Subject Code: KOE037

PAPER ID-411535

Roll No:

BTECH
(SEM III) THEORY EXAMINATION 2021-22
ANALOG ELECTRONICS

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If you require any missing data, then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2*10 = 20

Qno	Questions	CO
(a)	Write name of any four diode circuits and draw low frequency hybrid-π model of BJT.	1
(b)	What is objective of different biasing schemes for BJT and FET amplifier?	1
(c)	Define different parameters used in high frequency hybrid-π model.	2
(d)	What is effect of negative feedback on gain and bandwidth?	2
(e)	In an RC phase shift oscillator, R = 200 KΩ and C = 200pF. Find the frequency of BJT –based oscillator.	3
(f)	Explain Barkhausen criterion.	3
(g)	Differentiate between CMRR and ICMR for a differential amplifier.	4
(h)	Determine the range of differential-mode operation of MOS differential Pair of overdrive voltage (V_{ov}) is 1V.	4
(i)	Draw the circuit of precision half wave rectifier and its ideal transfer characteristic.	5
(j)	What are the limitations of an ideal integrator?	5

SECTION B

2. Attempt any *three* of the following: 10*3 = 30

Qno	Questions	CO
(a)	Draw the small signal AC equivalent circuit of a Common Drain FET amplifier. Derive the expression for voltage gain, input impedance and output impedance.	1
(b)	Why class AB power amplifiers are preferred over Class B operations? A transformer-coupled class A power amplifier supplies to an 80Ω load connected across the secondary of a step-down transformer having a turn-ratio 5:1. Determine the maximum power output for a zero signal collector of 120 mA.	2
(c)	Draw the neat circuit diagram of RC phase shift oscillator and derive its frequency of oscillations.	3
(d)	Discuss the basic topology of current mirror and its variants with V-I characteristics.	4
(e)	Sketch the three-input inverting summing circuit and derive an expression for the output voltage. Find out the voltages V_2 and V_3 of the given network.	5

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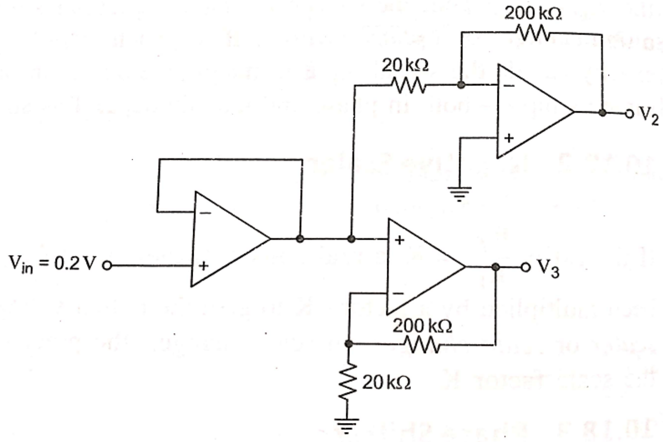
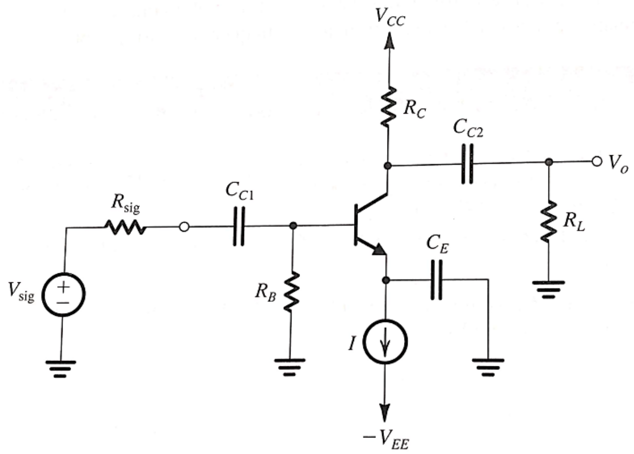
		

SECTION C

3. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	What is the significance of stability factor in transistor operation? A voltage divider circuit has R_1 = 39KΩ, R_2 = 82 KΩ, R_C = 3.3 KΩ, R_E=1 KΩ and V_{CC} =18V.The silicon transistor used has β=120. Find Q-point and stability factor.	1
(b)	Why does gain of amplifier falls at low and high frequencies? Specify different schemes of coupling in multistage amplifiers. Compare their merits and demerits.	1

4. Attempt any *one* part of the following: 10 *1 = 10

Qno	Questions	CO
(a)	Find the midband gain and the upper 3-db frequency of the common-emitter amplifier shown in given figure for the following case: V_{CC} = V_{EE} = 10V, I = 1mA, R_B = 100 KΩ, R_C = 8 KΩ, Rsig = 5 KΩ, R_L= 5 KΩ, β_0 = 100, V_A = 100V, Cμ = 1pF, f_T = 800 MHZ and r_x = 50Ω. 	2
(b)	Explain the block diagram of a feedback amplifier. Draw the block diagram of voltage series feedback amplifier and find the effect of feedback on input and output impedances.	2

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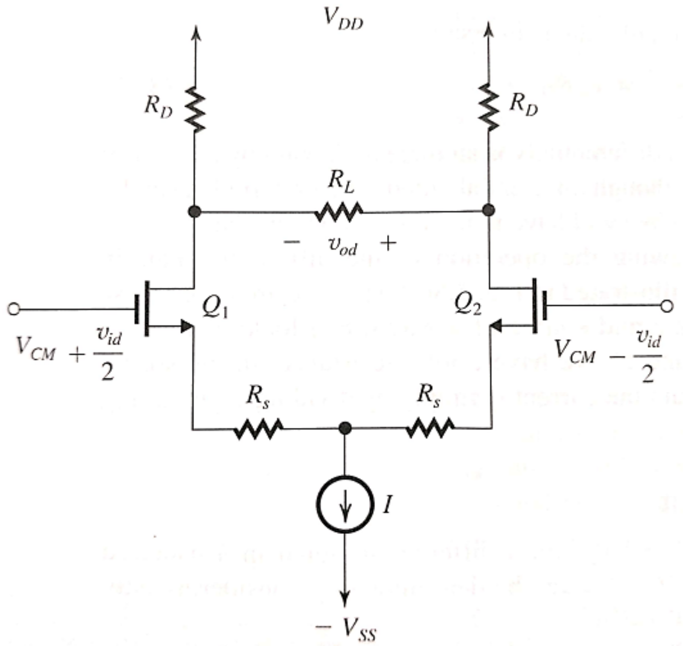
5. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Draw the circuit of Wien-bridge oscillator and discuss its basic principle of operation. Also determine frequency of oscillation.	3
(b)	With a neat circuit diagram, explain the operation of Colpitts oscillator. Derive the expression for frequency of oscillation and the minimum gain for sustained oscillations.	3

6. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Write short notes on any two of the following: (i)Minimum sustainable voltage(VON) (ii)Maximum usable load (iii) Differential gain and Common mode gain	4
(b)	Give the differential half-circuit of the differential amplifier shown in given figure. Assume that Q_1 and Q_2 are perfectly matched. Neglecting r_o, determine the differential voltage gain.	4



7. Attempt any *one* part of the following: 10*1 = 10

Qno	Questions	CO
(a)	Explain how a Schmitt Trigger circuit works with a neat diagram. Design an Schmitt trigger with V_{UT} = 2V, V_{LT} = -1V. Assume $\pm$ Vsat = $\pm$13V	5
(b)	How is order of filter decided? Design a wide band pass filter to meet the following specifications: f_1 = 5kHz, f_2 = 15kHz and Pass band gain=2.	5