



PAPER ID-411429

Printed Page: 1 of 3

Subject Code: KEC402

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BTECH
(SEM IV) THEORY EXAMINATION 2023-24
ANALOG CIRCUITS

TIME: 3 HRS**M.MARKS: 100**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

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

Q no.	Question	Marks	CO
a.	Define stability factor.	02	1
b.	Explain the reason behind choosing the common emitter configuration as an amplifier.	02	1
c.	Define gain cross over frequency and phase cross over frequency.	02	2
d.	Explain the factors behind the roll of gain at lower and higher frequency.	02	2
e.	Explain the Barkhausen's criterion.	02	3
f.	Differentiate between positive and negative feedback.	02	3
g.	List the properties of an ideal current mirror.	02	4
h.	Define common mode rejection ratio.	02	4
i.	Write the relation between quality factor and bandwidth.	02	5
j.	List the properties of an ideal operational amplifier.	02	5

SECTION B

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

a.	Calculate input impedance (R_i), output impedance (R_o), voltage gain (A_v), open circuit voltage gain (A_{v0}), overall voltage gain (G_v), short circuit current gain (A_i) for common emitter amplifier with emitter resistance (R_E).	10	1
b.	Explain the various feedback topologies, with their circuit models and properties.	10	2
c.	Derive the frequency of oscillation for Hartley oscillator along with the condition for sustained oscillations. Also calculate the values of components if the value of the capacitor is $0.1 \mu f$ for $1 KHz$ frequency of oscillations.	10	3
d.	Derive the transfer characteristics of differential amplifier with required mathematical expressions.	10	4
e.	Identify the nature of the filter shown in figure. Justify the nature through the transfer function and location of zeros. Also calculate the value of R_2 to achieve the cut off frequency $5 KHz$ for the following circuit.	10	5

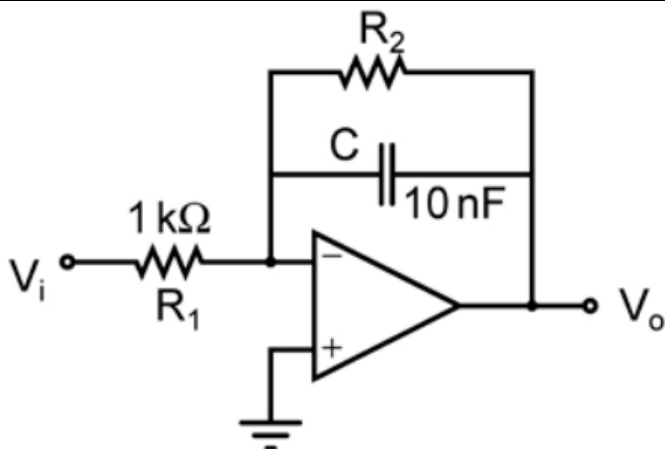


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SECTION C

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

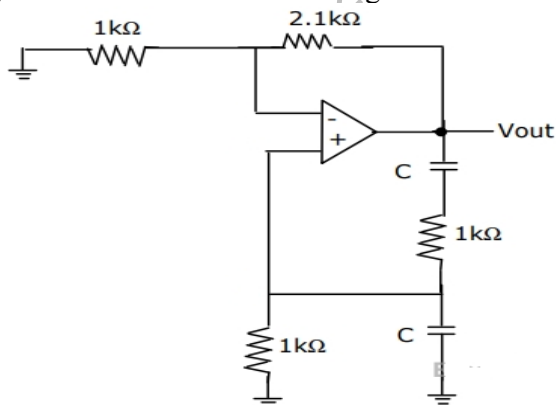
a.	Discuss the various amplifier models in detail along with their models and properties.	10	1
b.	Explain the various biasing schemes with their advantages and disadvantages. Also derive the stability factor for voltage divider biasing.	10	1

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

a.	Discuss the advantages of negative feedback in detail with relevant mathematical expressions.	10	2
b.	Discuss the working of class B power amplifiers with its efficiency and nonlinearity. Also discuss the remedy of nonlinear distortion associated with class B power amplifier.	10	2

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

a.	Derive the frequency of oscillation for RC phase shift oscillator along with the condition for sustained oscillations.	10	3
b.	Derive the frequency of oscillation for Wein bridge oscillator. Also calculate the value of 'C' required for to generate sinusoidal oscillations of frequency 1 KHz in the circuit of the figure shown.	10	3





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TIME: 3 HRS**M.MARKS: 100****6. Attempt any one part of the following: 1 x 10 = 10**

a.	Calculate the common mode gain, differential mode gain, CMRR, and input resistance of a differential amplifier using BJT.	10	4
b.	Discuss the basic principle of current mirrors. Also derive the relation of output current with reference current and output impedance of Wilson current mirror.	10	4

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

a.	Design a circuit using a single operational amplifier for the following mathematical operations: (V_1 and V_2 are the available inputs) 1) $V_0 = V_1 + 3V_2$ 2) $V_0 = 4V_1 - 6V_2$	10	5
b.	Discuss the circuit of wide band-pass active filter. Design a wide band pass filter having lower cut off frequency 3KHz, higher cut off frequency 30 KHz and pass band gain of 12 dB.	10	5