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Question Paper Code : 77115

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Fourth Semester

Electronics and Communication Engineering

EC 6401 — ELECTRONIC CIRCUITS — II

(Regulation 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. List out the properties of negative feedback amplifier.

2. The voltage gain without negative feedback is 40 dB. What is the new voltage gain if 3% negative feedback is introduced?

3. Write the feedback factor expression for BJT transistor based Wein bridge oscillator.

4. State Barkhausen criterion.

5. Determine the bandwidth of two stage synchronous tuned amplifier. Assume the bandwidth of individual stage is 310 kHz.

6. Draw the small signal model of a single tuned amplifier.

7. What is the role of commutation capacitor in bistable multivibrator circuit.

8. Differentiate between Clipper and Clamper circuits.

9. Design an RC circuit to generate an output voltage, Vo with a slope error of 20% and sweep time of 20 μs and a sweep voltage of 2 V.

10. Draw the schematic diagram of a free running blocking oscillator.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain single tuned amplifier and derive for gain, resonant frequency and cut-off frequencies. (10)

(ii) Explain in detail Class-C tuned amplifier. (6)

Or

(b) (i) List out the neutralization techniques that are used in the stability of tuned amplifier. With the help of neat circuit diagram explain any one. (6)

(ii) Explain the frequency response of a stagger tuned amplifier. (6)

(iii) Consider the design of an IF amplifier for FM radio receiver. Using two synchronously tuned stages with fo = 10.7 MHz and 3-dB bandwidth of each stage so that the overall bandwidth is 200 KHz. Using 3-μH inductors find C and R for each stage. (4)

12. (a) (i) Identify the nature of feedback in Figure-1. Let $R_{C1} = 3K\Omega$, $R_{C2} = 500\Omega$, $R_E = 50\Omega$, $R_S = R_F = 1.2K\Omega$, hfe = 50, hie = 1.1KΩ, hre=hoe=0. Determine overall voltage gain (Avf), overall current gain (Aif), input impedance (Rif) and output impedance (Rof). (10)

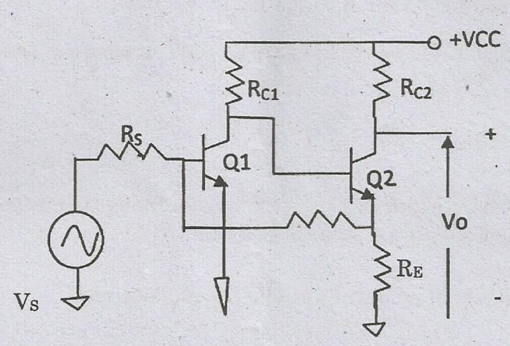

Figure. 1

(ii) A multipole amplifier having a first pole at 1 MHz and an open loop gain of 100 dB to be compensated for closed loop gain, as low as 20 dB by introducing of a new dominant pole. At what frequency must the new pole be placed? (4)

(iii) Identify the type of feedback amplifiers shown in Figure 2(a) and 2(b). (2)

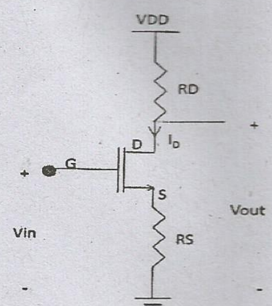

Figure 2(a)

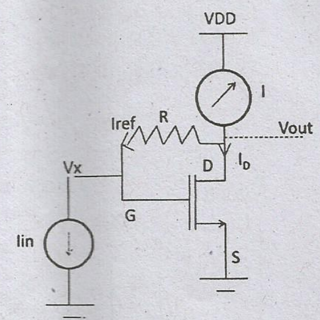

Figure 2(b)

Or

(b) (i) Determine the voltage-gain, input impedance and output impedance of transistor based voltage series feedback amplifier. (10)

(ii) Consider a three-pole feedback amplifier with a loop gain given by

$$T(f) = \frac{5*10^5}{\left(1+j\frac{f}{10^6}\right)\left(1+j\frac{f}{10^7}\right)\left(1+j\frac{f}{10^8}\right)}$$

Determine the frequency of the dominant pole to stabilize the feedback system. Assume the phase margin is atleast 45°. (6)

13. (a) (i) Draw RC-phase shift oscillator using BJT, explain and derive the condition for Oscillation. (10)

(ii) In Colpitt's Oscillator $C_1 = 1\mu F$ and $C_2 = 0.2\ \mu F$. If the frequency of oscillation is 10 KHz, find the value of inductor. Also find the required gain for sustained oscillation. (4)

(iii) Compare between Colpitt's and Clap Oscillator. (2)

Or

(b) (i) Draw Hartley oscillator using FET, explain and derive the condition for oscillation. (10)

(ii) Briefly discuss about the frequency of oscillation of Franklin Oscillator. (4)

(iii) Write an advantage of Wein bridge oscillator over RC-phase shift oscillator. (2)

14. (a) (i) Design a Schmitt trigger using BJT with UTP = 5V and LTP = 2 V. Assume $V_{CC} = 15\,V$, $Ic_2 = 5mA$ and hfe = 100. (8)

