AALIM MUHAMMED SALEGH COLLEGE OF ENGINEERING
Electronics and Communication Engineering
B.E./B.Tech. DEGREE MODEL EXAMINATION
Fourth Semester -EC2251 — ELECTRONIC CIRCUITS – II
Time: Three hours Maximum:100 Marks
Answer ALL Questions
PART A — (10 × 2 = 20 Marks)

1. What is 'return ratio' of a feedback amplier?
2. State t he effect on output resistance and on input resistance of amplier when current shunt feedback is employed.
3. A Wein bridge oscillator is used for operations at 9 kHz. If the value o f the resistance R is 100 kΩ, what is the value of C required?
4. A tuned collector oscillator in a radio receiver has a fixed inductance of 60 µH and has to be tunable over the frequency band of 400 KHz to 1200 KHz. Find the range of variable capacitor to be used.
5. What is t he effect o f cascading n stages of identical single tuned ampliers (synchronously tuned) on the overall 3 dB bandwidth?
6. What is narrow band neutralization?
7. What is meant by clipper circuit?
8. What are the applications of Bistable multivibrator?
9. What are the applications of Blocking oscillator?
10. Sketch and define the `slope error' of a voltage sweep waveform.

Part B - (5 x 16 = 80 marks)

11. (a) (i) Sketch the block diagram of a feedback amplier and derive the expressions for gain (1) with positive feedback and (2) with negative feedback. State the advantages of negative feedback. (6)

(ii) An amplier, without feedback, has a voltage gain of 400, lower cut-of frequency f_1= 50 Hz, upper cut-of frequency f_2= 200 KHz and a distortion of 10%.Determine the amplier voltage gain, lower cut-of frequency and upper cut-of frequency and distortion, when a negative feedback is applied with feedback ratio of 0.01. (5)

(iii) An amplier, with feedback, has voltage gain of 100. When the gain without feedback changes by 20% and the gain with feedback should not vary more than 2%. If so, determine the values of open loop Gain A and feedback ratio β. (5)

OR

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

(ii) Discuss Nyquist criterion for stability of feedback ampliers, with the help of Nyquist plot and Bode plot. (6)

12. (a) (i) Sketch the basic block diagram of an oscillator an d explain how it works. If the gain of the amplifier is A and the feedback factor is β , sketch the output waveforms for t he three cases (1) $|A\beta| > 1$, (2) $|A\beta| = 1$ and (3) $|A\beta| < 1$. Derive the conditions of sustained oscillations. (10)

(ii) Make a table of comparison of RC phase shift oscillator and Wien-bridge oscillator bringing out t he similarities and differences. (6)

OR

12. (b) (i) Explain the working of a Colpitts oscillator with a neat circuit diagram and derive the frequency of oscillation. (8)

(ii) In a Colpitt's oscillator, the value of the inductor and capacitors in the tank circuit are L = 40 mH, C_1 = 100 pF and C_2 = 500 pF. (8)

(1) Find t he frequency o f oscillation.
(2) If the output voltage is 10 V, and the feedback voltage at the input side of the amplifier.
(3) Find the minimum gain, if the frequency is changed by charging `L' alone.
(4) Find the value of $C_1$for a gain of 10 if C_2 is kept constant as 500 pF. Also and the resulting new frequency.

13. (a) (i) Draw the circuit diagram an d the equivalent circuit of a capacitor-coupled single tuned amplifier and explain its operation. Derive the equations for voltage gain and for 3-dB bandwidth. Sketch also the frequency response of the amplifier. (12)

(ii) A single tuned transistor amplifier is used to amplify modulated RF carrier of 600 kHz a nd bandwidth o f 15 kHz. The circuit has total output resistance Rt = 20 k and output-capacitance C0 = 50 pF . Calculate the values of inductance and capacitance of tuned circuit. (4)

OR

13. (b) (i) Explain, with suitable circuit diagrams, Hazeltine neutralization and coil neutralization techniques. (8)

(ii) A Class C tuned amplifier has RL = 6 kΩ and t he tank circuit is required to have Q_L = 80. Calculate the values of L and C of t he tank circuit. Assume Vcc= 20V, resonant frequency = 5 MHz and worst case power dissipation = 20 mW. (8)

14. (a) (i) With necessary circuit diagrams a nd waveforms, explain the operation of the following: (1) Positive clipper, (2) Negative clipper, (3) Biased clipper and (4) Combinational (Two-way) clipper. (12)

(ii) Mention the applications of clamping circuits. (4)

OR

14. (b) (i) With neat circuit diagram a nd suitable wave forms, explain the operation of a collector coupled transistor monostable multivibrator. (8)

(ii) Design a Schmitt trigger circuit to have V_{CC}= 12 V, UTP = 5 V, LTP = 3V and I_C= 2 A using two silicon NPN transistors with hfe (min) = 100 and I_2= 0:1 I_{C2} (8)

15. (a) (i) Draw and explain the triggering circuit used in monostable blocking oscillator. (8)

(ii) Explain, with the help of circuits and wave-forms, th e operation o f RC-controlled push-pull astable blocking oscillator with emitter timing. (8)

OR

15. (b) (i) Design a UJT relaxation oscillator to generate a saw tooth wave form at a frequency o f 500 Hz. Assume t he supply voltage V_{BB}= 20 V, V_P= 2:9 V, V_V= 1.118 V, I_P = 1.6 mA and I_V= 3.5 mA. State further assumptions made, if any. Sketch the circuit designed. (8)

(ii) Sketch a current time base circuit and explain its working with the help of relevant waveforms. (8)

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