener breakdown mechanism?	Remember	CAEC001.20
20	Sketch V-I characteristics of a PN diode for the following conditions: Rf=0,Rr = 0, Vγ =0	Remember	CAEC001.03
21	Explain about zener regulator?	Understand	CAEC001.03
PART – B (LONG ANSWER QUESTIONS)			
1	Define Fermi level? By indicating the position of Fermi level in intrinsic, n-type and p- type semiconductor, explain its significance in semiconductors?	Remember	CAEC001.01
2	Analyze between drift and diffusion current in a semiconductor. State continuity equation?	Understand	CAEC001.01
3	Sketch the V-I characteristics of p-n junction diode for forward bias voltages. Analyze between the incremental resistance and the apparent resistance of the diode?	Understand	CAEC001.01
4	What is potential energy barrier of the p-n junction? How does it arise and what is its order of magnitude?	Remember	CAEC001.01
5	Explain the temperature dependence of VI characteristics of PN diode?	Understand	CAEC001.01
6	Derive an expression for total diode current starting from Boltzmann relationship in terms of the applied voltage?	Remember	CAEC001.01
7	Explain the V-I characteristics of Zener diode and analyze the difference between Avalanche and Zener Break downs?	Understand	CAEC001.03
8	Explain in detail, the variation of following semiconductor parameters with temperature, i. Energy gap ii. Conductivity	Understand	CAEC001.01

9	Explain the concept of diode capacitance. Derive expression for transition capacitance?	Understand	CAEC001.01
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?	Understand	CAEC001.01
11	Explain Zener and avalanche breakdown mechanisms in detail?	Understand	CAEC001.03
12	Explain the differences between Static and dynamic resistances of a p – n diode Transition and Diffusion capacitances of a p – n diode.	Remember	CAEC001.01
13	Differentiate between, Volt –Ampere characteristics of a single silicon p – n diode and two identical silicon p- n diodes connected in parallel. Avalanche and zener break down mechanisms.	Remember	CAEC001.03
14	Define the terms for following of a PN diode, i. Dynamic resistance ii. Load line iii. Reverse saturation current.	Remember	CAEC001.01
15	Explain how Zener is used as a regulator?	Understand	CAEC001.03
PART - C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1	Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at 250 C with reverse saturation current, Io = 25μA and at an applied voltage of 0.2V across the diode?	Understand	CAEC001.01
2	The reverse saturation current of a silicon p – n function diode at an operating temperature of 270C 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?	Understand	CAEC001.01
3	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. 	Understand	CAEC001.01
4	A P-N junction germanium diode has a reverse saturation current of 0.10 μA at the room temperature of 270C.It is observed to be 30μA, when the room temperature is increased. Evaluate the room temperature?	Understand	CAEC001.01
5	Find the factor by which the reverse saturation current of a silicon diode will get multiplied when the temperature is increased from 2700 C to 8200 C?	Remember	CAEC001.01
6	Determine the values of forward current in the case of P-N junction diode, with I0=10 μA Vf=0.8V at T=3000K.Assume silicon diode?	Understand	CAEC001.01
7	A p-n junction diode has a reverse saturation current of 30 μA at a temperature of 12500 C. At the same temperature, find the dynamic resistance for 0.2 V bias in forward and reverse direction?	Remember	CAEC001.01
8	The voltage across a silicon diode at room temperature of 3000K is 0.7 V when 2 ma current flows through it. If the voltage increases to 0.75 v, Evaluate the diode current assuming VT=26mv.	Understand	CAEC001.01

