Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 70430

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fourth Semester

Electronics and Communication Engineering

EC 6401 – ELECTRONIC CIRCUITS – II

(Regulations 2013)

(Common to : PTEC 6401 – Electronic Circuits – II for B.E. (Part-Time) – Electronics and Communication Engineering – Third Semester (Regulation - 2014))

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the effect of negative feedback on circuit noise?
2. Mention the three networks that are connected around the basic amplifier to implement feedback concept.
3. Sketch the feedback circuit of a Colpitts Oscillator. Calculate the value of the equivalent series capacitance required if it uses an inductance of 100 mH and is to oscillate at 40 kHz.
4. Mention the advantages and disadvantages of RC Phase shift oscillators.
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 a regenerative comparator? Give example circuit.
8. What is the frequency of oscillation of an astable multivibrator having the component values of $R_1 = R_2 = 10k\Omega$ and $C_1 = C_2 = 1000pF$?
9. Draw the Millers circuit to activate the sweep.
10. What is known as intrinsic stand off ratio and mention its range?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Sketch the block diagram of a feedback amplifier and derive the expressions for gain with positive feedback and with negative feedback. (9)

(ii) An amplifier has voltage gain with feedback as 100. If the gain without feedback changes by 20% and the gain with feedback should not vary more than 2%, determine the values of open loop gain A and feedback ratio β. (4)

Or

(b) (i) Draw the circuits of voltage shunt and current series feedback amplifiers and derive the expressions for input impedance R_{if}. (10)

(ii) Write about the Nyquist criterion for stability of feedback amplifiers. (3)

12. (a) With a relevant circuit diagrams, explain the working of Wien bridge oscillator. Also obtain the expression for the frequency of oscillation. (13)

Or

(b) (i) With relevant circuit diagrams, explain the working of Pierce crystal oscillator. (9)

(ii) A Hartley oscillator is designed with $L_1 = 20\mu H$ $L_2 = 2mH$ and variable capacitance. Determine the range of capacitance value, if the frequency is varied between 950 kHz and 2050 kHz. (4)

13. (a) Discuss the effect of cascading single tuned amplifier on bandwidth.

Or

(b) (i) Briefly describe about hazeltine neutralization method with suitable diagram. (7)

(ii) Derive the efficiency of class 'c' tuned amplifier. (6)

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. (7)

(ii) Consider a fixed-bias NPN bistable multivibrator shown in Figure 14 (a) (ii). 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. (6)

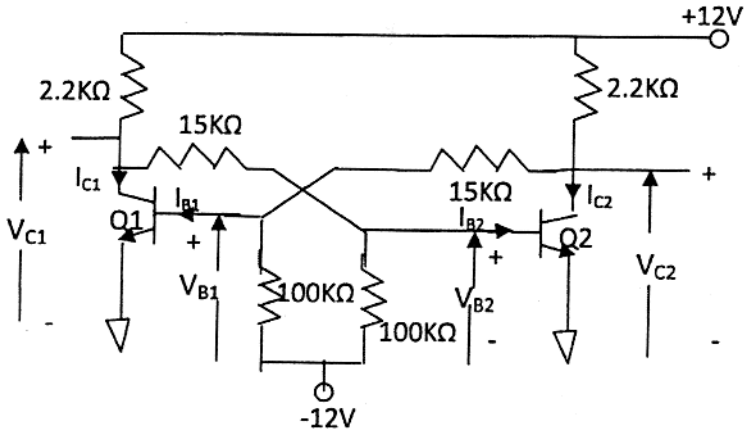

Figure 14 (a) (ii)

Or

(b) (i) Consider the collector-coupled monostable multivibrator whose components and supply voltages are indicated in Figure 14 (b) (i) 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 14 (b) (i) 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 Ω. (11)

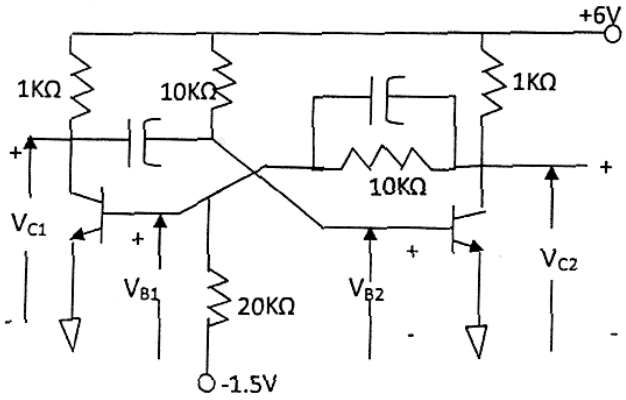

Figure 14 (b) (i) a

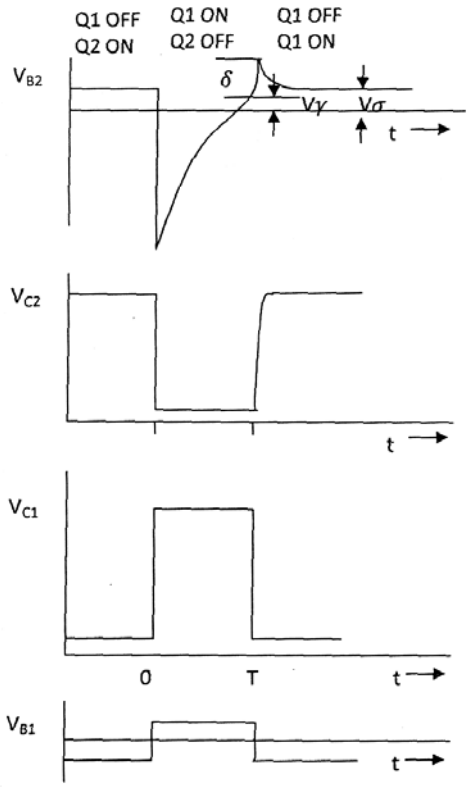

Figure 14 (b) (i) b

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

15. (a) With neat circuit diagram and waveform, explain the operation of a UJT relaxation oscillator. Derive the expressions for the sweep time and frequency of Oscillation of the circuit. (13)

Or

(b) Explain the operation and performance of a transistor current time base generator using a neat circuit diagram and relevant waveforms. (13)

PART C — (1 × 15 = 15 marks)

16. (a) (i) Design an astable multivibrator to generate a square wave of 2 kHz frequency with a duty cycle of 35%. (7)

(ii) Mention the significance of Gain-Bandwidth product of amplifiers with an example. (3)

(iii) An amplifier consists of 3 identical stages in cascade. The bandwidth of overall amplifiers is 20 Hz to 20 kHz. Calculate the bandwidth of individual stage. (5)

Or

(b) For a UJT sweep circuit the resistance is 10 kΩ while capacitance is 0.1 μF, valley potential is 1.5 V, VBB = 20 V. Assuming diode cutin Voltage of 0.7 V and intrinsic stand off ratio 0.6. Calculate the frequency of oscillation.

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