INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

ELECTRICAL AND ELECTRONICS ENGINEERING

TUTORIAL QUESTION BANK

Course Title	**ANALOG ELECTRONICS**				
Course Code	AECB02				
Programme	B.Tech				
Semester	III	EEE			
Course Type	Core				
Regulation	IARE - R18				
Course Structure	**Theory**			**Practical**	
	Lectures	**Tutorials**	**Credits**	**Laboratory**	**Credits**
	3	1	4	-	-
Chief Coordinator	Mrs. M Sreevani, Assistant Professor				
Course Faculty	Mr. P Sandeep Kumar, Assistant Professor				

COURSE OBJECTIVES:

The course should enable the students to:	
I	Explain the components such as diodes, BJTs and FETs their switching characteristics, application.
II	Learn the concepts of high frequency analysis of transistors.
III	Describe the various types of basic and feedback amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
IV	Discuss the basic building blocks of linear integrated circuits.
V	Understand the concepts of waveform generation and introduce some special function ICs.

COURSE OUTCOMES(COs):

CO1	Describe the concept of diode and transistor operation with applications.
CO2	Understand the principle of operation of MOSFET in CS, CG, CD amplifiers and analyze MOSFET with high frequency equivalent circuit.
CO3	Analyze the different types of multistage amplifiers and Power amplifiers.
CO4	Study and analyze the different characteristics of feedback amplifiers and oscillators.
CO5	Understand the principle of operation of Op-amp characteristics with different applications.

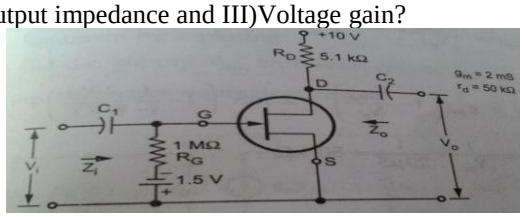
COURSE LEARNING OUTCOMES:

AECB02.1	Understand the basic concept of PN diode with characteristics.
AECB02.2	Analyze the application of diode in Rectifiers, clippers and clampers.
AECB02.3	Understand the working of different configurations of Bipolar Junction Transistor.
AECB02.4	Design the various biasing circuits.
AECB02.5	Analyze the different types of Amplifiers with BJT.
AECB02.6	Understand the principle of operation of MOSFET and as switch.
AECB02.7	Apply small-signal model to MOSFET and determine the voltage gain and input and output impedance.
AECB02.8	Analyze the MOSFET characteristics of common source, common gate and common drain amplifiers.
AECB02.9	Determine the parameters of MOSFET amplifier from drain and transfer characteristics.
AECB02.10	Analyze the high frequency equivalent circuit model of MOSFET.
AECB02.11	Understand the classification of transistor amplifiers.
AECB02.12	Understand the different coupling schemes used in amplifiers.
AECB02.13	Analyze frequency response of multistage amplifiers.
AECB02.14	Analyze hybrid-pi model of BJT.
AECB02.15	Analyze the different types of power amplifiers.
AECB02.16	Understand the concept of characteristics of feedback amplifiers.
AECB02.17	Analyze the different configurations of feedback amplifiers.
AECB02.18	Distinguish the constructional features and operation of feedback amplifiers and oscillators.
AECB02.19	Understand the basic concept of condition for oscillations.
AECB02.20	Analyze the different types of oscillators.
AECB02.21	Understand the basic concept Operational amplifier.
AECB02.22	Analyze different characteristics of OP-amp.
AECB02.23	Understand the different types of op-amp based on input.
AECB02.24	Analyze the different applications of Op-amp.
AECB02.25	Design the different types of waveform generators.

