INSTITUTEOFAERONAUTICALENGINEERING

(Autonomous)
Dundigal, Hyderabad-500043

ELECTRONICS AND COMMUNICATION ENGINEERING

TUTORIAL QUESTION BANK

Course Title	**ELECTRONIC DEVICES AND CIRCUITS**				
Course Code	AECB06				
Programme	B.Tech				
Semester	III	ECE			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	3	1.5
Chief Coordinator	Mr. D.Khalandar Basha, Assistant professor				
Course Faculty	Ms. G.Mary swarna latha, Assistant professor Ms. M.Sreevani, Assistant professor				

COURSE OBJECTIVES:

The course should enable the students to:	
I	Introduce components such as diodes, BJTs and FETs.
II	Know the applications of components
III	Know the switching characteristics of components.
IV	Give understanding of various types of amplifier circuits.
V	Introduce components such as diodes, BJTs and FETs.

COURSE OUTCOMES (COs):

CO 1	Describe diode operation, transition capacitance, diffusion capacitance and the use of diode in various electronic circuits.
CO 2	Understand the principle of operation of BJT in CE, CB, CC configuration and analyze transistor hybrid model.
CO 3	Bias the transistors and analyze the low frequency response of BJT amplifiers.
CO 4	Study and analyze the behavior of FET and MOSFET
CO 5	Analyze FET amplifiers in CS, CG, CD modes using small signal model and study the behavior of special purpose diodes.

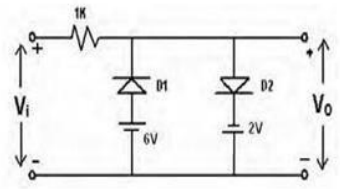
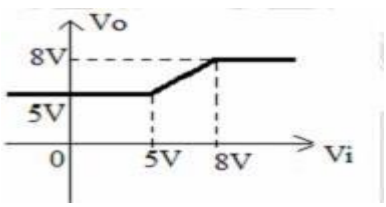
COURSE LEARNING OUTCOMES (CLOs):

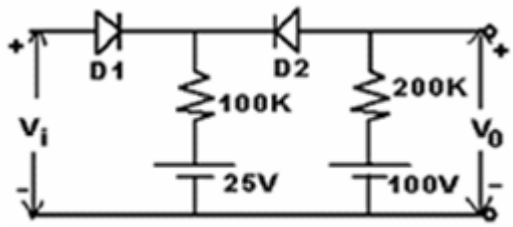
AECB06.01	Understand and analyze diodes operation and in order to design basic circuits.
AECB06.02	Understand static and dynamic resistance of diode in forward and reverse bias conditions.
AECB06.03	Understand and analyze diode applications and how the diode acts as a switch.
AECB06.04	Design rectifier without and with capacitive filters for the given specifications.
AECB06.05	Understand the use of diodes in typical circuits like, clipping, clamping circuits and comparator circuits.
AECB06.06	Understand the principle of operation and characteristics of common emitter, common base and common collector configurations.
AECB06.07	Understand the concept of operating point, DC & AC load lines.
AECB06.08	Analyze transistor hybrid parameter model for CE, CB and CC configurations.
AECB06.09	Determine of h-parameters of BJT amplifier from transistor characteristics.
AECB06.10	Understand the use of conversion of h-parameters among CE, CB and CC configurations.
AECB06.11	Identify the various transistor biasing circuits, compensation circuits and its usage in applications like amplifiers.
AECB06.12	Analyze various transistor configurations and asses merits and demerits for different applications.
AECB06.13	Analyze CE Amplifier with emitter resistance.
AECB06.14	Analyze low frequency response of BJT Amplifiers.
AECB06.15	Understand the effect of coupling and bypass capacitors on CE Amplifier.
AECB06.16	Explain construction and principle of operation of JFET.
AECB06.17	Understand the concept of pinch-off voltage and volt-ampere characteristic of JFET.
AECB06.18	Distinguish the constructional features and operation of BJT and FET and their applications.
AECB06.19	Understand biasing of FET and how it acts as voltage variable resistor.
AECB06.20	Discuss the construction of MOSFET and steady the VI characteristics, as it is the prime component in VLSI technology.
AECB06.21	Apply small-signal models to field effect transistors and determine the voltage gain and input and output impedances.
AECB06.22	Analyze CS, CD, CG JFET amplifiers using small signal model.
AECB06.23	Understand basic concepts of MOSFET amplifiers.
AECB06.24	Explain the operation of Zener diode and its usage in voltage regulating application.
AECB06.25	Understand the principle of operation and characteristics of silicon controlled rectifier, tunnel diode, UJT and depletion Varactor diode.

