**EC100: Basic Electronic Circuits (3-1-0: 4)**

**Course Instructors: Dhirendra Sinha**

**Course Contents:**

**Unit 1: Introduction to Circuit Elements & Sources**

Resistor, Capacitor, Inductor, Voltage and Current sources, Controlled Sources, Thevenin and Norton Theorem.

**Unit 2: Basics of Semiconductors**

Semiconducting Materials, Intrinsic and Extrinsic Semiconductors, Charge-carrier Density and Distribution, Fermi level.

**Unit 3: Diodes**

*p-n* Diode, Zener Diode, *I-V* Characteristics, Diode Models, Rectifiers and Voltage Regulators, Clippers and Clampers, Introduction to Special Purpose Diodes: Varactor Diode, LEDs, Solar Cells, Photo-diodes, Tunnel Diode, Schottky Diode.

**Unit 4: Bipolar Junction Transistors (BJTs)**

BJT structure, Basic BJT operation mechanism, Input and Output characteristics of common-emitter configuration, Transistor Bias Circuits-Base Bias, Emitter Bias, Voltage-Divider Bias, Emitter Feedback Bias, Collector Feedback Bias, Emitter-Collector Feedback Bias, ac Models, Voltage Amplifiers, Common Collector and Common Base Amplifiers, and Frequency Response.

**Unit 5: Field Effect Transistors**

JFETs-Device structure, Drain Curves, Transconductance Curve, Biasing Circuits, JFET Amplifiers, MOSFETs-Device structure, Depletion-Mode MOSFET, D-MOSFET Curves, Amplifiers, Enhancement-Mode MOSFET, Digital Switching, CMOS.

**Unit 6: Operational Amplifier**

Op-Amp pin configuration, Ideal and Practical Characteristics of Op-Amp, Inverting and Non-Inverting Amplifiers, Active Filters, Summing Amplifier, Differential and Integrating Amplifiers, Comparators, Frequency response of an Op-Amp.

**Text Books:**

1. *Electronic Principles*, 9th Ed, Albert Malvino, and David Bates, Tata McGraw-Hill, 2021.
2. *Electronic Devices*; 9th Edition, Thomas L. Floyd, Pearson.
3. *Microelectronic Circuits: Theory and Applications,* A.S. Sedra and K.C. Smith, Oxford University Press, Sixth Edition.

**Course Evaluation Policy:**

| **S. No.** | **Evaluation** | **Evaluation Scheme** | **Weightage** | **Contents** |
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| 1. | Continuous | Weekly Quiz | 15% | Topics covered during the week. |
| Weekly Assignment | 10% | Topics covered during the week.  (*Submission on or before the due date.*) |
| 2. | Mid-Semester | 2 hrs. Written Examination | 30% | Topics covered up to the exam date.  (U*p to the last lecture before the exam date.*) |
| 3. | End-Semester | 3 hrs. Written Examination | 45% | Entire topics covered during the semester.  (*The exam paper consists of 75% questions from the topics covered after Mid-Semester and 25% questions from the rest topics.*) |