TUTORIAL QUESTION BANK

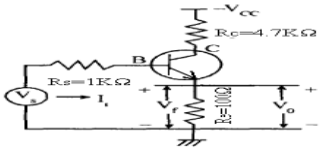
MODULE-I DIODE CIRCUITS				
PART-A (SHORT ANSWER QUESTIONS)				
S.No	**Question**	**Blooms Taxonomy Level**	**Course Outcome**	**Course Learning Outcomes**
1.	What do you mean by diode?	Remember	CO1	AECB02.01
2.	Explain about forward bias of diode?	Understand	CO1	AECB02.01
3.	Explain about reverse bias of diode?	Understand	CO1	AECB02.01
4.	Write the Applications of diode?	Remember	CO1	AECB02.01
5.	Draw the V-I characteristics of diode?	Remember	CO1	AECB02.01
6.	Define cut-in voltage?	Remember	CO1	AECB02.01
7.	Mention different names for cut-in voltages and its values for Si, Ge.	Remember	CO1	AECB02.01
8.	Define rectifier?	Remember	CO1	AECB02.02
9.	Give the broad classification of rectifiers.	Understand	CO1	AECB02.02
10.	What do you mean by clipper?	Understand	CO1	AECB02.02
11.	Define clamper.	Remember	CO1	AECB02.02
12.	How many types of clampers are there?	Remember	CO1	AECB02.02
13.	Define Transistor?	Remember	CO1	AECB02.03
14.	What is meant by operating point(Q)?	Understand	CO1	AECB02.03
15.	Draw the symbols of NPN and PNP transistor?	Remember	CO1	AECB02.03
PART-B (LONG ANSWER QUESTIONS)				
1.	Explain the operation of p-n junction diode under forward and reverse bias conditions and Sketch the V-I characteristics.	Remember	CO1	AECB02.01
2.	Explain the operation of any two rectifiers with neat output waveforms.	Remember	CO1	AECB02.01
3.	Explain the operation of clamper circuits with neat output waveforms.	Remember	CO1	AECB02.04
4.	With the help of a neat circuit diagram explain the working of two level diode clippers.	Remember	CO1	AECB02.02
5.	With neat circuit diagram explain the input and output characteristics of BJT in CB configuration.	Remember	CO1	AECB02.02
6.	With neat circuit diagram explain the input and output characteristics of BJT in CE configuration.	Understand	CO1	AECB02.02
7.	With neat circuit diagram explain the input and output characteristics of BJT in CC configuration.	Remember	CO1	AECB02.02
8.	With the help of neat circuit diagram explain the operation of self bias circuit.	Remember	CO1	AECB02.02
9.	Derive the expressions for voltage gain, current gain, input impedance and output impedance of CE amplifier.	Remember	CO1	AECB02.02
10.	Derive the expressions for voltage gain, current gain, input impedance and output impedance of CB amplifier.	Remember	CO1	AECB02.03
PART-C (ANALYTICAL QUESTIONS)				
1.	What is meant by Q-point? Also explain the need for biasing a transistor.	Remember	CO1	AECB02.01
2.	Draw the fixed bias circuit and derive an expression for the Q-factor.	Remember	CO1	AECB02.01
3.	Draw the voltage divider bias circuit and derive an expression for the Q-factor.	Remember	CO1	AECB02.02
4.	Determine voltage gain, current gain, input impedance and output impedance of CE amplifier using NPN transistor with hie = 1200Ω, hfe = 36, hre =0, and hoe=2*10-6 Mhos. RL=2.5kΩ, Rs= 500 Ω.	Remember	CO1	AECB02.02
5.	The h-parameter of a transistor in the CE amplifier mode are hie =	Remember	CO1	AECB02.02