TUTORIAL QUESTION BANK

MODULE -I				
DIODE AND APPLICATIONS				
Part - A(Short Answer Questions)				
S.NO	**QUESTIONS**	**Blooms Taxonomy Level**	**Course Outcomes**	**Course Learning Outcomes**
1	Define static resistance of diode?	Remember	CO 1	AECB06.02
2	Explain about forward bias of diode?	Understand	CO 1	AECB06.01

3	Explain about reverse bias of diode?	Understand	CO 1	AECB06.01
4	Write the Applications of diode?	Understand	CO 1	AECB06.03
4	Draw the V-I characteristics of diode?	Understand	CO 1	AECB06.01
5	List the differences between ideal diode and practical diode?	Remember	CO 1	AECB06.01
6	Define diffusion capacitance?	Remember	CO 1	AECB06.02
7	Define transition capacitance?	Remember	CO 1	AECB06.02
8	Define drift current?	Remember	CO 1	AECB06.02
9	Define dynamic resistance?	Remember	CO 1	AECB06.01
10	Explain the load line Analysis of diode?	Understand	CO 1	AECB06.01
11	How diode acts as switch?	Remember	CO 1	AECB06.01
12	Write the equation of diode current.	Remember	CO 1	AECB06.01
13	Define cut-in voltage?	Remember	CO 1	AECB06.01
14	Define rectifier?	Understand	CO 1	AECB06.04
15	How many types of rectifiers are there?	Remember	CO 1	AECB06.04
16	Define forward recovery time?	Understand	CO 1	AECB06.04
17	What do you mean by clipper?	Remember	CO 1	AECB06.04
18	What do you mean by clamper?	Remember	CO 1	AECB06.04
19	Define clamping circuit theorem?	Remember	CO 1	AECB06.04
20	What is peak inverse voltage for half-wave rectifier?	Understand	CO 1	AECB06.04
21	What is peak inverse voltage for bridge full-wave rectifier?	Remember	CO 1	AECB06.01
Part - B (Long Answer Questions)				
1	Sketch the V-I characteristics of p-n junction diode for forward bias and reverse bias voltages. Represent the static and dynamic resistance of the diode in the characteristic curve?	Remember	CO 1	AECB06.01
2	Differences between Static and dynamic resistances of a p – n diode. Transition and diffusion capacitances of a p – n diode	Understand	CO 1	AECB06.01
3	Define the following terms for a PN diode 1. Load line 2. Diode switching times. 3. Reverse saturation current.	Understand	CO 1	AECB06.01
4	Draw the circuit of a half-wave-rectifier and derive ripple factor, efficiency and PIV?	Remember	CO 1	AECB06.04
5	Compare among half-wave rectifier, center tapped transformer full wave rectifier and bridge full-wave rectifier.	Understand	CO 1	AECB06.04
6	Explain the operation of capacitor filter in full wave rectifier and derive the expression for ripple factor?	Remember	CO 1	AECB06.04
7	With suitable diagrams, explain the working of center-tapped full wave rectifier. Derive expressions for VDC, IDC, Vrms and Irms for it?	Understand	CO 1	AECB06.04
8	With the help of a neat circuit diagram explain the working of two level diode clippers.	Understand	CO 1	AECB06.05
9	Explain the positive and negative clamper circuits.	Understand	CO 1	AECB06.05
10	State and prove the clamping circuit theorem.	Understand	CO 1	AECB06.05
11	Explain negative peak clipper with and without reference voltage.	Understand	CO 1	AECB06.05
12	Draw the circuit of a center tapped transformer full-wave rectifier and derive ripple factor, efficiency and PIV?	Remember	CO 1	AECB06.05
13	Explain the operation of two level slicer with neat diagrams.	Remember	CO 1	AECB06.05
14	Explain the operation of comparator circuits with neat circuit diagrams.	Remember	CO 1	AECB06.05
15	Draw the circuit of a bridge full-wave rectifier and derive ripple factor, efficiency and PIV?	Understand	CO 1	AECB06.02
16	Discuss the operation of half wave rectifier with and without filter with neat sketches.	Remember	CO 1	AECB06.02

