Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree Examination June 2022 (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	Draw the circuit of an RC integrator. Give the conditions for an RC circuit to act as integrator.	3
2	Define Stability factor. Derive the expression for stability factor 'S'.	3
3	Differentiate between dc and ac load lines.	3
4	What is the significance of Miller effect on high frequency amplifiers?	3
5	Given $K=0.4mA/V^2$ and $I_{D(ON)} = 3.5mA$ with $V_{GS(ON)} = 4V$. Determine the value of V_{TH}.	3
6	What are the effects of cascading in gain and bandwidth of an amplifier?	3
7	Differentiate positive feedback and negative feedback.	3
8	Draw the block diagrams of current series and current shunt feedback.	3
9	Illustrate the principle of output current boosting circuit in a voltage regulator?	3
10	What do you mean by crossover distortion? How can it be eliminated?	3

PART B

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

Module -1

11	a)	Given an input wave, $Vin=10\sin\omega t$. Setup and explain a clamper that clamps the wave to 22.3V at the positive peak, assuming a voltage drop of 0.7 V across the diode. Draw the output waveform and transfer characteristics also.	8
	b)	Design a fixed bias circuit for a CE amplifier such that operating point is V_{CE} = 8V and I_C = 2 mA. Given, a fixed 15V d.c. supply and a silicon transistor with β = 100. Take base-emitter voltage V_{BE} = 0.6V and neglect R_E.	6
12	a)	With necessary diagrams, explain any two biasing methods of BJT.	8
	b)	Set up and explain a slicer circuit that clips an input sine wave at +2V and +4V. Draw the transfer characteristics.	6

Module -2

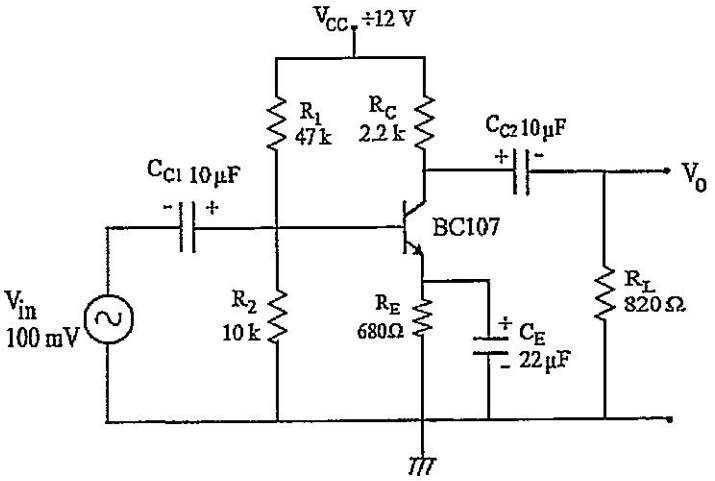
13 a) Analyse the high frequency response of an amplifier in CE configuration using hybrid π model. 8

b) Draw and explain the frequency response of RC coupled amplifier. 6

Using hybrid π model, calculate the small signal voltage gain, input impedance and output impedance of the given circuit.

Given, V_{BE}=0.7V, V_A=80V, Ic = 2mA and β=100. **(Neglecting r_0)**

14 14



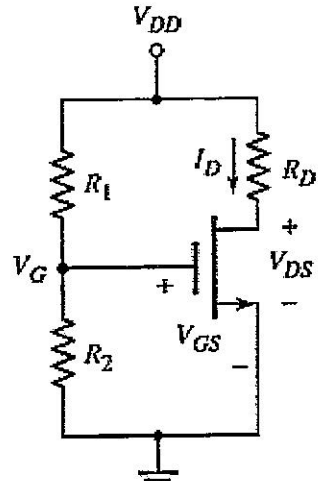
Module -3

a) Draw the CS stage with diode connected load and deduce the expression for voltage gain of the amplifier. 8

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 transistor.

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

15 b) 6



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 a Cascode amplifier.	6

Module -4

17		With neat circuit diagram, explain the discrete BJT circuit in voltage-series feedback and derive the expression for voltage gain, input impedance and output impedance.	14
18	a)	Design wein-bridge oscillator using BJT to generate 1KHz sine wave.	9
	b)	With neat circuit diagram, explain the working of Hartley oscillator	5

Module -5

19		What are the factors affecting the variation in output voltage of voltage regulator? With a circuit diagram, explain how load and line regulations are achieved in a shunt voltage regulator.	14
20		Explain the working of Class B push-pull power amplifier with a neat circuit diagram and output waveforms. Derive the expression for collector efficiency.	14

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