	1100Ω, hfe = 50, hre =2.5*10-4, and hoe=25*10-6 Mhos. Determine the current gain, input impedance and output impedance RL=2.5kΩ.			
6.	For a CB transistor amplifier driven by a voltage source of internal resistance Rs=1200Ω, RL=1000Ω. The h-parameters are hib = 22Ω, hfb = -0.98, hrb =3*10-4, and hob=0.5*10-6 A/V. Compute the current gain, input impedance and output impedance, overall voltage gain, overall current gain, power gain.	Remember	CO1	AECB02.02
7.	A CB transistor amplifier has the following values of h-parameters. hib = 22Ω, hfb = -0.98, hrb =5*10-4, and hob=0.34*10-6 A/V. Calculate the values of voltage gain, current gain, input impedance and output impedance if the RL=1.2kΩ. Assume source resistance as zero.	Remember	CO1	AECB02.02
8.	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?	Remember	CO1	AECB02.04
9.	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?	Remember	CO1	AECB02.04
10.	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?	Remember	CO1	AECB02.05
MODULE-II MOSFET CIRCUITS				
PART-A (SHORT ANSWER QUESTIONS)				
1.	Draw the drain characteristics of depletion type MOFET?	Understand	CO2	AECB02.06
2.	What is MOSFET?	Understand	CO2	AECB02.06
3.	What are the regions of operation of a MOSFET?	Understand	CO2	AECB02.06
4.	Draw the I-V characteristic of MOSFET.	Remember	CO2	AECB02.07
5.	Draw the circuit symbol of N-channel MOSFET.	Remember	CO2	AECB02.08
6.	Draw the drain characteristics of n-channel enhancement type MOSFET?	Remember	CO2	AECB02.07
7.	Draw the circuit symbol of P-channel MOSFET.	Remember	CO2	AECB02.08
8.	Define rd and gm?	Remember	CO2	AECB02.09
9.	How MOSFET can acts as switch?	Remember	CO2	AECB02.06
10.	Draw the circuit diagram of CS amplifier.	Remember	CO2	AECB02.09
11.	Draw the circuit diagram of CD amplifier.	Remember	CO2	AECB02.09
12.	Draw the circuit diagram of CG amplifier.	Remember	CO2	AECB02.09
13.	Define transconductance.	Remember	CO2	AECB02.09
14.	Define Pinch-off region.	Remember	CO2	AECB02.08
15.	Define Ohmic region.	Remember	CO2	AECB02.08
PART-B(LONG ANSWER QUESTIONS)				
1.	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	CO2	AECB02.06
2.	Sketch the drain characteristics of MOSFET for different values of VGS & mark different regions of operation.	Understand	CO2	AECB02.07
3.	Explain the principle of CS amplifier with the help of circuit diagram. Derive the expressions for AV, input impedance and output Impedance?	Remember	CO2	AECB02.09
4.	Draw the small-signal model of common drain FET amplifier. Derive expressions for voltage gain and output resistance?	Remember	CO2	AECB02.09
5.	Draw the small-signal model of common source FET amplifier. Derive expressions for voltage gain and output resistance?	Remember	CO2	AECB02.07
6.	Draw the small-signal model of common gate FET amplifier. Derive the expressions for voltage gain and output resistance?	Remember	CO2	AECB02.07

