INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

NAME OF DEPT./CENTRE**:** **Electronics and Computer Engineering**

1. Subject Code: **EC – 102** Course Title: **Fundamentals of Electronics**

2. Contact Hours: **L: 3** **T: 1** **P: 2/2**

3. Examination Duration (Hrs.): **Theory** 0 | 3 **Practical** 0 | 0

4. Relative Weight**:** **CWS** 15 **PRS** 15 **MTE** 30 **ETE** 40 **PRE** 00

5. Credits**:** 0 | 4 6. Semester [ ] **Autumn** [ ] **Spring** [√] **Both**

7. Pre-requisite**: NIL**

8. Subject Area**: ESC**

9. Objective: To introduce to the students the fundamental concepts of electronic devices and circuits for engineering applications

10. Details of the Course:

Sl. No.	Contents	Contact Hours
1.	**Review:** Conductors, semiconductors, and insulators; Drift and diffusion currents; p-n junction; junction under forward and reverse bias; circuit models; diode applications: rectifier, clipper, clamper; Zener diode regulator; simple power supply with capacitor filter and zener regulator.	9
2.	**Bipolar Junction Transistors:** Structure and operation, various configurations, input and output characteristics, BJT as amplifier, DC analysis of various biasing circuits, biasing stability.	8
3.	**Field Effect Transistors:** JFET, depletion-mode and enhancement-mode MOSFETs, FET biasing, FET as an amplifier	4
4.	**Small-signal analysis of BJTs and FETs:** h-parameter model of BJT, small-signal analysis of BJT amplifier circuits, frequency response of RC-coupled BJT and FET amplifiers.	4
5.	**Amplifiers:** Cascade connection, current mirror, differential amplifier, operational amplifier, op-amp applications, power amplifiers, feedback in amplifiers.	8
6.	**Oscillators:** Barkhausen criterion, damped oscillations in LC circuits, audio and rf oscillators.	4
7.	**Digital Electronics:** Combinational Circuits – adder, decoder,	5

	encoder, multiplexer, demultiplexer; Sequential Circuits – flip-flops, counters, and shift registers; ADC and DAC.	
	Total	**42**
	Laboratory component 1. Study of basic components and measuring instruments – Resistors, Capacitors, Inductors, CRO, Multimeter, and Function generator 2. Study of diode circuits – rectifiers with filter and zener regulator, clippers and clampers 3. Design of CE amplifier 4. Study of oscillator circuits 5. Study of operational amplifier and its applications 6. Studies on Flip-flops and Counters 7. Study of ADC and DAC	**7x2**

11. Suggested Books:

Sl. No.	Name of Books / Authors	Year of Publication
1.	Boylestad, R.L. and Nashelsky, L., "Electronic Devices and Circuit Theory", 9th Ed., Pearson Education Asia.	2006
2.	Millman, J. and Halkias, C.C., "Electronic Devices and Circuits", McGraw-Hill.	2000
3.	Millman, J. and Halkis, C.C., "Integrated Electronics", Tata McGraw-Hill.	2001
4.	Nagrath, I.J., "Electronics – Analog and Digital", PHI.	2000
5.	Santiram Kal, "Basic Electronics", PHI.	2002