MANIPAL UNIVERSITY JAIPUR

School of Electrical, Electronics & Communication Engineering

Department of Electronics & Communication Engineering
Course Hand-out

Analog Electronic Circuits | EC 1301 | 4 Credits | 3 1 0 4

Session: Aug. 14 – Dec. 14 | Faculty: Mr. Mohit Kumar Sharma | Class: Core Subject

A. Introduction: This course comes in the class of core subject for the undergraduates. This offered course covers very significant topics of Electronic devices and Circuits.To impart an in depth knowledge in electronic semiconductor devices & circuits, course give importance to the various aspects of design & analysis of different amplifiers. The subject scope would help students to incorporate these concepts into their electronic designs for other courses and also with industrial applications.

B. Course Outcomes: At the end of the course, students will be able to

[1306.1]. Develop and analyse various diode and transistor applications;
[1306.2]. Apply biasing scheme for transistor circuits;
[1306.3]. Prepare BJT and FET amplifier circuits;
[1306.4]. Develop High and Low frequency models of Transistors and analyze for research skills.
[1306.5]. Understanding of devices would enhance technical as well as employability skills.

C. SYLLABUS

Introduction to BJT: PNP and NPN transistors, Characteristics of current flow across base region of transistor, Graphical analysis (DC and AC load line), CE, CB, CC Configurations, Biasing and stabilization of Q- point, fixed bias, self-bias, collector bias; BJT as an amplifier. BJT as a Switch; **Transistor at low frequencies and high frequencies: Hybrid – TT model, high frequency limitations; multistage amplifiers:** Distortion in amplifiers, Frequency response of an amplifier, bandwidth of cascaded amplifiers, and low frequency response of an RC coupled stage, effect of coupling and emitter by-pass capacitor on low frequency response; **Power amplifiers:** Classification of large signal amplifiers, Analysis and design with respect to efficiency, linearity and harmonic distortions of class A, class B and AB push-pull amplifiers., **FET:** Structure of JFET and MOSFET, Characteristics, small signal and large signal model, Analysis of CS, CD and CG amplifiers at low and high frequencies, FET biasing; **Feedback amplifiers:** Concept of feedback, types of feedback – their advantages and disadvantages, effect of feedback on frequency response & impedances, Analysis of voltage-series, voltage-shunt, current series & current-shunt feedback amplifiers. Voltage-series and Current shunt Feedback amplifiers using FET; Oscillators: Barkhausen criterion for sustained oscillation, Nyquist criterion for stability of amplifier, R-C phase shift oscillator, Wein bridge oscillators, RF oscillators (Colpitts tuned collector/drain oscillators), crystal oscillator and frequency stability; **Sweep Circuits:** Sweep parameters, exponential sweep circuit, Miller & Bootstrap circuits.

D. Reference Books:

1) J.Millman & C.C.Halkias "Integrated Electronics" Tata McGraw Hill, New Delhi. (1994).
2) B. Razavi "Fundamental of Microelectronics" BR Wiley, (2006).
3) R.L.Boylestad & L.Nashelsky "Electronic Devices and Circuit Theory" 10th Ed. Prentice Hall (2009). 4. Millman & H.Taub "Pulse, digital and switching waveforms" Tata McGraw Hill (1965)