7.	List any four merits of MOSFET to show that they are more suitable than JFETS in Integrated circuits?	Understand	CO2	AECB02.07
8.	Compare enhancement and depletion modes of a MOSFET with the help of its characteristics and construction?	Understand	CO2	AECB02.09
9.	Derive the expression for transconductance of MOSFET?	Understand	CO2	AECB02.09
10.	Define pinch-off voltage and trans conductance in field effect transistors? Also mention the differences between BJT & FET.	Remember	CO2	AECB02.08
	PART-C (ANALYTICAL QUESTIONS)			
1.	Define the three FET parameters: gm, rd and μ. Prove that μ=gm x rd.	Remember	CO2	AECB02.09
2.	Common Source FET amplifier circuit has the following circuit parameters: RD = 5KΩ, RG = 10MΩ, rd = 35KΩ, μ=50. Determine AV,Ri& RO?	Remember	CO2	AECB02.08
3.	A Common Source FET amplifier circuit with un bypassed Rs has the following circuit parameters: Rd = 15K, RS = 0.5KΩ, Rg = 1M, rd = 5K, gm= 5mS and VDD = 20 V. Determine AV& RO?	Remember	CO2	AECB02.08
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	CO2	AECB02.09
5.	Explain the construction and principle of operation of Depletion type N-channel MOSFET.	Remember	CO2	AECB02.07
6.	Compare Depletion MOSFET and enhancement MOSFET. Also Derive the expression for transconductance in a CS field effect transistor.	Remember	CO2	AECB02.07
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	CO2	AECB02.09
8.	For the circuit shown in fig. Determine i) Input impedance II)output impedance and III)Voltage gain? 	Remember	CO2	AECB02.10
9.	Explain the construction and principle of operation of Depletion type P-channel MOSFET.	Understand	CO2	AECB02.08
10.	Explain the construction and principle of operation of Enhancement type P-channel MOSFET.	Understand	CO2	AECB02.08
	MODULE-III MULTI-STAGE AND POWER AMPLIFIERS			
	PART-A (SHORT ANSWER QUESTIONS)			
1.	What is meant by band width?	Remember	CO3	AECB02.11
2.	List the classification of amplifiers.	Remember	CO3	AECB02.11
3.	What are the merits and demerits of a cascade amplifier over a simple CE amplifier?	Understand	CO3	AECB02.11
4.	Define distortion.	Remember	CO3	AECB02.11
5.	How many types of coupling schemes are there?	Understand	CO3	AECB02.12
6.	What are the advantages of multistage amplifiers?	Understand	CO3	AECB02.13
7.	What is the need for cascading?	Remember	CO3	AECB02.13

8.	Classify power Amplifiers.	Remember	CO3	AECB02.15
9.	What are the advantages of class-B power amplifier.	Understand	CO3	AECB02.15
10.	Define power amplifier.	Remember	CO3	AECB02.13
11.	What do you mean by Gain band width product?	Remember	CO3	AECB02.14
12.	Define differential amplifier.	Remember	CO3	AECB02.14
13.	What are the drawbacks in Class A power amplifier?	Understand	CO3	AECB02.15
14.	Draw the circuit diagram of Darlington pair.	Remember	CO3	AECB02.14
15.	Define frequency response.	Remember	CO3	AECB02.12
	PART-B (LONG ANSWER QUESTIONS)			
1.	Explain about different types of distortions that occur in amplifier circuits.	Understand	CO3	AECB02.11
2.	Explain the two stage amplifier with Darlington connection. Give the advantages of this circuit What are the drawbacks of a Darlington amplifier.	Remember	CO3	AECB02.12
3.	Compare the different types of coupling methods used in multistage amplifiers.	Understand	CO3	AECB02.12
4.	Define the terms collector dissipation and conversion efficiency of class A power amplifier.	Understand	CO3	AECB02.15
5.	In a modified class B power amplifier cross over, how distortion can be eliminated?	Understand	CO3	AECB02.15
6.	Briefly explain about cascade amplifiers.	Understand	CO3	AECB02.13
7.	State the advantages of push pull class B power amplifier over class B power amplifier.	Remember	CO3	AECB02.15
8.	Draw the push-pull class-B power amplifier and explain its operation. Show that the maximum conversion efficiency is 78.5%.	Remember	CO3	AECB02.15
9.	Compare different power amplifiers.	Remember	CO3	AECB02.14
10.	What are the advantages and disadvantages of transformer coupling.	Remember	CO3	AECB02.13
	PART-C (ANALYTICAL QUESTIONS)			
1.	A Darlington emitter follower circuit uses two identical transistors having the following h-parameters hie=1.1K, hre=2.2*10, hfe=50, hoe=20μA/V. RE2=3KΩ , RS=400Ω, R1=90KΩ , R2=10KΩ. Compute overall A I & AV, Ri, Ro.	Remember	CO3	AECB02.12
2.	A CE-CC Amplifier uses RS=1KΩ, . RC1= RE2=4KΩ . The h-parameters hie=1.2K, hre=5*10-4, hfe=50, hoe=25μA/V, hic=1.2 Ω , hrc=1, hfc= -51, hoc=25μA/V. Compute individual & overall A I & AV, Ri, Ro	Remember	CO3	AECB02.13
3.	A CE-CE(cascade) Amplifier uses RS=1KΩ, . RC1=15KΩ, RE1=100Ω , RC2=4KΩ , RE2=330Ω,R1=200KΩ R2=10KΩ for the first stage, for second stage R1=47KΩ, R2=4.7KΩ . The h-parameters hie=1.2K, hre=2.5*10-4 , hfe=50, hoe=25*10-6 A/V. Compute individual & overall A I, AV, Ri, & Ro.	Remember	CO3	AECB02.13
4.	Draw the circuit diagram of Direct coupled class-A power amplifier and explain its operation. Show that the maximum conversion efficiency is 25%.	Remember	CO3	AECB02.15
5.	For a class B power amplifier driven from a 24V power supply and driving a load 8Ω , compute i)Input D.C power ii)output power iii) Conversion efficiency, if the peak to peak output voltage across the load resistance is 22V maximum.	Remember	CO3	AECB02.15
6.	A CE-RC coupled amplifier uses transistor with the following h-parameters hfe=50, hoe=30x10-6 mhos, hre=2.5x10-4.The value of gm at the operating point is 50m mhos. The biasing resistor R1 between Vcc and base is 100KΩ and R2 between base and ground is 10KΩ. The load resistor Rc = 5KΩ. Let C = 160pF be the total shunt capacitance in the input circuit and the coupling capacitor	Remember	CO3	AECB02.13