9	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?	Understand	CAEC001.01
10	Derive an expression for total diode current starting from Boltzmann relationship in terms of the applied voltage.	Remember	CAEC001.01
UNIT-II SPECIAL PURPOSE ELECTRONIC DEVICES AND RECTIFIERS			
PART - A (SHORT ANSWER QUESTIONS)			
1	Define rectifier?	Remember	CAEC001.14
2	What is the principle of operation of photodiode?	Remember	CAEC001.03
3	Draw the two transistor equivalent circuit of a SCR	Understand	CAEC001.03
4	Define holding current in a SCR?	Remember	CAEC001.03
5	Draw the V-I characteristics of SCR?	Understand	CAEC001.03
6	Explain why a SCR is operated only in the forward biased condition?	Understand	CAEC001.03
7	Explain how triggering of an SCR can be controlled by the gate signal supplied?	Understand	CAEC001.01
8	List the applications of varactor diode?	Understand	CAEC001.01
9	Define photodiode?	Remember	CAEC001.01
10	Define ripple factor?	Remember	CAEC001.04
11	Define transformer utilization factor?	Remember	CAEC001.04
12	Define efficiency?	Remember	CAEC001.04
13	Define full wave rectifier?	Remember	CAEC001.02
14	What are the merits of full wave rectifier?	Understand	CAEC001.02
15	List the disadvantages of full wave rectifier?	Understand	CAEC001.02
16	Draw the circuit diagram of half wave rectifier?	Understand	CAEC001.02
17	Draw the circuit diagram of full wave rectifier?	Remember	CAEC001.02
18	Give the advantages and disadvantages of HWR and FWR?	Understand	CAEC001.02
19	What is the need for a filter in rectifier?	Remember	CAEC001.02
20	What is the need for voltage regulators?	Understand	CAEC001.02
21	Draw the circuit diagram of capacitor filter?	Remember	CAEC001.02
22	Draw the circuit diagram of L-section filter?	Understand	CAEC001.02
23	Draw the circuit diagram of Inductor filter?	Remember	CAEC001.02
PART– B (LONG ANSWER QUESTIONS)			
1	Draw the block diagram of a regulated power supply and explain its operation?	Understand	CAEC001.05
2	Draw the circuit of a half-wave-rectifier and find out the ripple factor, %regulation? Efficiency and PIV?	Remember	CAEC001.04
3	Draw the circuit of bridge rectifier and explain its operation with the help of input and output waveforms?	Remember	CAEC001.02
4	With suitable diagrams, explain the working of centre-tapped full wave rectifier. Derive expressions for VDC, IDC, Vrms and Irms for it?	Understand	CAEC001.02
5	Explain the relative merits and demerits of all the rectifiers?	Understand	CAEC001.02
6	Compare the performance of Inductor filter and capacitor filter?	Understand	CAEC001.02
7	Define Ripple factor and form factor. Establish a relation between them?	Remember	CAEC001.02
8	Explain the necessity of a bleeder resistor in an L -section filter used with a Full Wave filter?	Understand	CAEC001.02
9	List out the merits and demerits of Bridge type Full Wave rectifiers over centre tapped type Full Wave rectifiers?	Remember	CAEC001.02

12	Explain the operation of inductor filter and derive expression for ripple factor?(FWR)	Understand	CAEC001.02
13	Explain the operation of L-section filter and derive expression for ripple factor?(FWR)	Understand	CAEC001.02
14	Define current amplification factor?	Remember	CAEC001.02
15	Explain the principle of operation and characteristics of Silicon controlled Rectifier.	Understand	CAEC001.03
16	Explain the tunneling phenomenon and the characteristics of tunnel diode with the help of necessary energy band diagrams?	Understand	CAEC001.03
17	Explain the construction and working of photo diode?	Understand	CAEC001.03
18	Sketch the static characteristics and firing characteristics of SCR and explain the shape of the curve?	Understand	CAEC001.03
19	Derive the expression for the ripple factor of LC-Section filter when used with a Full-wave-rectifier. Make necessary approximations.	Remember	CAEC001.02
PART - C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1	A full wave bridge rectifier having load resistance of 100Ω is fed with 220V, Assuming the diodes are ideal, Find the following terms, i) DC output voltage ii)Peak inverse voltage iii) Rectifier efficiency.	Understand	CAEC001.02
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?	Understand	CAEC001.02
3	A bridge rectifier uses four identical diodes having forward resistance of5Ω each. Transformer secondary resistance is 5 ohms and the secondary voltage is 30V(rms). Determine the dc output voltage for Idc = 200 mA and value of the output ripple voltage?	Understand	CAEC001.02
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.	Understand	CAEC001.02
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?	Remember	CAEC001.02
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. Irms ii. Average voltage across each diode iii. ripple factor iv. Transformer secondary voltage rating.	Understand	CAEC001.02
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%.	Remember	CAEC001.02
8	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).Determine the dc output voltage for IDC=200mA and the value of the ripple voltage.	Remember	CAEC001.02

UNIT-III

TRANSISTORS

PART –A (SHORT ANSWER QUESTIONS)

