

# **Design Assignment**

**Marks: 100**

**[CO3-PO-c, P1, P2, P3]**

**Date of Submission: 5.1.26**

**(Assignment will cover 10% of the total marks)**

- Hardcopy must be submitted.

Design an amplifier with a small signal voltage gain  $|A_v| = \frac{v_0}{v_i} = (35 + S + G)$ . The input resistance  $R_i$  must be greater than  $(20 + \frac{G}{2})$ .

- The circuit may be biased by either a single DC power source of 10V or by TWO 5V DC power source.
- The available transistor is an npn BJT or an NMOS device.
- Standard resistors are to be used.
- Transistor parameter values ( $\beta, K_n, V_{TN}$  etc.) must be consistent between hand calculations and simulation.

S: Section Number.

G: Group Number.

[Rubrics for assessment is attached]

### **Guidelines:**

The project should be done in a group of three [group members must be from the same section].

### **The Report must include the following sections:**

1. Objective
2. Design Methodology [ what are the specifications, technical requirements, constraints? Which configurations to be selected etc.]
3. Analysis of the selected amplifier to derive the expression of  $A_V$  **and**  $R_i$ .
4. Analysis of the selected biasing circuit to derive the expression of  $I_C$  **and**  $V_{CE}$ .
5. Show the approximation of the expressions required for the design.
6. Design steps to obtain the required values to meet the specifications.
7. Verification of the design using SPICE simulation.
8. Present in the form table the calculated values of the Resistors, corresponding standard values, the Gain and Input impedance obtained from simulations.
9. Comments and Conclusions.

The report will be graded out of 100 according to the rubrics provided in separate documents. Provide clear justifications for all the assumptions made in the design process. Report should contain a cover page, mentioning Course Name & Code, Semester & Year, Section No., Group No., Student's names, ID, Instructor's name, and Date of submission. The report must be hand-written and perfectly legible, and contribution from each member must be reflected properly and, in the manner, instructed in the class.

Reports must be submitted by **5<sup>th</sup> January 2026 by 11.00 PM**. Failure to follow the above-mentioned guidelines will result in reduction in marks. Rubrics is also attached.

## Rubrics for assessment

Performance Criteria	Weight	Performance Measure			
		Unsatisfactory (1)	Developing (2)	Satisfactory (3)	Exemplary (4)
c1a. Design the different stages of the system, subsystems, components of the design project	60%	Not able to design the system, subsystems, and components of the design project	Limited capability of designing the system, subsystems, and components	Able to design the system, subsystems, and components of the design project	Able to provide comprehensive design with detailed analysis and clear design steps
c1b. Define specifications, technical requirements and constraints of the system/subsystem, component	20%	Not able to define specifications and requirements of design project	Limited capability of defining specifications and requirements of design project	Able to define specifications and important design requirements of project	Able to define detail specifications and comprehensive design requirements
c4. Evaluate whether the design solutions meet the desired need	20%	Fail to evaluate the design solutions meet the desired need	Occasionally able to evaluate whether the design solutions meet the desired need	Always evaluate the design solutions to find whether it meets the desired need	Always evaluate whether the design solutions meets the desired need and find the best solutions among alternatives.