17	Discuss the terms as referred to the full wave rectifier: (i)PIV (ii) Average or D.C voltage (iii) RMS current (iv) Ripple factor.	Understand	CO 1	AECB06.02
18	Explain the formation of depletion region in an open circuited p-n junction with neat sketches.	Remember	CO 1	AECB06.01
19	What is d.c load line and explain the d.c load line analysis of p-n junction diode with relevant expressions.	Understand	CO 1	AECB06.01
20	What are the applications of p-n junction diode and explain how the p-n diode acts as a switch.	Remember	CO 1	AECB06.01
	Part - C (Analytical Questions)			
1	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 0 = 25μA and at an applied voltage of 0.2V across the diode?	Understand	CO 1	AECB06.02
2	The reverse saturation current of a silicon p – n function diode at an operating temperature of 27oC is 50nA. Estimate the dynamic forward and reverse resistances of the diode for applied voltages of 0.8 V and -0.4 V respectively?	Understand	CO 1	AECB06.02
3	A Full wave single phase rectifier makes use of 2 diodes, the internal forward resistance of each is considered to be constant and equal to 30Ω. The load resistance is 1KΩ. The transformer secondary voltage is 200-0-200V (rms).Calculate VDC, IDC, Ripple factor.	Understand	CO 1	AECB06.04
4	A sinusoidal voltage of magnitude Vm = 24 V is applied to a half wave rectifier. The diode may be considered to be ideal and RL = 1.8KΩ is connected as load. Find Peak value of current, RMS value of current, DC value of current and ripple factor.	Understand	CO 1	AECB06.04
5	A full-wave rectifier using capacitor filter has to supply 30V dc to a load resistance of 1K Ω. Assume the diode and transformer winding resistance to be negligible. Estimate the value of capacitor for a ripple factor of 0.01.	Remember	CO 1	AECB06.04
6	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 has a resistance of 100Ω, 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	CO 1	AECB06.04
7	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.	Remember	CO 1	AECB06.04
8	Determine Vo for the network shown in Figure for the given 16V P-P sin wave input. Also sketch the transfer characteristics. (Assume ideal diodes) 	Understand	CO 1	AECB06.05
9	The ideal transfer characteristic of particular clipper circuit is shown in Figure. Design the circuit using ideal diodes and draw the input-output waveforms with proper explanation, if Vi=10 sinωt. 	Understand	CO 1	AECB06.05

10	For the circuit shown in Figure, a sine wave input of 100V peak is applied. Sketch the output voltage V to the same time scale &transfer characteristic. Assume ideal diodes. 	Remember	CO 1	AECB06.05
	MODULE -II			
	BIPOLAR JUNCTION TRANSISTOR (BJT)			
	Part – A (Short Answer Questions)			
1	Define Transistor?	Remember	CO 2	AECB06.06
2	What is meant by operating point Q?	Understand	CO 2	AECB06.06
3	Draw the symbols of NPN and PNP transistor?	Understand	CO 2	AECB06.06
4	Draw and explain the ac load line?	Understand	CO 2	AECB06.07
5	Compare CE,CC and CB configurations	Remember	CO 2	AECB06.08
6	Draw h parameters in CE configuration?	Remember	CO 2	AECB06.09
7	Draw h parameters in CB configuration?	Remember	CO 2	AECB06.09
8	What is meant by base width modulation?	Remember	CO 2	AECB06.06
9	Draw h parameters in CC configuration?	Remember	CO 2	AECB06.09
10	Define current amplification factor for CE configuration?	Remember	CO 2	AECB06.06
11	When the transistor is said to be in cut-off region?	Understand	CO 2	AECB06.06
12	List the various regions in a transistor and compare them with respect to doping and width.	Understand	CO 2	AECB06.06
13	Draw the output characteristics of NPN transistor in CE configuration?	Understand	CO 2	AECB06.06
14	Draw the circuit of a CB transistor in saturation region?	Remember	CO 2	AECB06.06
15	Write the relation between I_C, β, I_B and I_{CBO} in a BJT?	Remember	CO 2	AECB06.06
16	Write the relation between α, β and γ in a BJT?	Remember	CO 2	AECB06.06
17	Draw the circuit of a CE transistor in active region?	Remember	CO 2	AECB06.06
18	Describes the various current components in a BJT?	Remember	CO 2	AECB06.06
19	Define Q-point?	Remember	CO 2	AECB06.06
20	Explain the concept of dc load line with the help of neat diagram?	Remember	CO 2	AECB06.07
	Part - B (Long Answer Questions)			
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?	Remember	CO 2	AECB06.06
2	Define Early-effect. Explain why it is called as base-width modulation? Discuss its consequences in transistors in detail?	Remember	CO 2	AECB06.06
3	Explain working of transistor in common emitter configurations and draw its input and output characteristics.	Understand	CO 2	AECB06.08
4	Explain working of transistor in common base configurations and draw its input and output characteristics.	Understand	CO 2	AECB06.08
5	Explain working of transistor in common collector configurations and draw its input and output characteristics.	Understand	CO 2	AECB06.08
6	Define h-parameters of a transistor in a small signal model. What are the benefits of h-parameters?	Remember	CO 2	AECB06.09
7	Explain the constructional details of bipolar Junction Transistor?	Understand	CO 2	AECB06.06

