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(c) What are piezoelectric crystals? Why are they used in oscillators? Explain.

(6)

(1000)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 5752

K

Unique Paper Code : 2512041101

Name of the Paper : Analog Electronics

Name of the Course : B.Sc. (H) Instrumentation

Semester : I

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **seven** questions in all, out of which you have to attempt any **five** questions.
3. **First** question is compulsory.
4. **All** questions carry equal marks.
5. Use of Non programmable Scientific Calculator is allowed.

P.T.O.

1. (a) Explain the effect of temperature on diode characteristics. (3)
- (b) Discuss the role of coupling and bypass capacitor in CE amplifier. (3)
- (c) What is oscillator? Explain the criteria for oscillation. (3)
- (d) Derive the relation between α and β of BJT. (3)
- (e) If the emitter current of a transistor is 8 mA and I_B is $1/50$ of I_C , determine the levels of I_C and I_B . (3)
- (f) What do you understand by cross-over distortion? How can it be eliminated in Class B-operation? (3)
2. (a) Derive the expression for ripple factor and efficiency of a half-wave rectifier. (8)

- (b) Discuss the effect of negative feedback on gain and bandwidth in the amplifier circuit. (4)
- (c) Calculate the closed loop gain for the negative feedback amplifier when open loop gain $A_v = 200,000$ and $\beta = 1/200$. Also calculate closed loop gain when A_v is increased by 70%. (6)
7. (a) State the working of Colpitts oscillator using BJT and derive the expression for its frequency of sustained oscillations? (8)
- (b) It is required to generate an output frequency of 140 KHz using Colpitts oscillator. Determine the value of C_1 and C_2 given $L = 0.7$ mH. Assume $(C_1 = C_2)$. (4)

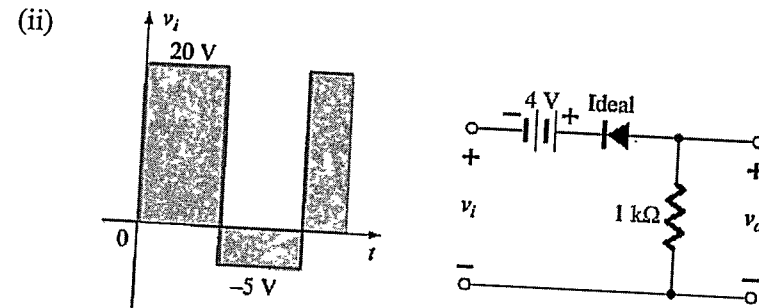
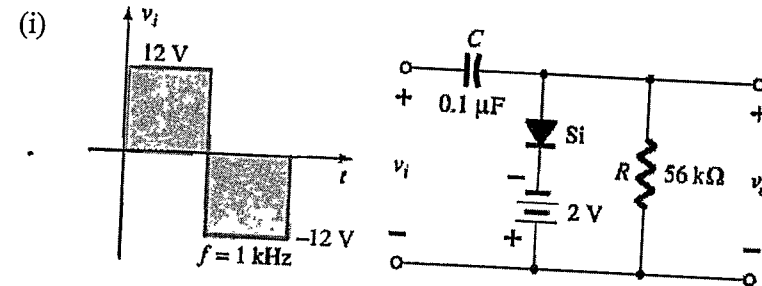
5. (a) Derive the expression of frequency of sustained oscillations generated by RC phase shift oscillator with 3 RC networks. (8)

(b) What is the need for 3 RC circuits in a phase shift oscillator? Calculate the frequency of oscillation of a BJT phase shift oscillator using component values $R = 100 \text{ k}\Omega$ and $C = 0.01 \mu\text{F}$. (6)

(c) Draw and explain the Input and Output characteristics of NPN common base transistor. (4)

6. (a) Derive the expression of input impedance, output impedance and gain of a Voltage shunt feedback circuit. (8)

- (b) Draw the output for the following circuits (6)

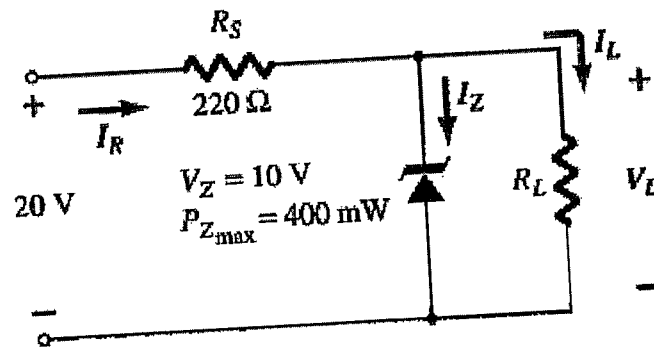


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(c) Differentiate between transition and diffusion capacitance. (4)

3. (a) (i) Determine V_L , I_L , I_Z , and I_R for the network of figure given below, if $R_L = 470\Omega$. (4)
- (ii) Determine the value of R_L that will establish maximum power conditions for the Zener diode. (4)
- (iii) Determine the minimum value of R_L to ensure that the Zener diode is in the "on" state. (8)



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(b) Draw the block diagram of a power supply and explain the functioning of each block. (6)

(c) Draw the simplified h-equivalent circuit of common emitter (CE) amplifier. (4)

4. (a) For a voltage divider bias circuit with $V_{CC} = 15V$, $R_1 = 25k\Omega$, $R_2 = 5k\Omega$, $R_C = 3k\Omega$, $R_E = 1k\Omega$ and $h_{fe} = 50$. Determine the operating point current and voltage. (6)

(b) Explain with the help of a diagram the frequency response of a CE amplifier. Also explain why the gain falls at low and high frequencies. (6)

(c) What are power amplifiers? Classify the power amplifiers according to their operating cycle and efficiency. (6)

P.T.O.