Reg No.:_____ Name:_____

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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S4 (S, FE) / S2 (PT) (S) Examination January 2024 (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	Derive the output voltage expression for an RC differentiator.	3
2	What is the need for biasing a transistor? What factors are to be considered for selecting the operating point Q?	3
3	Explain the hybrid-π parameters of BJT in CE configuration.	3
4	State Miller's theorem.	3
5	Draw the block diagram of a multistage amplifier with n number of stages and give an expression for its overall voltage gain.	3
6	Explain with a diagram common source MOSFET stage with diode-connected load	3
7	List any three advantages of negative feedback in amplifiers.	3
8	A voltage series negative feedback amplifier has a voltage gain without feedback A =500. Input and output resistances are 3 KΩ and 20 KΩ respectively ,feedback factor β = 0.01. Calculate the voltage gain A_f ,R_{if} , R_{of} of the amplifier with feedback .	3
9	With the help of a block diagram explain the working of a linear regulated power supply.	3
10	Compare class A , class B, and class AB power amplifiers.	3

PART B

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

Module -1

11	a)	Design an RC low pass filter with a cut off frequency 2 KHz. Also plot its frequency response.	7
	b)	Explain the concept of operating point with help of dc and ac load lines.	7
12	a)	Set up a slicer circuit that clips an input sine wave at +3V and -4V. Draw the output waveform and transfer characteristics. Assume the diodes are ideal.	6

b) Derive the stability factor of a voltage divider bias circuit. 8

Module -2

13 a) Obtain the hybrid- π model for a single transistor with a resistive load RL. 6

b) Short circuit CE current gain of transistor is 25 at a frequency of 2 MHz if f_β = 200 kHz. Calculate (i) f_T (ii) hfe (iii) |Ai| at a frequency of 10 MHz and 100 MHz 8

14 a) Explain the need of various components in an RC coupled amplifier with a neat circuit diagram, also draw its frequency response. 7

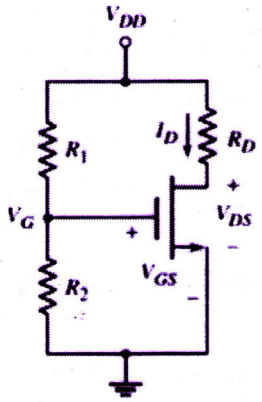
b) With a neat diagram explain high frequency equivalent circuit of BJT. 7

Module -3

15 a) Briefly explain the Common Source stage with current source load. 7

b) Draw the circuit of cascade amplifier and list any three advantages of this configuration. 7

16 a) Calculate the drain current and drain-to-source voltage of the following common source circuit. Given R_1 = 15 K, R_2 =10 K, R_D = 5.6 K, VDD=8V, VT=1V, Kn=0.1mA/V^2. 7



b) Explain any two biasing techniques for enhancement MOSFET. 7

Module -4

17 a) In a Wein bridge oscillator given that R_1 = R_2 = 200KΩ and C_1 = C_2 = 250pF.Determine the frequency of oscillations. 6

b) What are the four basic feedback topologies? Explain with block diagrams. 8

18 a) Explain the working principle of crystal oscillator.Draw the equivalent circuit of a crystal. 6

b) An amplifier has a voltage gain of 400, f_1 =50Hz, f_2= 200KHz and a distortion of 10% without feedback. Determine the amplifier voltage gain , f_{1f}, f_{2f} and D_f when a negative feedback is applied with feedback ratio of 0.01. 8

Module -5

19 a) Explain the working of a transformer coupled class A power amplifier 8

b) Define line regulation and load regulation in a voltage regulator. 6

20 a) In a class B amplifier V_{CEmin} = 2V ,supply voltage VCC = 15V.Find the collector circuit efficiency η. 6

b) Describe the operation of a transistor shunt regulator. 8

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