8	Explain active region, saturation region and cut-off region in transistor characteristics.	Remember	CO 2	AECB06.06
9	Define h-parameters. Explain how do you determine h-parameters of a transistor from its characteristics?	Understand	CO 2	AECB06.09
10	Define Q-point and explain how to calculate Q-point from dc and ac load lines.	Understand	CO 2	AECB06.07
11	What is early effect? How does it modify the V-I characteristics of a BJT?	Understand	CO 2	AECB06.06
12	Why BJT is considered as current control device? Explain in detail.	Remember	CO 2	AECB06.08
13	Explain the method of evaluating h-parameters for a transistor CE configuration from its characteristics.	Understand	CO 2	AECB06.08
14	Explain the method of evaluating h-parameters for a transistor CB configuration from its characteristics.	Understand	CO 2	AECB06.09
15	Explain the method of evaluating h-parameters for a transistor CC configuration from its characteristics.	Understand	CO 2	AECB06.09
16	Compare CE, CB and CC transistor configurations. Which is widely used configuration and why?	Remember	CO 2	AECB06.09
17	Obtain the expression for collector current of a transistor in CE & CB configurations.	Understand	CO 2	AECB06.09
18	Why diode cannot be replaced by back to back diode connection?	Understand	CO 2	AECB06.06
19	Explain the biasing of two transistor junctions for its various operating regions.	Understand	CO 2	AECB06.07
20	Mention the different types of transistor configurations. Draw the circuit diagram of each type using transistor.	Remember	CO 2	AECB06.08
	Part - C (Analytical Questions)			
1	The reverse leakage current of the transistor when in CB configuration is 0.3μA while it is 16μA when the same transistor is connected in CE configuration. Determine α, β and γ.	Understand	CO 2	AECB06.06
2	The common base d.c current gain of transistor is 0.967. If the emitter current is 10mA, what is the value of the base current?	Understand	CO 2	AECB06.06
3	(a)A transistor has α=0.975. What is the value of β and γ. (b) If β=200, What is the value of α and γ.	Remember	CO 2	AECB06.06
4	A transistor has β=150. Calculate the approximate collector and base currents if the emitter current is 10mA.	Understand	CO 2	AECB06.06
5	A transistor has IB=105 μA and IC=2.05mA. Find 1)β of the transistor 2)α of the transistor 3)emitter current IE 4)if IB changes by 27 μA and IC changes by 0.65mA,find the new value of β.	Understand	CO 2	AECB06.06
6	A certain transistor has α=0.98, IC0= 5 μA and IB=100 μA. Find the values of collector and emitter currents.	Remember	CO 2	AECB06.06
7	A certain transistor has α of 0.98 and a collector leakage current IC0 of 1 μA. Calculate the collector and base currents, when IE= 1 mA.	Understand	CO 2	AECB06.06
8	A transistor operating in CB configuration has Ic = 2.98mA, IE = 3mA and IC0 = 0.01mA. What current will flow in the collector circuit of this transistor when connected in CE configuration with base current of 30μA.	Understand	CO 2	AECB06.06
9	A silicon transistor with VBE = 0.7V, α = 0.98 and collector cut-off current of 10 μA. Assume Rc =2KΩ, VCC = 12V and IB = 10 μA. Find β, ICE0, Ic, IE and VCE.	Understand	CO 2	AECB06.06
10	The current gain of transistor in CE circuit is 49. Calculate CB current gain and find the base current where the emitter current is 3mA.	Understand	CO 2	AECB06.06
	MODULE –III			
	TRANSISTOR BIASING AND STABILIZATION			

