

ASSIGNMENT-6

Topic	Assignment Posted On	Submission Due On
Transistor Biasing	13.04.2016	18.04.2016

Note:

- **Write the answers legibly and neatly.**
- **Use a different color pen for writing questions** and draw a horizontal line at the end of each answer
- **Leave left margin on each page**
- **Write only on one side of the page.** This will facilitate you to use the other side to add extra notes or to incorporate any corrections to your solutions after verifying them with the solutions posted on course web page.
- Your objective of writing assignments is not for the sake of submitting, only to get assignment marks. **Writing assignments is a part of learning process, after listening to class lectures.** After all, You will be referring to class notes and assignment notes for MSEs and ESE.
- **Make an honest effort to solve the assignment problems. In case of difficulty, discuss with friends/Teacher and refer to solutions as a last resort. Finally, rework the solutions on your own for submission**
- **You will be graded based on the quality of your work. Please do not let your efforts go in vain**
- Class notes and Assignment will keep you in comfortable position in MSEs and ESE

Read carefully, the expectations from each answer and present them in detail

Assume the following data , if needed

$$V_{BE} = 0.7V \text{ (Si – transistor)}, 0.3V \text{ (Ge – transistor)}$$

1	Explain how DC load line is plotted for CE Amplifier.
2	What is the need of biasing in Transistor circuits? [You are expected to cover: (i) what is Q-point (ii) write the expression for I_C and mention what parameters cause I_C to vary (iii) explain on thermal runaway (iv) requirements of biasing circuits and (v) List different biasing circuits]
4	Define the stability factor S and derive a general expression for stability factor of a circuit in CE configuration and show that the stability factor for a fixed bias circuit is $(1+ \beta)$.
5	For a collector to base bias circuit, derive the expression for stability factor.
6	Derive the expression for stability factor of a Self Bias circuit.
7	With the help of circuit diagram, explain the operation of a BJT as a switch.
8	Design a self bias circuit using a Ge transistor with $V_{CC}=16V$ and $R_C=1.5K\Omega$ for obtaining of $V_{CE}=8V$ and $I_C=4mA$. Assume $S=12$ & $\beta=50$. Ans: [You are expected to (i) draw the self bias circuit (ii) mark the given data in the circuit (iii) In this design you need to calculate the values of resistive divider network resistors R_1 and R_2 (iv) Theorise the input side circuit and keep $V_{BB} = V_{CC} \left[\frac{R_2}{R_1 + R_2} \right]$ and $R_B = \left[\frac{R_1 R_2}{R_1 + R_2} \right]$ (v) write input loop equation (vi) write output loop equation (vii) solve equations to get R_1 and R_2]

9	<p>For a given fixed bias circuit with $R_B=100K\Omega$, $R_C=22K\Omega$, $V_{CE}=4V$, find the stability factor. Ans: $S=33.258$, $I_C=3mA$, $I_B=93\mu A$. <i>[You are expected to (i) draw the fixed circuit (ii) Derive the expression for S (iii) mark the given data in the circuit (iii) calculate the missing data required to calculate S as derived in (ii) calculate S]</i></p>
10	<p>Design a collector to base bias circuit for the specified conditions: $V_{CC}=15V$, $V_{CE}=5V$, $I_C=5mA$, $\beta=100$. Ans: <i>[You are expected to (i) draw the collector-base bias circuit (ii) mark the given data in the circuit (iii) In this design you need to calculate the values of resistors R_C and R_B (iv) write input loop equation (v) write output loop equation (vii) solve equations to get R_C and R_B]</i></p>

Instruction: Submit the solutions during the lunch break on or before due date @ Room No: B-I-208

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