Reg No.:_____ Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Supplementary Examination June 2023 (2019 scheme)

Course Code: ECT202

Course Name: ANALOG CIRCUITS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks)

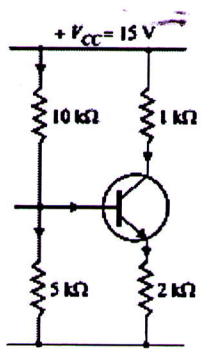
		Marks
1	Design a differentiator circuit to differentiate a square wave input of 20V peak to peak amplitude and 1.5KHz frequency.	3
2	Explain thermal run away.	3
3	What is the significance of Miller effect on high frequency amplifiers?	3
4	Explain how the presence of r_0 in hybrid π model of CE configuration justifies Early effect.	3
5	Given K=0.4mA/V^2 and $I_{D(ON)}$ = 3.5mA with $V_{GS(ON)}$ = 4V. Determine V_{TH}.	3
6	What are the effects of cascading in gain and bandwidth of an amplifier?	3
7	Explain Barkhausen criteria for sustained oscillations.	3
8	Illustrate the effect of negative feedback on gain of the amplifier.	3
9	What is line regulation and load regulation in a voltage regulator?	3
10	What do you mean by crossover distortion? How it can be eliminated?	3

PART B

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

Module -1

11 a) Draw the d.c. load line and determine the operating point of the given circuit. Assume the transistor to be of silicon. Take, β=100. 8



b) Draw the circuit and explain the working of an RC integrator circuit for a square wave input with period T. Sketch its output waveform for RC ≫ T, RC ≪ T and RC = T. 6

12 a) With necessary diagrams, explain the voltage divider biasing method of BJT. Derive the expression for stability factor also. 8

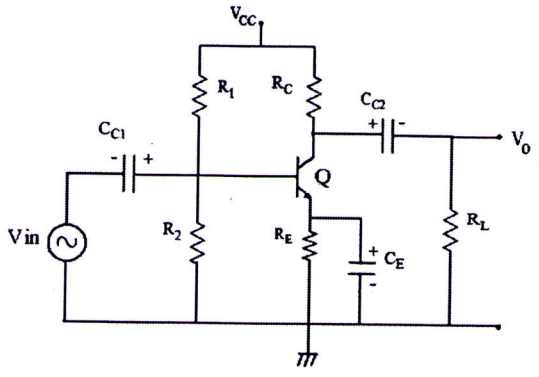
b) Set up and explain a slicer circuit that clips an input sine wave at +3V and -6V. Draw the transfer characteristics. 6

Module -2

13 a) Using small signal hybrid π model, obtain the expression for input impedance, output impedance and mid band voltage gain of a common emitter amplifier. 8

b) Draw the high frequency hybrid π model of BJT in CE configuration and explain the significance of each parameter. 6

14 Using hybrid π model, calculate the small signal voltage gain, current gain, input impedance and output impedance of the given circuit, having R_1=47KΩ, R_2=10KΩ, R_C=2.7KΩ, R_E=680Ω, R_L=22KΩ V_{CC}=15V, V_{BE}=0.7V, V_A=80V, Ic = 2mA and β=100. **(Neglecting r_0).** 14

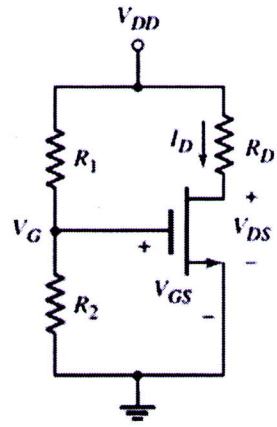


Module -3

15 a) Explain any two biasing techniques for enhancement MOSFET. 8

b) Calculate the drain current and drain-to-source voltage of a common source circuit with an n-channel enhancement mode MOSFET. Find the power dissipated in the MOSFET. 6

R_1=22KΩ, R_2=10KΩ, R_D=6.8KΩ, V_{DD}=8V, V_T=1V, Kn=0.1mA/V^2



16 a) Draw the circuit of a common source amplifier using MOSFET. Derive the expressions for voltage gain, input resistance and output resistance from small signal equivalent circuit. 8

b) Briefly explain the Common Source stage with current source load. 6

Module -4

17 With neat circuit diagram, explain the working of Wien bridge oscillator. Explain how Barkhausen criterion for oscillation is satisfied by the circuit and derive the expression for the frequency of oscillation. 14

18 a) Give the block schematic of current-series feedback amplifier configuration and deduce the expression for gain, input impedance and output impedance with feedback. 9

b) Explain the working principle of crystal oscillator with neat diagram. 5

Module -5

19 Explain the working of transformer coupled Class A power amplifier with a neat circuit diagram and collector waveforms. Derive the expression for collector efficiency. 14

20 With a neat circuit diagram, explain how output voltage can be regulated by using series feedback voltage regulator. How short circuit protection can be implemented in this? 14

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