**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI, HYDERABAD CAMPUS**

**INSTRUCTION DIVISION, SECOND SEMESTER 2024**

**COURSE HANDOUT (PART II)**

Date: 09-01-2024

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

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

***Course Title* : Microelectronic Circuits**

***Instructorincharge*  : SYED ERSHAD AHMED**

**Team of Instructors**

**(i ) For Lecture : Syed Ershad Ahmed, Niranjan Raj**

**(ii) For Tutorial : Syed Ershad Ahmed , Parikshit Sahatiya ,**

**Surya Shankar Dan and Niranjan Raj**

**1. 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.

2.  **Text Book:**

Adel. S. Sedra, Kenneth C Smith, “Microelectronic Circuits”, Oxford University Press, Fifth Edition, 2004.

1. **Reference books** 
   1. Richard. C. Jaeger, “Microelectronic Circuit Design”, Tata McGraw-Hill Companies Inc., International Edition.
   2. R.Jacob.Baker, Harry.W.Li, David.Boyce, “CMOS circuit Design Layout and simulation.”IEEE Press series on Microelectronic Systems, PHI.
2. **Course Plan :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| S.No. | Topic | Learning Objective | No. of  Lectures | Ref. From the Text Book (Article) |
| 1. | Introduction to Amplifiers | Characteristic of Amplifiers | 2 | Text chapter-1 1.4, 1.5,1.6 |
| 2 | Models of MOSFET, physics of MOSFET | MOS device physics | 2 | Text ch- 4.1 – 4.3 |
| 3. | Integrated circuit MOSFET Amplifier circuits, and Frequency response | IC MOSFET Amplifier design | 5 | Text Ch 4--4.5, 4.6, 4.7, 4.8, 4.9 |
| 4. | Integrated circuit BJT Amplifiers, frequency response and BJT models | Discrete and IC BJT Amplifier Design  (To be discussed in Flip mode using recorded videos) | 5 | Text Ch 5--5.5, 5.6, 5.7, 5.8, 5.9 |
| 5. | Differential amplifiers | Design of differential amplifiers | 7 | Text --Ch.7.1-7.7 |
| 6. | Passive and active current mirrors. | Design of IC bias circuits | 4 | Text Ch.6.12 |
| 7. | Feedback | Study of feedback | 7 | Text Ch.8.1-8.7 |
| 8. | Operational Amplifiers | Design and characterization of an integrated circuit OP-AMP | 5 | Text Ch. 9 |
| 9. | Stability & frequency compensation in OP AMP, Noise | Techniques for stability of opamp in feedback mode. | 3 | Text ch-8.8-8.11 |
| Total (40) | | | | |

6. **Evaluation Scheme:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Component | Duration | Weightage | Full marks | Date & time | Remarks |
| 1 | Quizzes | To be announced | 30 % | 60 | To be announced later | Closed book |
| 2 | Midterm | 90 min | 30 % | 60 | 12/03 - 11.00 - 12.30PM | Open Book |
| 3 | Comprehensive | 180 min | 40 % | 80 | 09/05 FN | Closed book\*\* |

### \*\* Though comprehensive exam is closed book, one A4 handwritten (both sides) formula sheet will be allowed for entire duration of comprehensive exam. Only formulas in the sheet are allowed. Circuits, and any form of Figures, images not allowed.

7. **Chamber Consultation Hour:** To be announced in the class

8. **Make-up 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 doctor.

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

**10.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.

**Instructorincharge**

**ECEF244 / EEE F244/ INSTR F244**