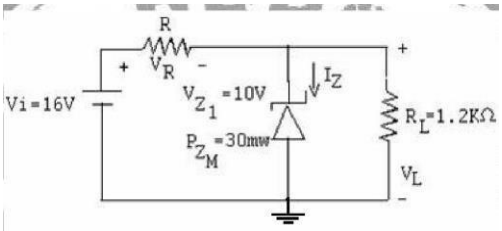
Part – A (Short Answer Questions)				
1	Define biasing?	Remember	CO 3	AECB06.11
2	Why biasing is necessary in BJT amplifiers?	Remember	CO 3	AECB06.11
3	Define three stability factors?	Remember	CO 3	AECB06.11
4	Which biasing method provides more stabilization amongst the three types of biasing methods?	Understand	CO 3	AECB06.11
5	Compare the advantages and disadvantages of biasing schemes?	Remember	CO 3	AECB06.11
6	Draw the circuit diagram of a collector to base biasing circuit of CE amplifier?	Remember	CO 3	AECB06.11
7	Write advantages of fixed bias circuitry?	Understand	CO 3	AECB06.11
8	Draw the circuit diagram of a fixed bias circuit of CE amplifier?	Remember	CO 3	AECB06.11
9	Draw a circuit employing a sensistor compensation?	Remember	CO 3	AECB06.12
10	Write down disadvantages of fixed bias circuit?	Remember	CO 3	AECB06.11
11	Define thermal runaway?	Remember	CO 3	AECB06.12
12	Define thermal resistance?	Remember	CO 3	AECB06.12
13	Define stability factors s and s‟.	Remember	CO 3	AECB06.11
14	Define thermal stability	Remember	CO 3	AECB06.12
15	List out the different types of biasing methods?	Remember	CO 3	AECB06.11
16	Differentiate bias stabilization and compensation techniques?	Remember	CO 3	AECB06.12
1	Write the expressions for AV and Ri of a CE amplifier.	Remember	CO 3	AECB06.14
2	Write the expressions for AV and Ri of a CB amplifier.	Remember	CO 3	AECB06.14
3	Write the expressions for AV and Ri of a CC amplifier.	Remember	CO 3	AECB06.14
4	What is the effect of bypass capacitor?	Understand	CO 3	AECB06.15
5	What is the effect of coupling capacitor?	Understand	CO 3	AECB06.15
6	Write the expressions for AI and Rout of a CE amplifier signals	Remember	CO 3	AECB06.13
7	Draw the frequency response of BJT amplifier.	Remember	CO 3	AECB06.14
8	Write the expressions for AI and Rout of a CB amplifier signals	Remember	CO 3	AECB06.12
9	Write the expressions for AI and Rout of a CC amplifier signals	Remember	CO 3	AECB06.12
10	Write the expressions for AVS and AIS of a CE amplifier.	Remember	CO 3	AECB06.12
Part – B (Long Answer Questions)				
1	Draw the circuit diagram of a voltage divider bias and derive the expression for stability factor.	Remember	CO 3	AECB06.11
2	Draw the circuit diagram of a fixed bias and derive the expression for stability factor.	Understand	CO 3	AECB06.11
3	Draw the circuit diagram of a collector to base bias and derive expression for stability factor.	Remember	CO 3	AECB06.11
4	List the three sources of instability of collector current and hence define the three stability factors.	Remember	CO 3	AECB06.11
5	Explain thermal runaway. What are the factors effecting the stability factor.	Remember	CO 3	AECB06.12
6	What is the necessity of biasing circuits? Explain bias compensation using diodes and transistors.	Understand	CO 3	AECB06.12
7	Which biasing method provides more stabilization than the three types of biasing methods? Why?	Understand	CO 3	AECB06.12
8	For the improvement of stability of the operating point what suggestions you make for self bias. Discuss with the help of stability factors.	Understand	CO 3	AECB06.11
9	What do you understand by bias stabilization and bias compensation? Why it is necessary in transistor amplifiers?	Understand	CO 3	AECB06.12
10	Explain the concept of d.c load line in BJT with the help of diagram. What are the requirements of biasing?	Understand	CO 3	AECB06.11

1	Draw the circuit diagram of CE amplifier using hybrid parameters and derive the expression for AI , AV, Ri and Ro.	Understand	CO 3	AECB06.14
2	Draw the circuit diagram of CB amplifier using hybrid parameters and derive the expression for AI , AV, Ri and Ro.	Remember	CO 3	AECB06.14
3	Draw the circuit diagram of CC amplifier using hybrid parameters and derive the expression for AI , AV, Ri and Ro.	Understand	CO 3	AECB06.14
4	Draw the frequency response of BJT amplifier and explain the effect of bypass capacitor on the frequency response in detail.	Remember	CO 3	AECB06.15
5	Draw the frequency response of BJT amplifier and explain the effect of coupling capacitor on the frequency response in detail.	Understand	CO 3	AECB06.15
6	Draw the circuit diagram of CE amplifier with emitter resistance and derive the expression for AI, AV, Ri and Ro using hybrid model.	Remember	CO 3	AECB06.13
7	Give the comparison between CB, CE and CC amplifiers in terms of current gain, voltage gain, input impedance and output admittance.	Remember	CO 3	AECB06.15
8	Write a short note on how the transistor acts as an amplifier.	Remember	CO 3	AECB06.13
9	For three configurations of a BJT, we require three different sets of h-parameters. Justify your answer.	Remember	CO 3	AECB06.13
10	What do you understand by the term ‘equivalent circuit’ of a transistor? Draw the equivalent circuit of the generalized transistor amplifier and explain the significance of each parameter.	Remember	CO 3	AECB06.13
	Part - C (Analytical Questions)			
1	In a Silicon transistor circuit with a fixed bias, Vcc = 9V, RC = 3KΩ, RB=8KΩ, β = 50, VBE = 0.7V. Find the operating point and stability factor.	Understand	CO 3	AECB06.11
2	In a Silicon transistor circuit with a fixed bias, Vcc =25V, RC =820Ω, RB =180KΩ, β = 80, VBE = 0.7V. Determine the values of base current, emitter current and the collector to emitter voltage.	Remember	CO 3	AECB06.11
3	In a Silicon transistor circuit with a fixed bias, Vcc =12V, RC =330Ω, IB=0.3mA, β = 100, VBE = 0.7V. Determine the value of bias resistor RB and Stability factor.	Understand	CO 3	AECB06.11
4	In a Silicon transistor circuit with a collector to base bias, Vcc =10V, RC = 10KΩ, RB =100KΩ, β = 100, VBE = 0.7V. Calculate the operating point and also draw the load line and locate Q point on it.	Remember	CO 3	AECB06.11
5	An NPN transistor with β =50 is used in a common emitter circuit with Vcc=10V, Rc=2K Ω. The bias is obtained by connecting a 100K Ω resistance from collector to base. Assume VBE=0.7V. Find (a) The quiescent point (b) The stability factor S.	Understand	CO 3	AECB06.11
6	Determine the quiescent currents and the collector to emitter voltage for a germanium transistor with β=50 in self-biasing arrangement. Draw the circuit with a given component values Vcc=20V, Rc=2KΩ, Re=100Ω, R1=100K Ω, R2=5K Ω. Also find the stability factor.	Remember	CO 3	AECB06.12
7	Design a self-bias circuit as per the following specifications. Vcc =12V, Vce=2V, Ic=4mA, hfe=80. Draw the complete diagram with the designed values.	Understand	CO 3	AECB06.11
1	The hybrid parameters for a transistor used in CE configuration are hie = 5kΩ; hfe = 180; hre = 1.25 × 10-4; hoe = 16 × 10-6 ohms. The transistor has a load resistance of 20 KΩ in the collector and is supplied from a signal source of resistance 5 KΩ. Compute the value of input impedance, output impedance, current gain and voltage gain.	Understand	CO 3	AECB06.13