1	Define Transistor?	Remember	CAEC001.06
2	Define operating point Q?	Understand	CAEC001.06
3	Draw the symbols of NPN and PNP transistor?	Understand	CAEC001.06
4	Explain the operation of BJT and its types?	Understand	CAEC001.06
5	Explain the breakdown in transistor?	Understand	CAEC001.06
6	Explain the transistor switching times?	Understand	CAEC001.06
7	Define Transistor current?	Remember	CAEC001.06
8	Define early effect or base width modulation?	Remember	CAEC001.06
9	Explain about transistor amplifier?	Understand	CAEC001.06
10	Define current amplification factor?	Remember	CAEC001.06
11	When does a transistor act as a switch?	Understand	CAEC001.06
12	Explain about the various regions in a transistor?	Understand	CAEC001.06
13	Draw the output characteristics of NPN transistor in CE configuration?	Understand	CAEC001.06
14	Define saturation region?	Remember	CAEC001.06
15	Write the relation between IC, β, IB and ICBO in a BJT?	Remember	CAEC001.06
16	Write the relation between IC, β, IB and ICBO in a BJT?	Remember	CAEC001.06
17	Define active region?	Remember	CAEC001.06
18	Describe the various current components in a BJT?	Remember	CAEC001.06

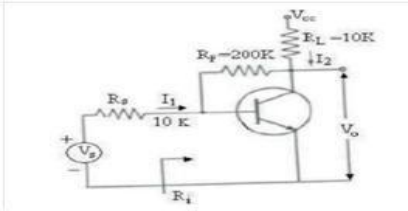
CIE II

1	Write a note on transistor construction?	Understand	CAEC001.07
2	What are the differences between BJT and UJT?	Understand	CAEC001.06
3	Draw the equivalent circuit of a UJT	Understand	CAEC001.06
4	Draw the V-I characteristics of UJT?	Remember	CAEC001.06
5	What do you mean by regeneration in UJT?	Understand	CAEC001.06
6	Explain the terms peak voltage and valley current in UJT?	Understand	CAEC001.06
7	Explain the terms peak voltage and valley current in UJT?	Remember	CAEC001.06
8	Why FET is called a voltage operated device?	Understand	CAEC001.06
9	Explain about transistor amplifier?	Remember	CAEC001.06
10	List the important features of FET?	Remember	CAEC001.08
11	Draw the functional diagram of JFET?	Remember	CAEC001.08
12	Give the classifications of FETs and their Apply areas?	Remember	CAEC001.08
13	Define pinch off voltage?	Understand	CAEC001.08
14	Draw the structure of an n-channel JFET?	Remember	CAEC001.08
15	Draw the static characteristics curves of an n-channel JFET?	Understand	CAEC001.08
16	Draw the drain characteristics of depletion type MOFET?	Remember	CAEC001.08
17	Draw the small signal model of JFET?	Remember	CAEC001.08
18	Draw the transfer characteristics for P-channel JFET?	Understand	CAEC001.08
19	Draw the Drain V_I characteristics for p-channel JFET?	Remember	CAEC001.08
20	Explain about ohmic and saturation regions?	Understand	CAEC001.08
21	Draw the drain characteristics of an n-channel enhancement Type MOSFET?	Remember	CAEC001.08

PART – B (LONG ANSWER QUESTIONS)

1	With a neat diagram explain the various current components in an NPN bipolar junction transistor and hence derive the general equation for collector current, IC.	Understand	CAEC001.22