	Cc=6μF, Calculate for one stage of the amplifier (i) mid-band current gain (ii) mid-band voltage gain.			
7.	A single transistor is acting as ideal Class B amplifier with load of 1KΩ, if DC collector current is 15mA, VCC=20V. Determine its efficiency.	Remember	CO3	AECB02.15
8.	Draw the circuit diagram of class B push pull power amplifier and derive an expression for its conversion efficiency.	Remember	CO3	AECB02.15
9.	Draw the circuit diagram of class-B power amplifier and explain its operation. Show that the maximum conversion efficiency is 78.5%.	Remember	CO3	AECB02.15
10.	Explain the two stage amplifier with CE-CC configuration. Give the advantages of this circuit.	Understand	CO3	AECB02.13
MODULE-IV FEEDBACK AMPLIFIERS				
PART-A (SHORT ANSWER QUESTIONS)				
1.	Define feedback amplifier.	Remember	CO4	AECB02.16
2.	What is meant by positive and negative feedback?	Remember	CO4	AECB02.16
3.	What are the advantages and disadvantages of negative feedback?	Understand	CO4	AECB02.16
4.	How many types of topologies in negative feedback amplifiers?	Remember	CO4	AECB02.16
5.	Define sensitivity.	Remember	CO4	AECB02.17
6.	Define De-sensitivity.	Remember	CO4	AECB02.18
7.	Differentiate between voltage and current feedback in amplifiers.	Remember	CO4	AECB02.17
8.	What is Oscillator circuit?	Understand	CO4	AECB02.20
9.	What are the classifications of Oscillators?	Understand	CO4	AECB02.19
10.	What are the conditions for oscillations?	Understand	CO4	AECB02.19
11.	What are the RC oscillators?	Understand	CO4	AECB02.20
12.	What are the LC oscillators?	Understand	CO4	AECB02.20
13.	Draw the circuit diagram of Hartley oscillator.	Remember	CO4	AECB02.20
14.	Draw the circuit diagram of Colpitts oscillator.	Remember	CO4	AECB02.20
15.	Calculate the frequency of oscillation for the Colpitts oscillator with c1=0.1μf, c2=1μf, c3=100pF and L=470μH.	Remember	CO4	AECB02.20
PART-B (LONG ANSWER QUESTIONS)				
1.	Explain the concept of feedback as applied to electronic amplifier circuits. What are the advantages & disadvantages of positive and negative feedback?	Understand	CO4	AECB02.16
2.	Derive an expression for frequency oscillation of Hartley oscillator using transistor.	Remember	CO4	AECB02.20
3.	What type of feedback is used in electronic amplifiers? What are the advantages of this type of feedback? Prove each one mathematically.	Understand	CO4	AECB02.19
4.	Give the equivalent circuits, and characteristics of ideal and practical amplifiers of the following types (i) Voltage amplifier,(ii) Trans-resistance amplifier.	Understand	CO4	AECB02.17
5.	Derive the expression for the input resistance with feedback Rif and output resistance with feedback Rof in the case of (a) Voltage series feedback amplifier. (b) Voltage shunt feedback amplifier.	Understand	CO4	AECB02.17
6.	Draw the circuit for Voltage series amplifier and justify the type of feedback. Derive the expressions for Av, Ri and Ro for the circuit.	Remember	CO4	AECB02.18
7.	Draw the circuit and explain the principle of operation of RC phase-shift oscillator circuit. What is the frequency range of generation of oscillations? Derive the expression for the frequency of oscillations.	Remember	CO4	AECB02.20
8.	Derive the expression for the input resistance with feedback Rif and output resistance with feedback Rof in the case of (a)current series feedback amplifier. (b) current shunt feedback amplifier.	Remember	CO4	AECB02.20