2	A CE amplifier with emitter resistor RE=800Ω, RL=1k Ω. Given the h-parameters of CE configuration are hie=1.1KΩ, hre=5*10-4, hfe=50, hoe=25µA/V. Compute AI, AV, AIs, Ri, Ro.	Remember	CO 3	AECB06.14
3	A CE amplifier is driven by voltage source with internal resistance Rs=800Ω. The load impedance RL=2k Ω. The h-parameters are hie=1.1KΩ, hre=2.5*10-4, hfe=50, hoe=25µA/V. Compute AI, AV, AIs, Ri, and Zo.	Understand	CO 3	AECB06.14
4	A CB amplifier is driven by voltage source with internal resistance Rs=800Ω. The load impedance RL=2k Ω. The h-parameters are hib=22 Ω, hrb=3*10-4, hfb=-0.98, hoe=0.5µA/V. Compute AI, AV, AIs, Ri, Zo & Ap.	Remember	CO 3	AECB06.14
5	A CC amplifier is driven by voltage source with internal resistance Rs=800Ω.The load impedance RL=2k Ω. The h-parameters are hic=1.1KΩ, hrc=1, hfc = -51, hoc = 25µA/V. Compute AI, AV, AIs, Ri, Zo & Ap.	Understand	CO 3	AECB06.14
	MODULE -IV			
	JUNCTION FIELD EFFECT TRANSISTOR			
	Part – A (Short Answer Questions)			
1	Why FET is called as unipolar device?	Understand	CO 4	AECB06.17
2	Why do you call FET as field effect transistor?	Understand	CO 4	AECB06.16
3	Write down the relationship between various FET parameters?	Remember	CO 4	AECB06.17
4	Why the input impedance of FET is more than that of a BJT?	Understand	CO 4	AECB06.18
5	Why N channel FET's are preferred over P channel FET's?	Understand	CO 4	AECB06.17
6	Give the drain current equation of JFET.	Remember	CO 4	AECB06.16
7	What are the parameters of JFET?	Remember	CO 4	AECB06.17
8	Mention the operating modes of FET.	Remember	CO 4	AECB06.20
9	Define the amplification factor in the JFET	Remember	CO 4	AECB06.17
10	What are the operating regions of a JFET?	Remember	CO 4	AECB06.17
11	Why FET is called a voltage controlled device?	Understand	CO 4	AECB06.18
12	What is a FET?	Remember	CO 4	AECB06.17
13	Draw the symbol for i) P-channel JFET, ii) N-channel JFET	Remember	CO 4	AECB06.19
14	List the advantages of FET	Remember	CO 4	AECB06.17
15	Draw the drain characteristics curves of an n-channel JFET?	Remember	CO 4	AECB06.19
16	What are the special features of FET?	Remember	CO 4	AECB06.17
17	Define pinch off voltage?	Remember	CO 4	AECB06.18
18	Define rd and gm?	Remember	CO 4	AECB06.17
19	Draw the transfer characteristics curves of an n-channel JFET?	Remember	CO 4	AECB06.20
20	What are the main draw backs of FET?	Understand	CO 4	AECB06.17
	Part – B (Long Answer Questions)			
1	Explain the operation of JFET and derive the drain and transfer characteristics.	Understand	CO 4	AECB06.17
2	With neat sketches explain the construction, principle of operation, and characteristics of an n-channel JFET.	Understand	CO 4	AECB06.20
3	Explain the construction and operation of p-channel JFET.	Understand	CO 4	AECB06.20
4	Compare JFET with BJT.	Understand	CO 4	AECB06.18
5	How a FET can be used as voltage variable resistance (VVR)?	Understand	CO 4	AECB06.17
6	Create a relation between the three JFET parameters?	Understand	CO 4	AECB06.17
7	Using the basic structure of JFET. Explain its physical operation and draw its output characteristics. Give expression for drain current.	Understand	CO 4	AECB06.20
8	Obtain the expression for the pinch off voltage VP in the case of n-channel JFET.	Understand	CO 4	AECB06.17
9	Explain voltage divider biasing in FET.	Understand	CO 4	AECB06.20
10	Draw the fixed bias and self bias circuit using FET. Explain in detail.	Understand	CO 4	AECB06.20

