Hall Ticket No | | | | | | | | | | | Question Paper Code: AECB11

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)
Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER - I

B.Tech IV Semester End Examinations, April - 2020
Regulation: IARE-R18
ANALOG AND PULSE CIRCUITS
(Electronics and Communication Engineering)

Time: 3 Hours **Max Marks: 70**

Answer any ONE question from each Unit
All questions carry equal marks
All parts of the question must be answered in one place only

UNIT – I

1	a)	Explain the different types of coupling methods used in multistage amplifiers.	[7M]
	b)	A CE-CB (cascode) Amplifier uses RS=1KΩ, . RC1=25KΩ, RE=100Ω, R3=200KΩ R4=10KΩ . The h-parameters hie=2K,hre=0,hfe=100,hoe=0. Compute individual & overall A I & AV, Ri, Ri', Ro & Rot .	[7M]
2	a)	What is Darlington amplifier? Explain in detail about the main characteristics of a Darlington amplifier?	[7M]
	b)	A Darlington emitter follower circuit uses two identical transistors having the following h-parameters hie=1.1K, hre=2.5*10-4,hfe=60,hoe=20μA/V. RE=2KΩ,RS=500Ω Compute overall A I & AV, Ri, Ro & Rot .	[7M]

UNIT – II

3	a)	Define feedback and explain the concept of feedback as applied to electronic amplifier circuits.	[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]
4	a)	Derive the expressions for Av, Ri and Ro for the current series feedback circuit.	[7M]
	b)	An amplifier has mid-band gain of 125 and a bandwidth of 250KHz. i. If 4% negative feedback is introduced, find the new bandwidth and gain. ii. If bandwidth is restricted to 1MHz, find the feed back ratio.	[7M]

UNIT – III

5	a)	What is Oscillator circuit? Explain the basic principle of generation of oscillations in LC tank circuits.	[7M]

b) 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. [7M]

6 a) Derive the expression for Max. Theoretical efficiency in the case of class B push pull amplifier. Why is it named so ? What are its advantages and disadvantages? [7M]

b) In a class B complementary power amplifier Vcc=+15V, -Vcc=15V and RL=4Ω. [7M]

Calculate.

i. maximum a.c power which can be developed

ii. collector dissipation while developing maximum a.c power

iii. efficiency

iv. maximum power dissipation per transistor

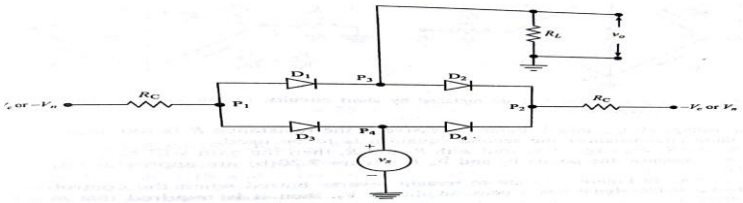
UNIT – IV

7 a) Explain the response of RC low pass circuit to ramp input with different time constants and also calculate transmission error with respect to input signal. [7M]

b) A symmetrical square wave of ±10V and frequency of 1 kHz applied to a high pass Rc circuit having R = 10kΩ and c = 0.05μf. Draw the corresponding output waveform and find its percentage tilt. [7M]

8 a) Discuss the operating principle of uni directional sampling gate with pedestal state and mention advantages and disadvantages. [7M]

b) For the four-diode gate shown in fig.With a divider resistance R used, Vs=25V, Rf=20Ω, R_L=Rc=200KΩ and R=100Ω.Find (Vc)min, A and (Vn)min. [7M]



UNIT – V

9 a) Describe the working of emitter coupled binary with neat circuit diagram and obtain the transfer characterstics using triggering points. [7M]

b) A collector coupled Fixed bias binary uses NPN transistors with h_{FE} = 100. The circuit parameters are V_{CC} = 12v, V_{BB} = -3v, R_C = 1k Ω, R_1 = 5k Ω, and R_2 = 10 k Ω. Verify that when one transistor is cut-off the other is in saturation. Find the stable state currents and voltages for the circuit. Assume for transistors $V_{CE(sat)}$ = 0.3V and $V_{BE(sat)}$ = 0.7V. [7M]

10 a) Explain the operation of collector coupled monostable multivibrator with circuit diagram and also obtain gate width. Draw the wave forms at collector and Bases of both transistors. [7M]

b) Design an astable multivibrator to generate a 5kHz square wave with a duty cycle of 60% and amplitude 12v. Use NPN silicon transistors having $h_{FE(min)}$= 70, $V_{CE(sat)}$ = 0.3v, $V_{BE(sat)}$ = 0.7v, $V_{BE(cut-off)}$ = 0v and R_C = 2K. Draw the waveforms seen at both collectors and bases. [7M]

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COURSE OBJECTIVES

The course should enable the students to:

S.No	Description
I	Learn the concepts of high frequency analysis of transistors.
II	Understanding of various types of amplifier circuits such as small signal, cascaded, large signal and tuned amplifiers.
III	Familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
IV	Construct various multivibrators using transistors.

