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B.TECH. IV SEM MAIN/BACK EXAM AUGUST-2023

ELECTRONICS AND COMMUNICATION ENGINEERING

(4EC4-01) - APPLIED ELECTRONICS

Time : 3 Hours] **[Max. Marks : 70**

[Min. Passing Marks :

Instructions to Candidates : Part – A : Short answer type questions (up to 25 words) 10 × 2 marks = 20 marks. All ten questions are compulsory.

Part – B: Analytical/Problem Solving questions 5 × 4 marks = 20 marks. Candidates have to answer 5 questions out of 7.

Part – C: Descriptive/Analytical/Problem Solving questions 3 × 10 marks = 30 marks. Candidates have to answer 3 questions out of 5.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting materials is permitted during examination. (Mentioned in form No. 205)

1_____ 2_____

PART A

1. What is feedback in amplifiers ? [2]
2. How does the high-frequency response of a CE (Common Emitter) stage differ from its low-frequency response ? [2]
3. Define the Gain Bandwidth Product of an amplifier and explain its significance. [2]
4. What are Crystal Oscillators, and why are they widely used for high-precision oscillations ? [2]

5. What is the advantage of using transformer for a Class A amplifier ? [2]

6. Describe the working principle of Class B/AB Push-Pull Amplifiers and their benefits. [2]

7. Why are heat sinks essential in power amplifiers, and how do they improve thermal management ? [2]

8. What is Efficiency in amplifiers, and how can it be calculated ? [2]

9. Explain the Barkhausen Criterion for sustained oscillations in feedback systems. [2]

10. Define Power Output in amplifiers and explain its relationship with load impedance. [2]

PART B

1. Prove that the maximum efficiency of class A transformer coupled amplifier is 50% and that of class B type is 78.5%. [4]

2. Draw the circuit of push pull class B amplifier coupled using transformers and explain the operation. Prove that all the even harmonics get eliminated. What is the assumption made for this ? [4]

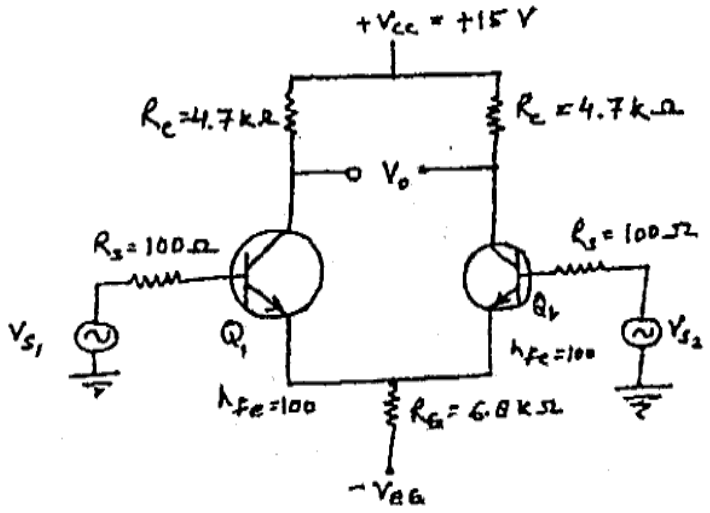
3. What are the main factors to consider while designing and tuning Sinusoidal Oscillators for specific applications ? [4]

4. How do you analyze multistage amplifiers at high frequencies, and what challenges may arise in such analysis ? [4]

5. How do Class C Power Amplifiers operate, and what are their main applications ? [4]

6. Draw the circuit of BJT Wien bridge oscillator and explain its working ? [4]

7. For the given Figure dual input, balanced output differential amplifier configuration. Assuming silicon transistors with hie = 2.8k Ω. [4]



Calculate

(a) Operating point values

(b) Differential gain

(c) Common mode gain

(d) CMRR

(e) Output if V_{s1} = 70 mV peak to peak at 1KHz and V_{s2} = 40 mV peak to peak at 1kHz.

PART C

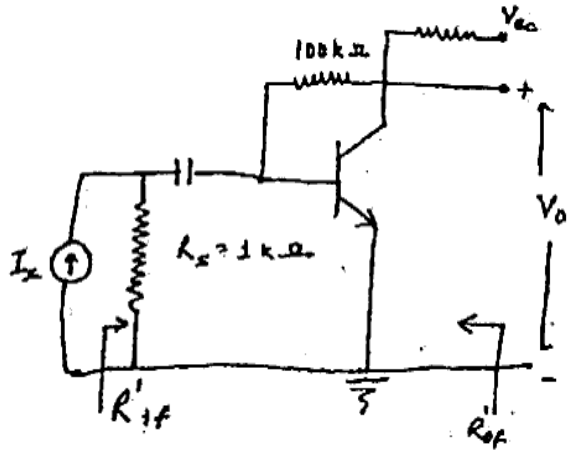
1. Distinguish between voltage series feedback and current series feedback. Explain briefly with suitable circuit diagrams. [10]

2. What is monostable multivibrator ? Explain its working with the help of neat waveforms. [10]

3. Explain the concepts of Crossover Distortion and Harmonic Distortion in power amplifiers. [10]

4. What is a Class B/AB Push-Pull Amplifier, and why is it commonly used in audio applications ? [10]

5. For the given feedback amplifier circuit, h_{fe} = 100, h_{ie} = 1 kΩ and neglect h_{re} and h_{oe}. Find :



(i) $R_{mf} = V_0/I_s$ where $I_s = V_s/R_s$

(ii) $A_{vf} = V_0/V_s$

(iii) R_{if}

(iv) R'_{of}.

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