Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (S,FE) (FT/WP) (S2 PT) Examination December 2025/January 2026 (2019 Scheme)

Course Code: ECT202

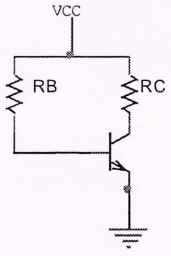
Course Name: ANALOG CIRCUITS

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1	Design a differentiator to differentiate a square wave of 10Vpp amplitude and 1KHz frequency?	3
2	What is the need for Bias Stabilization?	3
3	Calculate the collector current and the collector to emitter voltage for the given circuit. Given R_C=2KΩ, R_B=300KΩ, β=50, V_{CC}=9V	3



4	Draw the high frequency hybrid-π model of a BJT. What are the additional parameters in comparison with low frequency model?	3
5	Explain with a diagram the Common Source stage with current source load	3
6	For an n channel MOSFET, given K_n=0.4mA/V^2 and $I_{(ON)}$ = 3.5 mA, with $V_{GS(ON)}$ = 4 V. Determine the value of V_{TH}.	3
7	Draw the block diagrams of Voltage Series & Current Series feedback topology?	3
8	State Barkhausen criteria for sustained oscillations.	3
9	Describe about Class AB Power amplifiers	3
10	With the help of block diagram, explain the working of a linear regulated power supply	3

PART B

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

Module -1

11	a)	Draw the circuit and explain the working of an RC integrator circuit for a square	8

wave input with period T. Sketch its output waveform for RC $\gg$ T, RC $\ll$ T and RC = T

b) Set up and explain a clipper circuit that clips the input sine wave at+5V and -3V. Draw the transfer characteristics. 6

12 a) "Voltage divider biasing is superior to other biasing circuits" Justify with suitable equations? 8

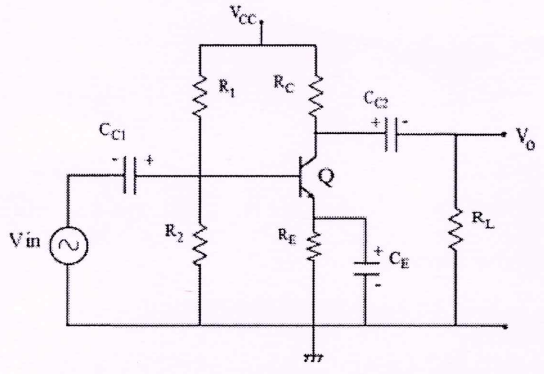
b) Explain the concept of operating point with the help of DC load lines. 6

Module -2

13 a) With neat diagrams, explain the frequency response of RC Coupled amplifier 7

b) Using small signal hybrid π model, obtain the expression for input impedance, output impedance and mid-band voltage gain of a common emitter amplifier 7

14 Draw the hybrid π model and calculate the small signal voltage gain, input impedance and output impedance of the given circuit, having R_1=56KΩ, R_2=10KΩ, R_C=2.2KΩ, R_E= 680Ω, R_L= 10KΩ, V_{CC}=12V, V_{BE}=0.7V, V_A=80V, I_C=2mA, and β=100. (Neglect r_o) 14

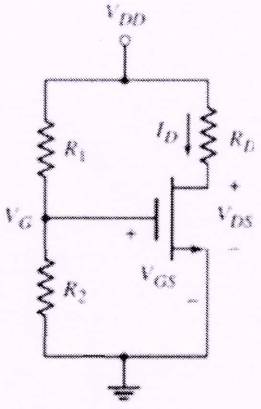


Module -3

15 Draw and explain the Common Source MOSFET amplifier and derive the expressions for the voltage gain, input impedance and output impedance. 14

16 a) With a neat circuit diagram of a Cascode amplifier, derive the expression for mid- band gain 7

b) Calculate the drain current and drain-to-source voltage of the following common source circuit. Given R_1 = 10KΩ, R_2 =15KΩ, R_D = 1KΩ, V_{DD}=10V, V_T=1V,K_n=0.2mA/V^2 7



Module -4

17	a)	With the help of block schematic of Voltage- Shunt feedback amplifier configuration and deduce the expression for gain, input impedance and output impedance with feedback	9
	b)	Explain the working principle of Hartley Oscillator with neat diagram	5
18		Explain how Barkhausen criterion for oscillation is satisfied by the Wein Bridge oscillator and derive the expression for the frequency of oscillation	14

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 its efficiency.	14
20		Draw the circuit of a series voltage regulator and explain its working. Discuss how short circuit and fold back protection can be implemented in the circuit.	14

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