COURSE OUTCOMES (COs):

CO 1	Discuss the frequency response and analysis of multistage amplifiers and transistor at high frequency
CO 2	Analyze the effect of feedback on Amplifier characteristics in feedback amplifiers
CO 3	Discuss the frequency response of various oscillators and analyze the large signal and tuned amplifiers
CO 4	Understand the linear wave shaping and different types of sampling gates with operating principles using diodes, transistors
CO 5	Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors

COURSE LEARNING OUTCOMES

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

AECB11.01	Understand the classification of amplifiers, distortions in amplifiers and different coupling schemes used in amplifiers.
AECB11.02	Analyze various multistage amplifiers such as Darlington, Cascade etc.
AECB11.03	Understand and remember the concept of Hybrid - model of Common Emitter transistor.
AECB11.04	Analyze the importance of positive feedback and negative feedback in connection in electronic circuits.
AECB11.05	Analyze various types of feedback amplifiers like voltage series, voltage shunt, current series and current shunt.
AECB11.06	Understand the condition for Oscillations and various types of Oscillators.
AECB11.07	Design various sinusoidal Oscillators like RC Phase shift, Wien bridge, Hartley and Colpitts oscillator for various frequency ranges.
AECB11.08	Design different types of power amplifiers for practical applications of desired specifications like efficiency, output power, distortion, etc.
AECB11.09	Design the tuned circuits used in single tuned amplifiers and understand its frequency response.
AECB11.10	Analyze the response of high pass RC to different non sinusoidal inputs with different time constants and identify RC circuit's applications.

AECB11.11	Understand the basic operating principle of sampling gates.
AECB11.12	Analyze the response of low pass RC circuits to different non sinusoidal inputs with different time constants and identify RC circuit's applications.
AECB11.13	Illustrate the Bistable multivibrator with various triggering methods and apply design procedures to different bistable multivibrator circuits.
AECB11.14	Analyze the Monostable, Astable multivibrator circuits with applications and evaluate time, frequency parameters.
AECB11.15	Evaluate triggering points, hysteresis width of Schmitt trigger circuit and also design practical Schmitt trigger circuit.

MAPPING OF SEMESTER END EXAMINATION TO COURSE LEARNING OUTCOMES:

SEE Question No.		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Level
1	a	AECB11.01	Understand the classification of amplifiers, distortions in amplifiers and different coupling schemes used in amplifiers	CO 1	Understand
	b	AECB11.02	Analyze various multistage amplifiers such as Darlington, Cascade etc	CO 1	Remember
2	a	AECB11.02	Analyze various multistage amplifiers such as Darlington, Cascade etc	CO 1	Understand
	b	AECB11.02	Analyze various multistage amplifiers such as Darlington, Cascade etc	CO 1	Remember
3	a	AECB11.05	Analyze various types of feedback amplifiers like voltage series, voltage shunt, current series and current shunt	CO 2	Remember
	b	AECB11.05	Analyze various types of feedback amplifiers like voltage series, voltage shunt, current series and current shunt	CO 2	Apply
4	a	AECB11.05	Analyze various types of feedback amplifiers like voltage series, voltage shunt, current series and current shunt	CO 2	Remember
	b	AECB11.04	Analyze the importance of positive feedback and negative feedback in connection in electronic circuits	CO 2	Apply
5	a	AECB11.06	Understand the condition for Oscillations and various types of Oscillators	CO 3	Remember
	b	AECB11.07	Design various sinusoidal Oscillators like RC Phase shift, Wien bridge, Hartley and Colpitts oscillator for various frequency ranges	CO 3	Apply
6	a	AECB11.08	Design different types of power amplifiers for practical applications of desired specifications like efficiency, output power, distortion, etc	CO 3	Understand
	b	AECB11.08	Design different types of power amplifiers for practical applications of desired specifications like efficiency, output power, distortion, etc	CO 3	Apply
7	a	AECB11.10	Analyze the response of high pass RC to different non sinusoidal inputs with different time constants and identify RC circuit's applications	CO 4	Understand
	b	AECB11.10	Analyze the response of high pass RC to different non sinusoidal inputs with different time constants and identify RC circuit's applications	CO 4	Apply
8	a	AECB11.11	Understand the basic operating principle of sampling gates	CO 4	Remember

	b	AECB11.11	Understand the basic operating principle of sampling gates	CO 4	Apply
9	a	AECB11.13	Illustrate the Bistable multivibrator with various triggering methods and apply design procedures to different bistable multivibrator circuits	CO 5	Understand
	b	AECB11.13	Illustrate the Bistable multivibrator with various triggering methods and apply design procedures to different bistable multivibrator circuits	CO 5	Understand
10	a	AECB11.14	Analyze the Monostable, Astable multivibrator circuits with applications and evaluate time, frequency parameters	CO 5	Apply
	b	AECB11.14	Analyze the Monostable, Astable multivibrator circuits with applications and evaluate time, frequency parameters	CO 5	Apply

Signature of Course Coordinator **HOD, ECE**