(ii) Consider a fixed-bias NPN bistable multivibrator shown in Figure 3. Determine its stable currents (I_{B1}, I_{C1}, I_{B2}, I_{C2}) and stable voltages (V_{B1}, V_{C1}, V_{B2}, V_{C2}) when Q_1 is ON and Q_2 is OFF. (8)

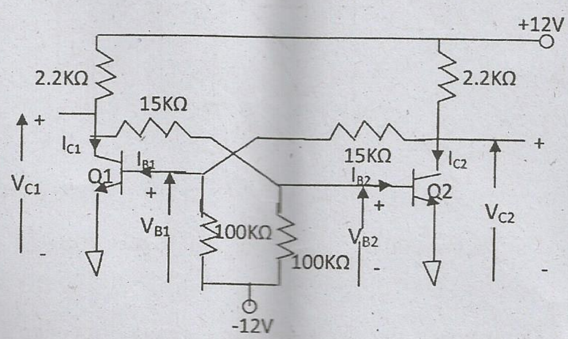

Figure. 3

Or

(b) (i) Consider the collector-coupled monostable multivibrator whose components and supply voltages are indicated in Figure 4(a), calculate the voltage levels (V_{B2}, V_{C2}, V_{C1}, V_{B1}) of the waveforms during (t = 0^-, 0 and T) period in Figure 4(b). Also find the overshoot voltage, δ. Assume silicon transistor having h_{fe} = 50, $V_\sigma = 0.7$ V, $V_\gamma = 0.5$ V and input resistance, $200\,\Omega$. (14)

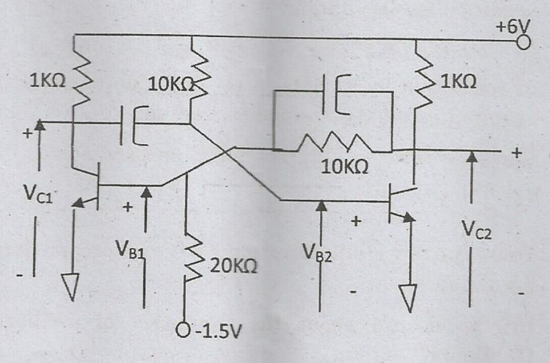

Figure 4(a)

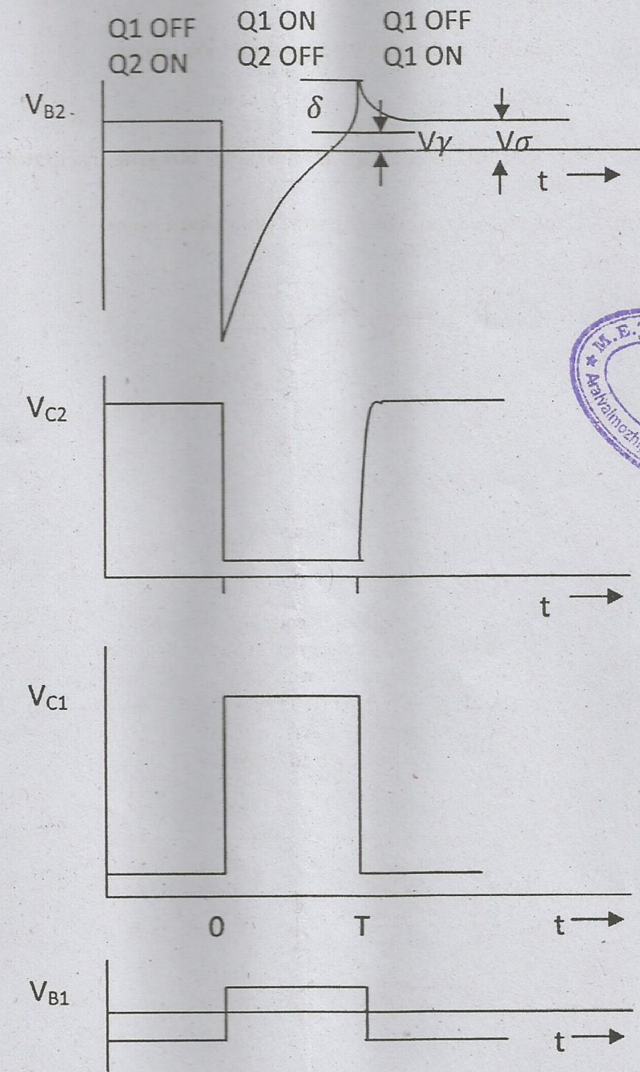

Figure 4(b).

(ii) Write an advantage of emitter-coupled monostable multivibrator over collector coupled monostable multivibrator. (2)

15. (a) (i) Explain in detail the working principle of UJT Saw-tooth waveform generator. **(8)**

(ii) Explain in detail the voltage-time base circuit. **(8)**

Or

(b) (i) Explain in detail the monostable blocking oscillator with base timing. **(8)**

(ii) Explain in detail the Current time base circuit. **(8)**
