Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree Examination December 2021 (2019 scheme)

Course Code: EET205

Course Name: ANALOG ELECTRONICS

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions. Each question carries 3 marks Marks

1 Explain why a fixed bias circuit is not widely used in amplifiers, despite its simplicity. (3)

2 Determine the following parameter for the collector to base bias circuit of transistor amplifier circuit i) I_B ii) I_C. (3)

Given V_{CC} = 12V, β=100, R_B=100kΩ and R_C=10kΩ.

3 Define the following JFET parameters: (3)

(a)Transconductance

(b)Dynamic output resistance

4 Draw the frequency response of CE amplifier and explain the concept of bandwidth. (3)

5 Draw the circuit of two stage RC coupled amplifier and briefly explain loading effect. (3)

6 State and explain Barkhausen's criterion of oscillation (3)

7 Compare the characteristics of ideal Op-Amps and practical Op-Amps. (3)

8 Explain the concept of common mode rejection with suitable diagram. (3)

9 Draw the circuit diagram of an ideal integrator and derive the expression for output voltage. (3)

10 Explain voltage level detector circuit with neat diagram. Draw the output waveform considering that the input is Vin=10sinωt and V_{ref}=4V (3)

PART B

Answer any one full question from each module. Each question carries 14 marks

Module 1

11 a) Determine the voltage gain, current gain, input impedance and output impedance of the common emitter amplifier circuit driving a load of 5kΩ. It is supplied by a (10)

signal source of internal resistance 10kΩ. The hybrid parameters of the transistors are $h_{ie}=1100\,\Omega, h_{\text{ян}}=2.5\times10^{-4}, h_{fe}=50, h_{oe}=25\,\mu$ ʊ.

b) Explain any one compensation technique used for reducing the drift of operating point (4)

12 a) Determine the following parameter for the fixed bias configuration of transistor amplifier. i) I_C ii) V_{CC} iii) R_B iv) β (6)

Given Rc = 2.5kΩ, I_B = 20μA, I_E = 3mA, V_{CE} = 6.5V

b) List the factor affecting the stability of operating point of a transistor. Derive the expression for stability of Voltage divider bias (8)

Module 2

13 a) Draw and explain the working of common drain FET amplifier with voltage divider bias arrangement using small signal AC equivalent circuit. Also derive the expression for voltage gain, input impedance and output impedance. (10)

b) Mention any four applications of FET. (4)

14 a) With suitable circuit diagrams, explain the effect of internal capacitance during high frequency operation of CE amplifier. (8)

b) Explain the operation of E-type MOSFET (6)

Module 3

15 (a) Describe the operation of class B push pull power amplifier and determine its maximum power conversion efficiency. (8)

(b) List any two advantages, disadvantages and applications of Transformer coupled amplifier (6)

16 (a) Compare positive and negative feedback in amplifiers. (6)

(b) With a neat circuit diagram, explain RC phase shift oscillator using BJT. Derive an expression for frequency of oscillation. (8)

Module 4

17 a) Compare the characteristics of ideal Op-Amps and practical Op-Amps. (6)

b) Draw the circuit of an inverting amplifier and obtain the expression for its closed loop gain. Also design an inverting amplifier with gain 12. (8)

18 a) Design an op-amp circuit to obtain an output of $V_o=-[3V_1+2V_2+0.5V_3+5V_4]$. where V_1, V_2, V_3 and V_4 are the inputs to op-amp. (6)

b) What are the features of an instrumentation amplifier using op-amp? Derive the expression for output voltage. (8)

Module 5

19	a)	Explain the working of an ideal integrator using op-amp and derive the expression for output voltage. Draw the output waveform of the integrator when input is square wave.	(9)
	b)	What are the disadvantages of ideal differentiator and what are the modifications done in practical differentiator to overcome this?	(5)
20	a)	With the help of internal circuit diagram explain the working of an astable multivibrator. Derive the expression for frequency of oscillation.	(10)
	b)	Design an astable multivibrator using 555 timer IC to generate an output signal with frequency 2kHz and 60% duty cycle	(4)

*****