Register No.: ..... Name: .....

SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

FOURTH SEMESTER B.TECH DEGREE EXAMINATION (R), MAY 2023
ELECTRONICS AND COMMUNICATION ENGINEERING
(2020 SCHEME)

Course Code : 20ECT202

Course Name: Analog Circuits

Max. Marks : 100 **Duration: 3 Hours**

PART A

(Answer all questions. Each question carries 3 marks)

1. Explain working of a fixed-bias circuit with a neat diagram?
2. Draw an RC differentiator circuit. State and explain the condition for an RC differentiator.
3. Obtain and elaborate the hybrid-π parameters of BJT in CE configuration at high-frequency.
4. Explain the role of Miller effect in analysis of high frequency amplifiers with necessary equations.
5. Elaborate the small signal equivalent circuit of MOSFET.
6. Briefly explain how the MOS can be used as a current-source. Mention the conditions for the same.
7. State and justify Barkhausen criteria for oscillators.
8. List the various classifications of oscillators.
9. Define crossover distortion and how is it resolved?
10. List the various power amplifiers with its efficiency.

PART B

(Answer one full question from each module, each question carries 14 marks)

MODULE I

11. a) Deduce the concept of operating point and illustrate using dc load lines. (8)

    b) Design a clamper circuit to clamp a 20Vpp sine wave so that its negative peak is clamped at +2V. Assume practical diode is used. Illustrate with adequate input-output waveform and transfer characteristics. (6)

OR

12. a) Plot the response of high pass RC circuit to a pulse input of amplitude 'V'. (6)

b) Set up and explain a combination clipper circuit that clips an input sine wave at -1V and +3V with its transfer characteristics curve. (8)

MODULE II

13. a) Derive the expression for voltage gain, input and output impedance of Common Emitter configuration of single stage RC Coupled Amplifier using the small signal low frequency hybrid π model. (8)

b) Draw and explain AC load line of an RC Coupled Amplifier. (6)

OR

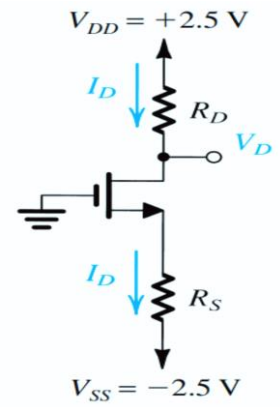
14. a) Draw the frequency response of RC Coupled Amplifier and justify the roll-off at high frequencies and low frequencies. (8)

b) Explain the need for various components in a RC-coupled CE Amplifier. (6)

MODULE III

15. a) Analyse the effect of cascading on gain and bandwidth of a multistage amplifier. (6)

b) Determine the values of drain resistance R_D and Source Resistance R_S of given circuit, given I_D= 0.4mA and V_D=1.5V. The nMOS transistor has threshold voltage V_{th}=0.6V, μnCox=100μA/V_2, W=64μm, L=2μm. Assume channel length modulation is not existent here i.e. λ=0. (8)



OR

16. a) Obtain the expression for voltage gain and output impedance of a CS stage MOS amplifier with current-source load. (8)

b) Explain any 3 biasing circuit of the discrete MOSFET amplifier. (6)

MODULE IV

17.	a)	Explain the principle of Wein bridge. Design a Wein-bridge oscillator to generate 1KHz sine wave using BJT.	(8)
	b)	Analyze the effect of feedback on, gain, frequency response and distortion in an amplifier.	(6)

OR

18.	a)	Explain the four basic feedback topologies.	(8)
	b)	With a neat circuit diagram, explain the working of Hartley oscillator.	(6)

MODULE V

19.	a)	Analyse the circuit and working of series voltage regulator. Mention how short circuit protection is achieved in the same circuit.	(10)
	b)	How is current boosting achieved in a regulated power supply?	(4)

OR

20.	a)	Compare Class A and Class AB push-pull complementary symmetry power amplifiers with adequate circuit diagrams, waveforms and graphs.	(10)
	b)	How power amplifiers are classified?	(4)

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