2	Define Early-effect; Explain why it is called as base-width modulation? Discuss its consequences in transistors in detail?	Remember	CAEC001.06
3	How transistor acts as an amplifier?	Remember	CAEC001.06
4	Draw the input and output characteristics of a transistor in common emitter Configurations and explain its working?	Understand	CAEC001.06
5	Draw the input and output characteristics of a transistor in common base configurations?	Remember	CAEC001.06
6	Draw the input and output characteristic of a transistor in common collector configurations?	Understand	CAEC001.06
7	Explain the constructional details of Bipolar Junction Transistor?	Remember	CAEC001.06
8	Derive the relation among α, β and γ?	Understand	CAEC001.06
9	What is thermal runaway in transistors? Obtain the condition for thermal stability in transistors?	Remember	CAEC001.06
10	Describe the significance of the terms, α and β. Establish a relation between them?	Remember	CAEC001.07
CIE II			
1	Explain how the UJT can be used as a negative-resistance device with the aid of static characteristics?	Understand	CAEC001.06
2	Give the construction details of UJT and explain its operation with the help of equivalent circuits?	Remember	CAEC001.06
3	Explain any two construction techniques of transistor?	Understand	CAEC001.06
4	Explain the Apply of a UJT as a relaxation oscillator?	Understand	CAEC001.07
5	With reference to bipolar junction transistors, define the following terms and explain. Emitter efficiency, Base Transportation factor and Large signal current gain.	Understand	CAEC001.06
6	Explain the operation of FET with its characteristics and explain the different regions transfer characteristics?	Understand	CAEC001.08
7	Define pinch-off voltage and trans conductance in field effect transistors?	Understand	CAEC001.08
8	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?	Remember	CAEC001.08
9	List out the differences between BJT and FET.	Understand	CAEC001.06
10	Create a relation between the three JFET parameters, μ, r d and gm?	Remember	CAEC001.08
11	How a FET can be used as a voltage variable Resistance (VVR)?	Understand	CAEC001.08
12	Derive the expression for transconductance of MOSFET?	Remember	CAEC001.23
13	Compare enhancement and depletion modes of a MOSFET with the help of its characteristics and construction?	Remember	CAEC001.23
14	Sketch the drain characteristics of MOSFET for different values of VGS & mark different regions of operation.	Understand	CAEC001.08
15	Explain the construction & operation of a P-channel MOSFET in enhancement and depletion modes with the help of static drain Characteristics and transfer characteristics?	Understand	CAEC001.08
PART - C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1	Determine the values of IC and IE for a transistor with αdc = 0.99 and ICBO = 5μA, if IB is measured as 20 μA ?	Understand	CAEC001.22
2	Determine the collector current and emitter current for a transistor with α = 0.99 and ICBO = 490μA when the base current is 19μA?	Understand	CAEC001.06

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?	Understand	CAEC001.06
4	For an NPN transistor with αN = 0.98, ICO= 2μA and IEO = 1.6μAconnected in Common Emitter Configuration, Determine the minimum base current for which the transistor enters into saturation region. VCC and load resistance are given as12 V and 4.0 KΩ respectively? 	Understand	CAEC001.06
5	If the base current in a transistor is 20μA when the emitter current is 6.4mA, what are the values of αdc and βdc? Also determine the collector current?	Understand	CAEC001.06
	CIE II		
1	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?	Understand	CAEC001.06
2	i. Find αdc for each of the following values of βdc=50 and 190. ii. Find βdc for each of the following values of αdc=0.995 and 0.9765.	Remember	CAEC001.06
3	In an n-channel FET, the effective channel width is 3x 10-4cm and the donor impurity concentration is 1015 electrons/cm3. Find the pinch-off voltage?	Understand	CAEC001.08
4	A self-biased p – channel JFET has a pinch – off voltage of VP = 5 V and IDSS = 12 mA. The supply voltage is 12 V. Determine the values of RD and RS so that ID = 5 mA and VDS = 6V?	Remember	CAEC001.08
5	The P-channel FET has a |IDS|=-12mA, |Vp|=5V, VGS is 1.6 V. Determine ID Gm and Gm0 ?	Understand	CAEC001.08
6	Data sheet for a JFET indicates that IDS=10mA and VGS(off)= -4V. Determine the drain current for VGS=0V, -1V and -4V.	Understand	CAEC001.08
7	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?	Remember	CAEC001.08
	UNIT-IV **BIASING AND COMPENSATION TECHNIQUES**		
	PART – A (SHORT ANSWER QUESTIONS)		
1	Define biasing?	Remember	CAEC001.06
2	Why biasing is necessary in BJT amplifiers?	Remember	CAEC001.06
3	Define Q-point?	Remember	CAEC001.06
4	Explain the concept of dc load line with the help of neat diagram?	Understand	CAEC001.06
5	Draw and explain the ac load line?	Remember	CAEC001.06
6	Define three stability factors?	Understand	CAEC001.06
7	Which biasing method provides more stabilization amongst the three types of biasing methods?	Understand	CAEC001.07
8	Compare the advantages and disadvantages of biasing schemes?	Remember	CAEC001.07