9.	Derive an expression for frequency oscillation of Colpitts oscillator using transistor.	Understand	CO4	AECB02.20
10.	Draw the circuit diagram of Wein bridge oscillator using BJT and derive the expression for frequency of oscillations.	Remember	CO4	AECB0219
	PART-C (ANALYTICAL QUESTIONS)			
1.	In Hartley oscillator, if L1=0.2mH, L2=0.3mH and C=0.003 μF, calculate the frequency of its oscillation.	Remember	CO4	AECB02.20
2.	Calculate the gain, input impedance, output impedance of voltage series feedback amplifier having A=300, Ri=1.5K,RO=50K and β =1/12.	Remember	CO4	AECB02.19
3.	A Hartley oscillator is designed with L = 20μH and a variable capacitance. Find the Range of capacitance values if the frequency of oscillation is varied between 950 KHz to 2050 KHz.	Remember	CO4	AECB02.19
4.	The following information is available for the generalized feedback n/w. Open loop voltage amplification (AV) = - 100. Input voltage to the system (V,') = 1mV. Determine the AECB02sed loop voltage gain, the output voltage, feedback voltage, input voltage to the amplifier, and type of feedback for (a) β = 0.01, (b) β = - 0.005. c) β = 0.	Remember	CO4	AECB02.18
5.	An amplifier has a mid band gain of 125 and bandwidth of 250 kHz. If 4% negative feedback is introduced, find the new bandwidth and gain.	Remember	CO4	AECB02.18
6.	An amplifier with open loop voltage gain Av = 1000 ± 100 is available. It is necessary to have an amplifier where voltage gain varies by not more than ± 0.1 %. a. Find the reverse transmission factor β of the feedback network used. b. Find the gain with feedback.	Remember	CO4	AECB02.17
7.	An amplifier with Av = - 500, produces 5% harmonic distortion at full output. What value of β is required to reduce the distortion to 0.1 % ? What is the overall gain?	Remember	CO4	AECB02.18
8.	What are the advantages of negative feedback? Prove each one mathematically?	Remember	CO4	AECB02.16
9.	For a voltage series feedback amplifier Find D, Avf, Rif, Rof . 	Remember	CO4	AECB02.18
10.	A Colpitts oscillator is designed with capacitance C = 20μF and a variable inductance. Find the Range of capacitance values if the frequency of oscillation is varied between 1000 KHz to 2000 KHz.	Remember	CO4	AECB02.20
	MODULE-V OPERATIONAL AMPLIFIERS			
	PART-A (SHORT ANSWER QUESTIONS)			
1.	Define an operational amplifier.	Remember	CO5	AECB02.21
2.	Mention the characteristics of an ideal op-amp.	Remember	CO5	AECB02.21
3.	Define input offset voltage.	Remember	CO5	AECB02.21
4.	Define Output offset voltage.	Remember	CO5	AECB02.21
5.	Define input bias current.	Remember	CO5	AECB02.21
6.	Define slew rate.	Remember	CO5	AECB02.21
7.	Define an integrator.	Remember	CO5	AECB02.22
8.	Define differentiator circuit.	Remember	CO5	AECB02.22
9.	What are the two configuration of op-amp?	Understand	CO5	AECB02.23
10.	What is an integrated circuit?	Understand	CO5	AECB02.23