11	With neat sketches explain the construction, principle of operation, and characteristics of P-channel JFET.	Remember	CO 4	AECB06.17
12	What are the main constructional differences between a MOSFET and a BJT? What effect do they have on the current conduction mechanism of a MOSFET?	Understand	CO 4	AECB06.17
13	List out the differences between BJT and FET.	Remember	CO 4	AECB06.17
14	Compare enhancement and depletion modes of a MOSFET with the help of its characteristics and construction?	Understand	CO 4	AECB06.18
15	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	CO 4	AECB06.18
16	Explain constructional features of a JFET.	Understand	CO 4	AECB06.17
17	Explain the construction & operation of a N-channel MOSFET in enhancement and depletion modes with the help of static drain characteristics and transfer characteristics?	Remember	CO 4	AECB06.19
18	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	CO 4	AECB06.17
19	Sketch the drain characteristics of MOSFET for different values of VGS & mark different regions of operation.	Remember	CO 4	AECB06.19
20	List any four merits of MOSFET to show that they are more suitable than JFETS in Integrated circuits?	Remember	CO 4	AECB06.20
Part - C (Analytical Questions)				
1	In a n-channel JFET, IDSS = 20 m A and VP = -6 V. Calculate the drain current when VGS = -3 V.	Evaluate	CO 4	AECB06.17
2	Determine the transconductance of a JFET if its amplification factor is 96 and drain resistance is 32 KΩ.	Evaluate	CO 4	AECB06.17
3	An N-channel JFET has IDSS = 8 mA and VP = -5V. Determine the minimum value of VDS for pinch-off region and the drain current IDS for VGS = -2V in the pinch-off region.	Evaluate	CO 4	AECB06.17
4	A JFET has parameters of VGS(off) is -20V and IDSS is 12mA. Find ID for the device using VGS = 0V.	Evaluate	CO 4	AECB06.17
5	The following information is included on the data sheets for an N-channel JFET. IDSS = 20mA, VP = -8V and gm0 = 5000us. Determine the values of transconductance at VGS = -4V.	Evaluate	CO 4	AECB06.17
6	Compare Depletion MOSFET and enhancement MOSFET. Also Derive the expression for transconductance in a CS field effect transistor.	Remember	CO 4	AECB06.18
7	A common source MOSFET amplifier is to be constructed using a n-channel MOSFET which has a conduction parameter of 50mA/V and a threshold voltage of 2.0 volts. If the supply voltage is +15 volts and the load resistor is 470 Ohms, calculate the values of the resistors required to bias the MOSFET amplifier at 1/3(VDD). Draw the circuit diagram and Values given: VDD = +15v, VTH = +2.0v, k = 50mA/V2 and RD = 470Ω.	Remember	CO 4	AECB06.19
8	The following information is included on the data sheets for an N-channel JFET. IDSS = 25mA, VP = -10V and gm0 = 4000us. Determine the values of transconductance at VGS = -5V.	Remember	CO 4	AECB06.19
9	Explain the construction and principle of operation of Depletion type P-channel MOSFET.	Understand	CO 4	AECB06.17
10	Explain the construction and principle of operation of Enhancement type P-channel MOSFET.	Understand	CO 4	AECB06.17
	MODULE -V			
FET AMPLIFIERS				