9	Draw the circuit diagram of a collector to base bias circuit of CE amplifier?	Remember	CAEC001.14
10	Write down advantages of fixed bias circuitry?	Understand	CAEC001.07
11	Draw the circuit diagram of a fixed bias circuit of CE amplifier?	Remember	CAEC001.06
12	Draw a circuit employing a sensistor compensation?	Understand	CAEC001.06
13	Write down disadvantages of fixed bias circuit?	Remember	CAEC001.11
14	Define thermal runaway?	Understand	CAEC001.10
15	Define thermal resistance?	Remember	CAEC001.06
16	Define stability factors S ?	Remember	CAEC001.05
17	Define thermal stability	Remember	CAEC001.10
18	Draw the circuit diagram of a self-bias circuit of CE amplifier?	Understand	CAEC001.06
19	Draw the circuit diagram of a emitter feedback bias circuit of CE amplifier?	Understand	CAEC001.14
20	List out the different types of biasing methods?	Understand	CAEC001.11
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 RB= 790 KΩ determine its operating point.	Understand	CAEC001.11
22	Differentiate bias stabilization and compensation techniques?	Understand	CAEC001.11
PART – B (LONG ANSWER QUESTIONS)			
1	Define biasing? Draw the fixed bias circuit and obtain the expression for the stability factor?	Remember	CAEC001.11
2	Draw the collector-emitter feedback bias circuit and obtain the expression for the stability factor?	Understand	CAEC001.11
3	Draw the self-bias circuit and obtain the expression for the stability factor. Discuss the advantages and disadvantages of self-biasing?	Remember	CAEC001.11
4	Draw the emitter feedback bias circuit and obtain the expression for the stability factor?	Understand	CAEC001.11
5	Draw the circuit diagram & small signal equivalent of CB amplifier using accurate h-parameter model. Derive expressions for AV, AI, Ri and R0?	Understand	CAEC001.11
6	Draw the circuit diagram of CC amplifier using hybrid parameters and derive expressions for AI, AV, Ri, RO?	Understand	CAEC001.11
7	What are the compensation techniques used for VBE and ICO. Explain with help of suitable circuits?	Remember	CAEC001.11
8	Define the stability factors with respect to the changes in ICO, VBE and β. Why is the stability with respect to changes in VCE not considered?	Remember	CAEC001.11
9	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?	Remember	CAEC001.11
10	Determine the significance of operating point, DC and AC load lines toensure active region operation of a BJT in CE amplifier Apply?	Understand	CAEC001.10
11	Define Thermal Runaway in transistors? Derive the condition to prevent Thermal Runaway in Bipolar Junction Transistors?	Remember	CAEC001.11

PART - C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1	Design a collector to base bias circuit using silicon transistor to achieve a stability factor of 20, with the following specifications: VCC = 16V, VBE = 0.7V, VCEQ = 8V,Icq=4mA & β=50?	Understand	CAEC001.11
2	A silicon NPN transistor has Ico = 20nA and β=150, Vbe = 0.7V. It is operated in Common Emitter configuration having Vbb= 4.5V,Rb=150K,Rc = 3K, Vcc = 12V. Find the emitter, base and collector currents and also verify in which region the transistor operates. What will happen if the value of the collector resistance is increased to very high values?	Remember	AEC001.11
3	Design a self bias circuit using silicon transistor to achieve a stability factor of 10, with the following specifications: VCC = 16V, VBE = 0.7V, VCEQ = 8V, ICQ = 4 mA & β= 50?	Understand	CAEC001.11
4	Design an Emitter bias circuit using silicon transistor to achieve a stability factor of 20, with the following specifications: VCC = 16V, VBE= 0.7V, VCEQ = 8V, ICQ = 4 mA & β= 50.	Understand	CAEC001.11
5	Design a fixed bias circuit using silicon transistor, with the following specifications: VCC = 16V, VBE = 0.7V, VCEQ = 8V, ICQ = 4 mA & β= 50?	Understand	CAEC001.11
6	Design a self-bias circuit using silicon transistor to achieve a stability factor of 10, with the following specifications: VCC = 16V, VBE = 0.7V, VCEQ =8V, ICQ = 4 mA & β = 50?	Understand	CAEC001.11
7	Design a self-bias circuit for the following specifications: VCC= 12 V; VCE =2v; Ic=4mA;hfe=80. Assume any other design parameters required. Draw the designed circuit.	Understand	CAEC001.11
8	A self-biased p – channel JFET has a pinch – off voltage of VP = 5 V and IDSS = 12 mA. The supply voltage is 12 V. Determine the values of RD and RS so that ID = 5 mA and VDS = 6V?	Understand	CAEC001.11
UNIT-V **BJT AND FET AMPLIFIERS**			
PART – A (SHORT ANSWER QUESTIONS)			
1	Draw the small signal model of a CE configuration?	Understand	CAEC001.14
2	Define hie and hfe in CE configuration?	Remember	CAEC001.12
3	Define hoe and hre in CB configuration?	Understand	CAEC001.12
4	Draw the hybrid model of a CB configuration?	Understand	CAEC001.12
5	Draw the small signal model of JFET?	Remember	CAEC001.12
6	Define rd and gm?	Understand	CAEC001.12
7	Draw the hybrid model of a CC configuration?	Remember	CAEC001.12
8	Draw the small signal model of FET as a common gate amplifier?	Understand	CAEC001.12
9	Draw the small signal model of FET as a common source amplifier?	Understand	CAEC001.12
10	Draw the small signal model of FET as a common drain amplifier?	Remember	CAEC001.16
PART – B (LONG ANSWER QUESTIONS)			
1	Discuss the high frequency response of CD configuration?	Remember	CAEC001.12
2	Explain the effect of external source resistance on the voltage gain of a common source amplifier? Explain with necessary derivations?	Remember	CAEC001.12
3	Draw the small-signal model of common drain FET amplifier and derive expressions for voltage gain and output resistance?	Understand	CAEC001.12