11.	What is an inverting amplifier?	Understand	CO5	AECB02.24
12.	What is a non-inverting amplifier?	Remember	CO5	AECB02.24
13.	Define Gain.	Remember	CO5	AECB02.21
14.	Draw the practical op-amp symbol.	Remember	CO5	AECB02.25
15.	What are the parameters of an op-amp?	Understand	CO5	AECB02.21
PART-B (LONG ANSWER QUESTIONS)				
1.	Explain the following terms in an OP-AMP. I) input Bias current ii) Input offset voltage and current iii)slew rate.	Understand	CO5	AECB02.21
2.	Explain the operation of non-inverting Op-amp and derive the expression for output voltage?	Understand	CO5	AECB02.23
3.	With a neat diagram explain about square wave generator and derive the frequency of Oscillation.	Understand	CO5	AECB02.25
4.	With a neat diagram explain about triangular wave generator and derive the frequency of Oscillation.	Remember	CO5	AECB02.25
5.	Draw and explain the operation of an op-amp as an integrator for square wave input.	Remember	CO5	AECB02.24
6.	Draw and explain the operation of an op-amp as differentiator for sine wave input.	Remember	CO5	AECB0224
7.	Explain the operation of inverting Op-amp and derive the expression for output voltage?	Understand	CO5	AECB02.23
8.	With a neat diagram explain about free running oscillator and derive the frequency of Oscillation.	Understand	CO5	AECB02.25
9.	Draw and explain the operation of an op-amp as an integrator for sine wave input.	Remember	CO5	AECB02.23
10.	Draw and explain the operation of an op-amp as differentiator for square wave input.	Remember	CO5	AECB02.23
PART-C (ANALYTICAL QUESTIONS)				
1.	An op-amp with a slew rate = 0.5V/μS is used as an inverting amplifier to obtain a gain of 100. The voltage gain Vs frequency characteristic of the amplifier is flat up to 10 KHz. Determine i.The maximum peak-to-peak input signal that can be applied without any distortion to the output. ii.The maximum frequency of the input signal to obtain a sine wave output of 2V peak.	Remember	CO5	AECB02.21
2.	Design an integrator to integrate an input signal that varies in frequency from 10 Hz to about 1 KHz. If a sine wave of 1V peak at 1000 Hz is applied to this differentiator draw the output waveforms.	Remember	CO5	AECB02.23
3.	Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to about 1 KHz. If a sine wave of 1V peak at 1000 Hz is applied to this differentiator draw the output waveforms.	Remember	CO5	AECB02.23
4.	Design and draw the wave forms of 1KHZ square waveform generator using555 Timer for duty cycle i)D=25% ii) D=50%.	Remember	CO5	AECB02.25
5.	Explain about the term CMRR, Input offset voltage, input offset current, input bias current, out offset voltage with reference to OPAMPs.	Remember	CO5	AECB02.21
6.	Design an op-amp differentiator that will differentiate an Input signal with fmax = 100Hz	Remember	CO5	AECB02.23
7.	Explain the operation of non-inverting Op-amp and derive the expression for voltage gain?	Understand	CO5	AECB02.22
8.	Explain the operation of non-inverting Op-amp and derive the expression for output voltage?	Understand	CO5	AECB02.22
9.	Explain the operation of inverting Op-amp and derive the expression for output voltage?	Understand	CO5	AECB02.22

10.	Design an op-amp integrator that will integrate an Input signal with fmin = 100Hz.	Remember	CO5	AECB02.23

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