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Question Paper Code : 10292

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2012.

Fourth Semester

Electronics and Communication Engineering

EC 2251/147401/EC 41/10144 EC 402/080290019 – ELECTRONICS CIRCUITS – II

(Common to PTEC 2251 Electronics Circuits-II for B.E.(Part -Time) Third Semester
ECE - Regulations 2009)

(Regulation 2008)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

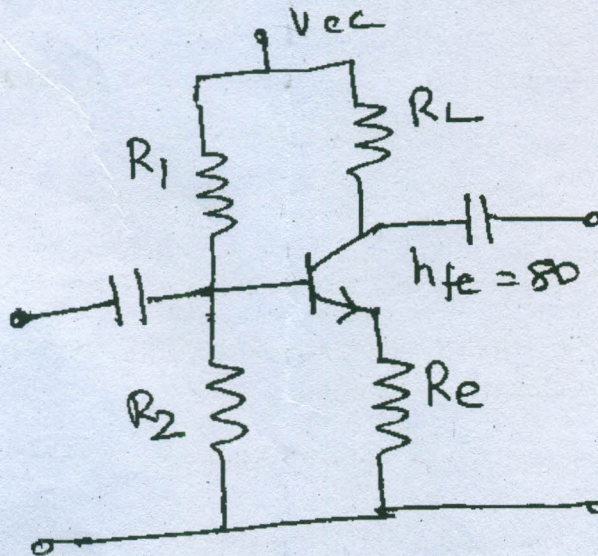
1. Define 'feedback factor' of a feedback amplifier.
2. State the effect on output resistance and on input resistance of amplifier when current shunt feedback is employed.
3. State the essential conditions for maintaining oscillations.
4. In a Hartley oscillator, if $L_1 = 0.2$ mH, $L_2 = 0.3$ mH and $C = 0.003$ μ F. Calculate the frequency of its oscillations.
5. A tuned circuit has resonant frequency of 1600 kHz and bandwidth of 10 kHz. What is the value of its Q-factor?
6. State two advantages and two disadvantages of tuned amplifiers.
7. What is meant by clamper circuit?
8. Give two applications of Schmitt Trigger circuit.
9. State any two applications of pulse transformer.
10. What are 'Restoration time' and 'Sweep time' of a time-base signal?

PART B — (5 × 16 = 80 marks)

11. (a) (i) For a feedback amplifier, derive the expressions for (1) the gain with feedback, (2) Lower cut-off frequency and (3) Upper cut-off frequency. (8)
- (ii) If an amplifier has a bandwidth of 300 kHz and a voltage gain of 100, what will be the new bandwidth and gain if 10% negative feedback is introduced? What will be the gain-bandwidth product before and after feedback? What should be the amount of feedback if the bandwidth is to be limited to 800 kHz? (8)

Or

- (b) (i) What is the effect of a current series negative feedback on input resistance and output resistance of a BJT amplifier? Explain the same, with necessary circuit, equivalent-circuit and equations. (8)
- (ii) A current series feedback amplifier is shown in the figure below:



It has the following parameters :

$$R_1 = 20 \text{ K}\Omega, R_2 = 20 \text{ K}\Omega, h_{ie} = 2 \text{ K}\Omega, R_L = 1 \text{ K}\Omega, R_e = 100 \Omega,$$

$$h_{fe} = 80; h_{re} = 0; h_{oe} = 0.$$

Calculate A_v , β , R_{if} and A_{uf} . (8)

12. (a) (i) Draw the circuit of RC phase shift oscillator which uses BJT. Draw also the equivalent circuit and derive the expression for the frequency of oscillation and the minimum gain required for sustained oscillations. (10)

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

Or

- (b) With neat circuit diagrams explain the working principle of the following oscillators. State also the expression for the frequency in each case.

- (i) Tuned collector oscillator (6)
(ii) Franklin oscillator (5)
(iii) Armstrong oscillator. (5)

13. (a) (i) Draw the circuit diagram and 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 and bandwidth of 15 kHz. The circuit has total output resistance $R_t = 20 \text{ k}\Omega$ and output-capacitance $C_o = 50 \text{ pF}$. Calculate the values of inductance and capacitance of tuned circuit. (4)

Or

- (b) (i) Draw the circuit of class C tuned amplifier and explain its operation with relevant waveforms. Discuss also its frequency response. (10)
(ii) With a neat circuit diagram, explain the Hazeltine method of neutralization. (6)

14. (a) (i) Derive and draw the response of low pass RC circuit to the following input waveforms :
(1) Step (2) Pulse (3) Square. (10)
(ii) A 10 Hz symmetrical square wave, with a peak to peak amplitude of 2 V, is impressed upon a high pass RC circuit whose 3-dB frequency is 5 Hz. Calculate and sketch the output waveform. What is the peak to peak output amplitude? (6)

Or

- (b) (i) Determine the values of capacitors to be used in an astable multivibrator to provide a train of pulses, $2 \mu\text{s}$ wide, at a repetition rate of 100 kHz, if $R_1 = R_2 = 20 \text{ k}\Omega$. (6)
(ii) Explain the working of Schmitt trigger using emitter-coupled bistable multivibrator, with circuit diagrams and waveforms. (10)

15. (a) Draw the circuit of an astable blocking oscillator with base timing. Sketch the wave-forms of collector voltage, base voltage and magnetizing current. Explain the operation of the oscillator covering one full cycle, along with necessary equations. Sketch the equivalent circuits (1) when there is magnetizing current and (2) when the magnetizing current is zero. Also, mention the advantages and disadvantages of this oscillator. (16)

Or

- (b) (i) With suitable circuit and wave-form diagrams, explain the working of UJT saw tooth generator. Derive the expression for the oscillating frequency. (10)
- (ii) For a certain UJT sweep circuit, the resistance is $10\text{ k}\Omega$ while the capacitance is $0.1\ \mu\text{F}$. The valley potential is $1.5\ \text{V}$ when $V_{\text{BB}} = 20\ \text{V}$. Assuming diode cut-in voltage of $0.7\ \text{V}$ and intrinsic stand off ratio as 0.6 , calculate the frequency of oscillations. (6)