ECE 101: Basics of Electrical and Electronic Circuits

Total Credit=5 (L:T:P= 3:1:1)

Weekly contact hrs 3:1:2

Course Instructor: L2-B016: Prof. Dinkar Prasad (P7, T3, T6, T7)

email: dp362@snu.edu.in, Office: C216E

Meeting Hrs: Wed/Thurs/Fri- 11:00 AM – 12:00 PM

Course Instructor : L1-D217: Dr. Atul Vir Singh (P1, P2, P3)

Co-Instructors- Dr. Himanshu S. Sahu (Lab: P4, P5, P6)

Dr. Sonal Singhal (T1, T2)

Dr. Jitendra Prajapati (T4, T5)

ECE 101: Basics of Electrical and Electronic Circuits

Total Credit=5 (L:T:P= 3:1:1)

Weekly contact hrs -3:1:2

Course Instructor : L1-D217: Dr. Atul Vir Singh (P1, P2, P3)

Associate Prof. (Electrical Engg. Department)

email: atul.singh@snu.edu.in, Office: C216D

Meeting Hrs: M/W- 12:00 PM - 01 PM

L2-B016: Prof. Dinkar Prasad (P7, T3, T6, T7)

Co-Instructors- Dr. Himanshu S. Sahu (Lab: P4, P5, P6)

Dr. Sonal Singhal (T1, T2)

Dr. Jitendra Prajapati (T4, T5)

Outline of Syllabus

Basics of Electrical and Electronic Circuits

Basic Components of Electrical Circuits: Fundamental electrical variables – charge, current, voltage & power; Independent Voltage & Current sources; Ideal circuit elements - Resistor, Capacitor & Inductor; Controlled Source models – VCVS, VCCS, CCVS & CCCS - definitions & circuit models; Concepts of Linearity, Time-invariance & Passivity.

Linear D-C Circuits: Kirchhoff's laws, Series & Parallel combinations of resistances, Voltage & Current divisions, Analysis of resistive circuits using Loop & Node equations – with independent sources only, and with both independent and controlled sources.

Time-domain Analysis of LTI Circuits: Natural & forced responses of basic RC & RL circuits, Natural & forced responses of Series & Parallel RLC circuits.

Sinusoidal Steady State Analysis of A-C Circuits: Notions of phasors, impedance, admittance & transfer function; Frequency response vs transient response; Responses of RC, RL & RLC circuits – series & parallel Resonance; Simple passive Filters & their Bode plots; Loop & Node Analysis of a-c circuits with independent & controlled sources.

Useful Circuit Analysis Techniques: Superposition, Source transformations, Thevenin's equivalent, Norton's equivalent, Maximum Power transfer, Delta-wye conversions.
Basic Amplifiers: Amplifier parameters & controlled source models; VCVS model of an Opamp; Amplifiers using ideal OPAMP; Frequency response of basic OPAMP-based amplifiers.

Waveform Generators: Condition of harmonic oscillation; RC and LC oscillator circuits; Square wave generator using 555 Timer and Digital inverters (TTL/CMOS).

Lab. Mode: Hardware Circuit based Experiments and Hand on Projects
Lab. Name: Electronics Lab-1 (Room No. C201)

Any Standard Scientific Calculator (non-programmable) is compulsory in this course and It is also allowed during the exams. Eg. Casio fx-991MS / or equivalent.

RECOMMENDED BOOK(S):

1. Engineering Circuit Analysis, W. H. Hayt, J. E. Kemmerly & S. M. Durbin, Tata McGraw Hill.
2. Circuit theory and analysis by Robert L. Boyalsted, Pearsoned publication.
3. Electronic Devices and Circuit Theory by Robert L. Boyalsted

EVALUATION PLAN

Quizzes: 15% (During class hrs, best 3 out of 4 will be considered for grading)

Mid-Term: 20%

End-Term: 35%

Lab: 30%

- **Day-to-Day performance** (Lab. Report +lab. participation)= 10%
- **Project: 15%**
- **Viva/ Lab Quiz: 5%**

Cut-off Passing Marks: 35%

'A' Grade Cut-off Marks: 80%

Thanks