4	Draw the small-signal model of common source FET amplifier. Derive expressions for voltage gain, input resistance and output resistance?	Understand	CAEC001.12
5	Draw the small-signal model of common gate FET amplifier. Derive expressions for voltage gain and output resistance?	Remember	CAEC001.12
6	Draw the small-signal model of common emitter BJT amplifier. Derive expressions for voltage gain, input resistance and output resistance?	Understand	CAEC001.12
7	With a neat schematic, explain how amplification takes place in a common drain amplifier?	Understand	CAEC001.16
8	Draw the small-signal model of common base BJT amplifier. Derive expressions for voltage gain, input resistance and output resistance?	Remember	CAEC001.16
9	Draw the small-signal model of common collector BJT amplifier. Derive expressions for voltage gain, input resistance and output resistance?	Remember	CAEC001.16
PART - C (PROBLEM SOLVING AND CRITICAL THINKING QUESTIONS)			
1	A Common Source FET amplifier circuit shown in Figure.2 with un bypassedRS has the following circuit parameters: Rd = 15K, RS = 0.5K, Rg =1M,,rd = 5K, gm= 5mS and VDD = 20 V. Calculate AV, AI, Ri and R0?	Remember	CAEC001.16
2	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.	Understand	CAEC001.16
3	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 theequivalent hybrid model and calculate Ai, Ri, Ro and Av?	Understand	CAEC001.16
4	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 resistance for the transistor is 1 K in the collector circuit. Determine Ri, Ro, AV& Ai in the amplifier stage. (Assume Rs = 1000)?	Understand	CAEC001.16
5	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.	Remember	CAEC001.16
6	A bipolar junction transistor with hie = 1100Ω, hfe = 50, hre = 2.4x10-4, hoe = 25 μA/V, is to drive a load of 1KΩ in Emitter-Follower arrangement. Estimate AV, AI, Ri& R0?	Understand	CAEC001.16
7	Draw small signal equivalent circuit of Emitter Follower using accurate hparameter model. For the emitter follower circuit with RS = 0.5K and RL =5K, calculate Ri, AV and RO. Assume, hfe = 50, hie =1K, hoe = 25 μA/V.	Remember	CAEC001.16
8	A silicon NPN transistor has Ico = 20nA and β=150, Vbe = 0.7V. It is operated in Common Emitter Configuration having Vbb = 4.5V, Rb=150K,Rc = 3K, Vcc = 12V. Find the emitter, base and collector currents and also verify in which region the transistor operates. What will happen if the value of the collector resistance is increased to very high values?	Remember	CAEC001.16
9	The P-channel FET has a |IDS|=-12mA, |Vp|=5V, VGS is 1.6 V. Determine ID, gm and gm0 ?	Remember	CAEC001.09