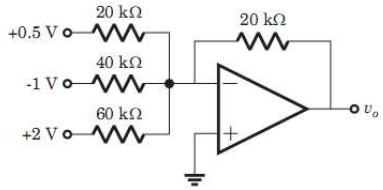
(vi) In the circuit shown in the figure below, the output voltage is



(a) 2.67V (b) -2.67V (c) 2.67V (d) -2.67V.

(vii) In CE configuration the output V- I characteristics are drawn by taking
(a) V_{CE} vs. I_C for constant value of I_E
(b) V_{CE} vs. I_C for constant value of I_B
(c) V_{CE} vs. I_C for constant value of V_{CB}
(d) None of these.

(viii) The voltage divider biasing circuit is used in amplifiers quite often because it
(a) limits the ac signal going to base
(b) reduces the cost of the circuit
(c) reduces the dc base current
(d) makes the operating point almost independent of β.

(ix) The higher cut-off frequency of a RC coupled amplifier depends upon
(a) Parasitic capacitor (b) Network capacitor
(c) Frequency dependency of h_{fe} (d) All of them.

(x) Placing a bypass capacitor, in common-emitter configuration, is necessary to
(a) prevent the fall of mid-band voltage gain
(b) achieve a stable Q point
(c) prevent thermal runway
(d) none of them.

Group - B

2. (a) Draw the collector to base bias circuit. Explain why such circuit is an improvement on the fixed bias circuit so far as stability is concerned.

(b) Is the operation point of the transistor amplifier fixed? If not, what are the factors responsible for its shift?

Group – D

6. (a) Design an Astable multivibrator circuit using op-amp and expl operation. Derive the expression for its output pulse width.

(b) Design the equation with suitable block diagram in which c voltage, $V_{out} = (V_1^{2/3}+V_2^{3/4})$, where, V_1 and V_2 are the input volta

9 + 3

7. (a) For the circuit in Figure 5 find output (v_0) when $v_s = sin(10\pi t$

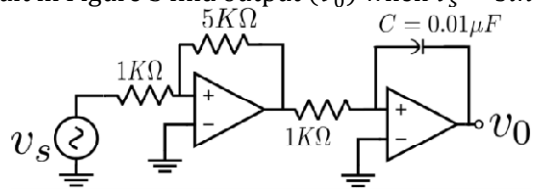


Fig.5

(b) Explain the basic operation of an instrumentation amplifier.

6 + 6

Group - E

8. (a) What is the difference between voltage and power amplifier? that maximum efficiency of class B operation will not exceed percent.

(b) List the advantages of a push pull amplifier circuit.

(c) What is cross over distortion and how it can be overcome?

6 + 4 + 2

9. (a) Design an automatic smoke alarm system using 555-Timer IC in a way that the circuit triggered by an external signal initiat alarm. The alarm rings for 1 minute and turns off.

(b) Draw the internal circuit diagram of IC555 Timer. How can yo this circuit to design a free running square wave oscillator? Fin expression of ON and OFF duration of the output.

4 + 8

B.TECH/ECE/3RD SEM/ECEN 2101/2016

ANALOG ELECTRONIC CIRCUITS
(ECEN 2101)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) For transistor action
(a) the base region must be very thin and lightly doped
(b) the emitter junction must be forward biased and collector junction should be reverse biased
(c) the emitter should be heavily doped to supply the required amount of majority carriers
(d) all of these.

(ii) The input /output impedence of a transresistance amplifier, with negative feedback,
(a) increases / decreases (b) increases / increases
(c) decreases / increases (d) decreases /decreases.

(iii) The Barkhausen criterion is associated with the
(a) negative feedback (b) positive feedback
(c) both of them (d) none of them.

(iv) The open-loop gain $A_0 = 99990$, of an amplifier, varies by 20%.
For what value of the feedback factor K, the closed-loop gain will vary only by 0.02%.
(a) 0.01 (b) 0.0098 (c) 0.00999 (d) 0.00888.

(v) The cross-over distortion is observed in which type of amplifier's operation?
(a) Class A (b) Class B
(c) Class C (d) Class AB.

(c) In a fixed bias circuit indicated in Fig.1. R_b = 1MΩ, R_c = 5kΩ, V_{CC} = 6V, β = 100, and neglect V_{BE}. Determine Q point, draw dc load line and determine the stability factor.

