Hall Ticket No | | | | | | | | | | |

Question Paper Code: AECB02

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER -I

B.Tech III Semester End Examinations, November - 2019

Regulations: IARE-R18

ANALOG ELECTRONICS

(EEE)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Module
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1 a) Explain the operation of p-n junction diode under forward and reverse bias conditions and Sketch the V-I characteristics [7M]

b) Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at 25˚C with reverse saturation current, Io = 25μA and at an applied voltage of 0.2V across the diode? [7M]

2 a) Derive the expressions for voltage gain, current gain, input impedance and output impedance of CE amplifier. [7M]

b) Determine voltage gain, current gain, input impedance and output impedance of CE amplifier using NPN transistor with h_{ie} = 1200Ω, h_{fe} = 36, h_{re} =0, and h_{oe}=2*10^{-6} Mhos. R_L=2.5kΩ, R_s= 500 Ω. [7M]

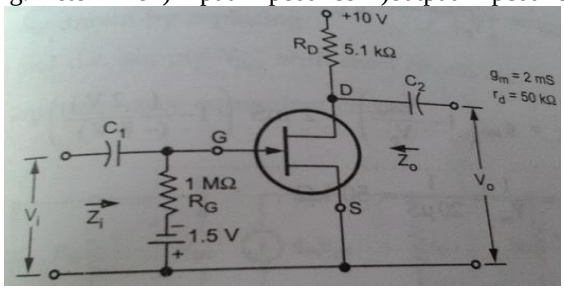
MODULE – II

3 a) Explain the principle of CS amplifier with the help of circuit diagram. Derive the expressions for AV, input impedance and output impedance? [7M]

b) 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? [7M]

4 a) Compare enhancement and depletion modes of a MOSFET with the help of its characteristics and construction? [7M]

b) For the circuit shown in fig. Determine i) Input impedance II)output impedance and III)Voltage gain? [7M]



MODULE – III

5 a) Explain about different types of distortions that occur in amplifier circuits. [7M]

b) A CE-CC Amplifier uses R_S=1KΩ, . R_{C1}= R_{E2}=4KΩ . The h-parameters h_{ie}=1.2K, h_{re}=5*10^{-4} ,h_{fe}=50,h_{oe}=25μA/V, h_{ic}=1.2 Ω , h_{rc}=1, h_{fc}= -51, h_{oc}=25μA/V.Compute individual & overall A_I & A_V, R_i, R_o. [7M]

6 a) Draw the push-pull class-B power amplifier and explain its operation. Show that the maximum conversion efficiency is 78.5%. [7M]

b) For a class B power amplifier driven from a 24V power supply and driving a load 8Ω , compute i)Input D.C power ii)outtput power iii) Conversion efficiency, if the peak to peak output voltage across the load resistance is 22V maximum. [7M]

MODULE– IV

7 a) Draw the circuit for Voltage series amplifier and justify the type of feedback.Derive the expressions for Av, Ri and Ro for the circuit. [7M]

b) Calculate the gain, input impedance, output impedance of voltage series feedback amplifier having A=300, Ri=1.5K,RO=50K and β =1/12. [7M]

8 a) 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. [7M]

b) Find the capacitor C and hfe for the transistor to provide a resonating frequency of 10KHZ of a phase-shift oscillator. Assume R1=25k, R2=60k,Rc=40k, R=7.1k and hie=1.8k. [7M]

MODULE –V

9 a) Explain the following terms in an OP-AMP. I) input Bias current ii) Input offset voltage iii)input offset current iv)slew rate. [7M]

b) An op - amp has a slew rate of 1.5V/μs. What is the maximum frequency of an output sinusoid of peak value 10 V at which the distortion sets in due to the slewrate limitation? [7M]

10 a) With a neat diagram explain about triangular wave generator and derive the frequency of Oscillations. [7M]

b) 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. [7M]

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COURSE OBJECTIVES

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

CO 1	Describe the concept of diode and transistor operation with applications.
CO 2	Understand the principle of operation of MOSFET in CS, CG, CD amplifiers and analyze MOSFET with high frequency equivalent circuit.
CO 3	Analyze the different types of multistage amplifiers and Power amplifiers.
CO 4	Study and analyze the different characteristics of feedback amplifiers and oscillators.
CO 5	Understand the principle of operation of Op-amp characteristics with different applications.

COURSE LEARNING OUTCOMES

AECB02.01	Understand the basic concept of PN diode with characteristics.
AECB02.02	Analyze the application of diode in Rectifiers, clippers and clampers.
AECB02.03	Understand the working of different configurations of Bipolar Junction Transistor.
AECB02.04	Design the various biasing circuits.
AECB02.05	Analyze the different types of Amplifiers with BJT.
AECB02.06	Understand the principle of operation of MOSFET and as switch.
AECB02.07	Apply small-signal model to MOSFET and determine the voltage gain and input and output impedances.
AECB02.08	Analyze the MOSFET characteristics of common source, common gate and common drain amplifiers.
AECB02.09	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.

MAPPING OF SEMESTER END EXAMINATION TO COURSE LEARNING OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	AECB02.01	Understand the basic concept of PN diode with characteristics.	CO 1	Understand
	b	AECB02.01	Understand the basic concept of PN diode with characteristics.	CO 1	Remember
2	a	AECB02.02	Analyze the application of diode in Rectifiers, clippers and clampers.	CO 1	Understand
	b	AECB02.01	Understand the basic concept of PN diode with characteristics.	CO 1	Understand
3	a	AECB02.09	Determine the parameters of MOSFET amplifier from drain and transfer characteristics.	CO 2	Understand
	b	AECB02.07	Apply small-signal model to MOSFET and determine the voltage gain and input and output impedances.	CO 2	Remember
4	a	AECB02.08	Analyze the MOSFET characteristics of common source, common gate and common drain amplifiers.	CO 2	Understand
	b	AECB02.09	Determine the parameters of MOSFET amplifier from drain and transfer characteristics.	CO 2	Understand
5	a	AECB02.13	Analyze frequency response of multistage amplifiers.	CO 3	Remember
	b	AECB02.12	Understand the different coupling schemes used in amplifiers.	CO 3	Understand
6	a	AECB02.15	Analyze the different types of power amplifiers.	CO 3	Understand
	b	AECB02.15	Analyze the different types of power amplifiers.	CO 3	Understand
7	a	AECB02.16	Understand the concept of characteristics of feedback amplifiers.	CO 4	Understand
	b	AECB02.17	Analyze the different configurations of feedback amplifiers.	CO 4	Understand
8	a	AECB02.19	Understand the basic concept of condition for oscillations.	CO 4	Understand
	b	AECB02.20	Analyze the different types of oscillators.	CO 4	Understand
9	a	AECB02.22	Analyze different characteristics of OP-amp.	CO 5	Understand
	b	AECB02.23	Understand the different types of op-amp based on input.	CO 5	Understand

10	a	AECB02.24	Analyze the different applications of Op-amp.	CO 5	Remember
	b	AECB02.25	Design the different types of waveform generators.	CO 5	Remember

Signature of Course Coordinator **HOD, ECE**