Electronics

Programme: MSc Physics. **Year**: 2019-20 **Semester** : Ist
Course : core **Credits** : 4 **Hours** : 56 hours

Course Context and Overview (100 words):

The objective of the course is to provide students with an in-depth understanding of fundamental principles of electronics devices and their applications.

Prerequisites Courses: None

B.Sc, (PCM or PEM group), B.Tech (ECE, CSE)

Course outcomes(COs):

On completion of this course, the students will have the ability to:
CO1 : Should be able to get knowledge about the fundaments of semiconductors and devices and their applications in different electronic devices and circuits.
CO2 : Fundamental knowledge of amplifiers, feedback systems and oscillators
CO3 Should be able to get understanding about the concept of operational amplifier and its various applications in different applications
CO4: Should be able to analyze the digital Electronics to be used in electronics and computer
CO5 : Basic information about Communication electronics

Unit 1 Electronic devices (14 L)

Advanced electronic Devices: Brief introduction of Semiconductors Schottky Diodes, Semiconductor diodes, Zener diodes, tunnel diodes and their applications, BJT Transistors and its operation and characteristics, biasing and stabilization, Transistor hybrid model, Analysis of a transistor amplifier circuit using h-parameter, characteristics of Junction Field effect transistors, biasing of JFETs, Idea of metal oxide semiconductor JFETs and applications, Optoelectronic diodes, LED and solar cells, Power supplies (including rectifier and filter circuits) and regulators.

Unit 2 Feedback amplifiers and Oscillators (10 L)

Classification of amplifiers, Concept of feedback, General characteristics of negative and positive feedback, Oscillator principle, Barkhausen criterion, Colpitt's and Hartley oscillators, RC oscillator, Wein Bridge Oscillaltor, RC phase shift oscillator, Multivibrators, astable, monostable and bistable multivibrator, Square, triangle wave generators and pulse generators

Unit 3 Operational Amplifiers (10 L)

Differential amplifier - circuit configurations - dual input, balanced output differential amplifier, DC analysis, CMRR-constant current bias level translator. Block diagram of OP-Amp and analysis. inverting

and non-inverting amplifiers, Op-Amp with negative feedback, voltage series feedback, effect of feed back on closed loop gain, input resistance, bandwidth and output offset voltage, voltage follower. Practical Op-Amp, input offset voltage-input bias current-input offset current, total output offset voltage, Integrator and differentiator using Op-AMP.

Unit 4 Digital Electronics (12 L)

Basic logic gates, Boolean algebra, combinational logic gates, digital comparators, Flip flops, shift registers, counters, Analog to digital converters and vice-versa, Adder (half and full), substractor (half and full), multiplexer/demultiplexer, decoder and end-coders, SR, JK master slave filp flop, synchronous, asynchronous counters, serial to parallel vice-versa, universal shift registors, ring counter. Priority Encoders, Decoder / Drivers for display devices, Seven Segment display device. ROM, Programmable Logic Array, Introduction of Microprocessors and microcontrollers

Unit 5 communication (10 L)

Fundamental of communication Electronics, Analog communication (AM, FM, PM), AM and AM transmitters, Demodulation fundamentals and circuits, Radio Receivers, digital communication, Concept of Transmission lines, Optical communication, Radar and microwave communications.

Textbooks

1. J. Millman and C.C. Hallkias, Integrated Electronics. Tata McGraw Hill.
2. Robert L., Boylsted and Louis Nashelsky, Electronic Devices and Circuits. PHI, New Delhi

3. Digital Principle and Applications, A.P. Malvino and Donald P. Leach, Tata McGraw Hill Company, New Delhi, 1993.
4. OP-AMP and Linear Integrated Circuits, Ramakanth, A. Gayakwad, PHI, Second Edition 1991.
5. Charles M. Gillmore, Microprocessors: Principles and applications, Tata McGraw Hill Publishing
6. Electronic communications: G. Kennedy and B. Davis, Tata McGraw Hill

Evaluation Methods:

Item	Weightage
Assignments	10%
Quizs	10%
Midterm	30%
Final Examination	50%

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