BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE PILANI, HYDERABAD CAMPUS SUMMER SEMESTER - 2022

COURSE HANDOUT (PART II)

In addition to PART I (General Handout for all courses appended to the time-table), this portion gives further specific details regarding the course.

**Course no.** : ECE/EEE/INSTR F244

**Course title** : Microelectronic Circuits

**Instructor In-charge** : Dr. Parikshit Sahatiya

**Team of instructors:** (i) Lecture: Dr. Parikshit Sahatiya

(ii) Tutorials : Dr. Parikshit Sahatiya

**Scope and objective of the course:**

1. Analyze and design basic integrated electronic circuits.
2. Thorough understanding of fundamentals of electronic circuits & building blocks necessary for effective realizations of integrated circuits.
3. The course also includes the practical component under ECE/EEE/INSTR F246.

**Text book:** [T1] A. S. Sedra & K. C. Smith, “Microelectronic Circuits”, Oxford University Press, 7thed.

**Reference books:** [R1] B. Razavi, “Fundamentals of Microelectronics”, Wiley.

[R2] D. A. Neamen, “Electronic Circuits – Analysis and Design”, McGraw Hill, 3rded. [R3] R. T. Howe & C. G. Sodini, “Microelectronics – An Integrated Approach” Pearson. [R4] J. Millman & A. Grabel, “Microelectronics”, Tata McGraw Hill, 2nded.

**Course Roadmap:**

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| --- | --- | --- | --- | --- |
| **#** | **Topics to be covered** | **Learning Objective** | **# of lec** | **Chapter in the Text Book** |
| 1 | Introduction | Semiconductor basics | 2 | T1: 1.7 – 1.11 |
| 2 | Models and physics of BJT + DC analysis | BJT device physics | 5 | T1: 4.1 – 4.4  T1: 6.2. – 6.5  (6.4 is for biasing and DC Analysis) |
| 3 | BJT Amplifiers | Discrete BJT Amplifier design | 5 | T1: 6.2 – 6.5 |
| 4 | Models and physics of MOSFET | MOS device physics | 3 | T1: 5.1 – 5.4 |
| 5 | MOSFET Amplifier | Discrete MOSFET Amplifier design | 5 | T1: 6.2. – 6.5 |
| 6 | Frequency response | Low and High frequency response (BJT and MOSFET) | 4 | T1: 9.1 – 9.7 |
| 6 | Passive and active current mirrors | Design of IC bias circuits | 3 | T1: 7.2 |
| 7 | Feedback and Stability study in BJT and MOSFET circuits | Study of feedback and Stability | 4 | T1: 10.1 – 10.10 |
| 8 | Differential amplifiers | Design of differential amplifiers | 4 | T1: 8.1 – 8.6 |
| 9 | Ideal Operational Amplifiers | Design and characterization of ideal OP-AMP circuits | 3 | T1: 2.1 – 2.3 |
| 10 | Introduction to basic oscillators | Wien-Bridge, Hartley &Colpitt | 3 | T1: 14.1 – 14.3 |

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| --- | --- | --- | --- | --- |
|  |  | oscillator |  |  |
| 11 | Introduction to basic filters | Butterworth & Chebyshev filters | 2 | T1: 13.1 – 13.3 |

**Evaluation scheme:**

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| --- | --- | --- | --- | --- | --- | --- |
| **#** | **Component** | **Duration** | **Weightage** | **Full marks** | **Date & time** | **Nature of Component** |
| 1 | Quizzes/Assignments | To be announced | 25 % | 50 | To be announced later | Open book |
| 2 | Midterm | 90 min | 35 % | 70 | 24/06 9.30 - 11.00AM | Closed Book |
| 3 | Comprehensive | 180 min | 40 % | 80 | 21/07 FN | Closed Book |

**Notices**: \*\*All notices for the course will be announced in class and displayed on the CMS simultaneously.

**Makeup policy:** Requests for makeup examination will be considered ONLY for extremely serious cases where:

1. Parents of the concerned student have to request the course IC in a signed document for the makeup of their son/daughter.
2. Written & signed documentary evidence needs to be furnished by the Hostel Warden/ID confirming the reason for absence from scheduled examination.
3. In case of medical emergencies, students must produce a documentary evidence from the surgeon.

**Chamber consultation hour:** To be announced in class.

**Academic Honesty and Integrity Policy**: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor Incharge ECE/EEE/INSTR F244**