Part - A (Short Answer Questions)				
1	Give small signal model of JEFT	Understand	CO 5	AECB06.21
2	List the important features of FET?	Remember	CO 5	AECB06.21
3	Draw the functional diagram of JFET?	Understand	CO 5	AECB06.21
4	Define pinch off voltage?	Understand	CO 5	AECB06.17
5	List the applications of Zener diode?	Remember	CO 5	AECB06.24
6	Define rd and gm?	Understand	CO 5	AECB06.21
7	Write the differences between avalanche and Zener breakdown mechanisms?	Remember	CO 5	AECB06.24
8	Draw the two transistor equivalent circuit of a SCR	Understand	CO 5	AECB06.25
9	Draw the V-I characteristics of SCR?	Understand	CO 5	AECB06.25
10	List the applications of varactor diode?	Remember	CO 5	AECB06.25
11	Explain why a SCR is operated only in the forward biased condition?	Understand	CO 5	AECB06.25
12	Explain about ohmic and saturation regions?	Understand	CO 5	AECB06.22
13	Draw the drain characteristics of an n-channel enhancement type MOSFET?	Understand	CO 5	AECB06.23
14	Draw the equivalent circuit of a UJT	Understand	CO 5	AECB06.25
15	Write down applications of UJT?	Understand	CO 5	AECB06.25
16	What is meant by tunnel diode?	Remember	CO 5	AECB06.24
17	Draw the VI characteristics of tunnel diode.	Understand	CO 5	AECB06.24
18	List out the applications of tunnel diode	Remember	CO 5	AECB06.24
19	What is meant by SCR?	Understand	CO 5	AECB06.25
20	List out the advantages of SCR.	Remember	CO 5	AECB06.25
Part - B (Long Answer Questions)				
1	Give the construction details of UJT & explain its operation with the help of equivalent circuits?	Remember	CO 5	AECB06.25
2	Explain the operation of FET with its characteristics and explain the different regions in transfer characteristics?	Understand	CO 5	AECB06.21
3	Create a relation between the three JFET parameters, μ, r d and gm?	Understand	CO 5	AECB06.21
4	Explain the construction & operation of a P-channel MOSFET in enhancement and depletion modes with the help of static drain characteristics and transfer characteristics?	Remember	CO 5	AECB06.23
5	Draw the small-signal model of common drain FET amplifier. Derive expressions for voltage gain and output resistance?	Understand	CO 5	AECB06.22
6	Explain the tunneling phenomenon. Explain the characteristics of tunnel diode with the help of necessary energy band diagrams?	Understand	CO 5	AECB06.25
7	Sketch the static characteristics and firing characteristics of SCR and explain the shape of the curve?	Remember	CO 5	AECB06.25
8	Explain how a variable capacitance can be built using a varactor diode?	Remember	CO 5	AECB06.25
9	Explain the V-I characteristics of Zener diode and distinguish between Avalanche and Zener Break downs?	Understand	CO 5	AECB06.24
10	Draw the small-signal model of common gate FET amplifier. Derive expressions for voltage gain and output resistance?	Remember	CO 5	AECB06.23
11	Draw the small-signal model of common drain FET amplifier. Derive expressions for voltage gain and output resistance?	Remember	CO 5	AECB06.23
12	Draw the small-signal model of common source FET amplifier. Derive expressions for voltage gain and output resistance?	Understand	CO 5	AECB06.23
13	Describe the operation of UJT and sketch its characteristics.	Remember	CO 5	AECB06.24
14	Discuss the operation of varactor diode and list out its application.	Remember	CO 5	AECB06.24
15	Describe the working principle of SCR with VI characteristics.	Understand	CO 5	AECB06.25
16	Sketch the V-I characteristics of zener diode for forward bias and reverse bias voltages.	Remember	CO 5	AECB06.25

17	Compare zener diode and the conventional p-n junction diode.	Remember	CO 5	AECB06.24
18	Draw the basic structure of a SCR and explain its characteristics.	Understand	CO 5	AECB06.25
19	Discuss the working principle of a varactor diode and explain its characteristics.	Remember	CO 5	AECB06.25
20	Explain the V-I characteristics of tunnel diode with negative resistance region. State the applications of tunnel diode.	Remember	CO 5	AECB06.24
	Part - C (Analytical Questions)			
1	A 5.0V stabilized power supply is required to be produced from a 12V DC power supply input source. The maximum power rating PZ of the zener diode is 2W. Using the zener regulator circuit above calculate: a) The maximum current flowing through the zener diode. b) The minimum value of the series resistor, RS. c) The load current IL if a load resistor of 1kΩ is connected across the zener diode. d) The zener current IZ at full load.	Remember	CO 5	AECB06.24
2	Define the three FET parameters: gm, rd and μ. Prove that μ=gm x rd.	Understand	CO 5	AECB06.21
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	CO 5	AECB06.21
4	A Common Source FET amplifier circuit with un bypassed Rs has the following circuit parameters: Rd = 15K, RS = 0.5K, Rg = 1M, rd = 5K, gm= 5mS and VDD = 20 V. Determine AV& RO?	Understand	CO 5	AECB06.22
5	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	CO 5	AECB06.22
6	For the Zener diode circuit shown in Figure, **determine** VL, VR, IZ & R? 	Understand	CO 5	AECB06.24
7	The data sheet for a 2N2646 Uni junction Transistor gives the intrinsic stand-off ratio η as 0.65. If a 100nF capacitor is used to generate the timing pulses, calculate the timing resistor required to produce an oscillation frequency of 100Hz. A). The timing period. B) The value of the timing resistor, R3.	Remember	CO 5	AECB06.25
8	Explain the construction and principle of operation of Depletion type N-channel MOSFET.	Remember	CO 5	AECB06.23
9	A Zener voltage regulator circuit is to maintain constant voltage at 60 V, over a current range from 5 to 50 mA. The input supply voltage is 200 V. Determine the value of resistance R to be connected in the circuit, for voltage regulation from load current IL = 0 mA to IL max, the maximum possible value of IL. What is the value IL max?	Remember	CO 5	AECB06.24
10	Compare Depletion MOSFET and enhancement MOSFET. Also Derive the expression for transconductance in a field effect transistor.	Understand	CO 5	AECB06.23

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