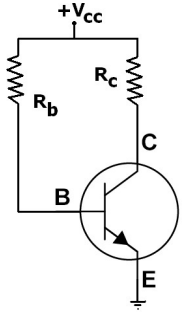


Fig.1

4 + 3 + 5 = 12

3. (a) What is thermal runway and how can it be controlled?

(b) Explain the importance of finding the input and output impedance when two voltage amplifiers are coupled.

(c) Calculate the resistances (R_1 & R_2) to bias a transistor as configured in the figure 2. Assume $V_{CC} = 20V,\ V_{CEQ} = 6\,V, S = 6, I_{CQ} = 0.6\,mA,$ $R_C = 1K\ \Omega, \beta = 150$.

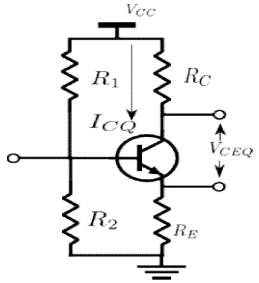


Fig.2

2 + 3 + 7 = 12

Group - C

4. (a) Design the circuit diagram of Colpitts oscillator and calculate the frequency of oscillation.

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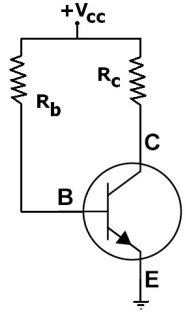

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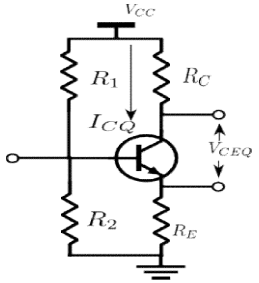

Fig.2

2 + 3 + 7

Group - C

4. (a) Design the circuit diagram of Colpitts oscillator and calcula frequency of oscillation.

(b) Sketch the circuit of a Wien bridge oscillator and explain its operation. Find an expression for the frequency of oscillation and the condition for sustained oscillation.

5 + 7 = 12

5. (a) State the general rules to analyse feedback amplifiers. By applying those rules, identify the correct feedback topology for the circuit in Figure 3 and hence, derive the expression of closed-loop gain, desensitivity factor, input impedence and output impedence. $R_s = 100\Omega, h_{ie} = 1K, h_{fe} = 150, R_E = 5K$

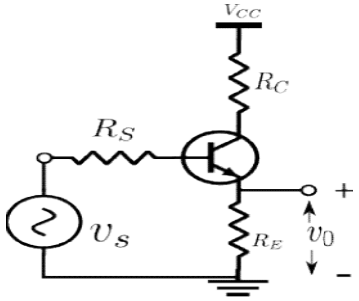

Fig.3

(b) Derive and calculate the closed-loop gain and closed-loop input impedence, for the circuit in Fig.4.

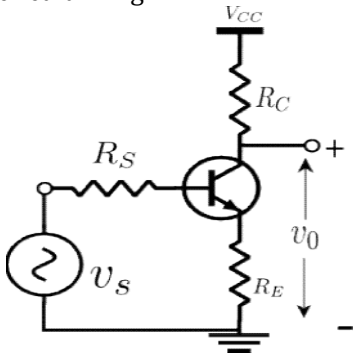

Fig.4

(c) Derive an expression of input impedence and output impedence for current-shunt type feedback amplifier.

4 + 4 + 4 = 12

B.TECH/ECE/3RD SEM/ECEN 2101/2016

(b) Sketch the circuit of a Wien bridge oscillator and expla operation. Find an expression for the frequency of oscillation a condition for sustained oscillation.

5 +

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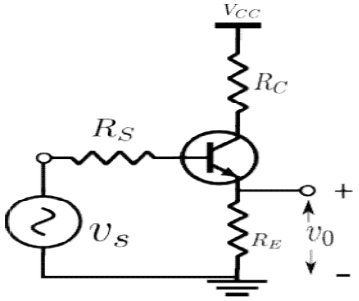

Fig.3

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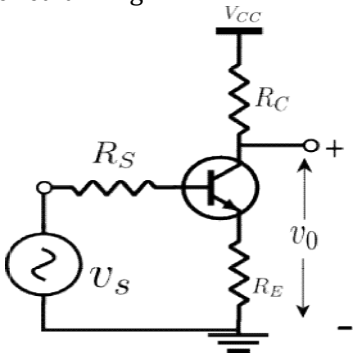

Fig.4

(c) Derive an expression of input impedence and output impeden current-shunt type feedback amplifier.

4 + 4 +