SARDAR PATEL UNIVERSITY
Programme: B.Sc (Physics)
Semester:VI
Syllabus with effect from: November/December-2013

Paper Code: US06CPHY05	Total Credit: 3
Title Of Paper: Digital Electronics, Electronic Communication and VLSI Technology	

Unit	Description in detail	Weighting (%)
I	**Number Systems, Gates and Logic Family** **Number systems and codes:** Decimal and binary odometer, Binary numbers, Use of binary numbers, Binary to decimal conversion, Decimal to Binary conversion, Hexadecimal numbers, Hexadecimal- Binary conversion, Hexadecimal to decimal conversion, Decimal to hexadecimal conversion, BCD numbers, The ASCII code, Gates: Inverters, OR gates, AND gates, Boolean algebra, NOR gates (with DTL circuit), De Morgan's first theorem, NAND gates(with DTL circuit), De Morgan's Second theorem, EXCLUSIVE-OR gates, EXCLUSIVE-NOR gates, **TTL circuits**: Digital integrated circuits, 7400 devices, TTL characteristics, TTL overview	
II	**Flip-Flops, Registers and Counters** **Flip –Flops:** Introduction, RS latches, Level clocking, D latches, Edge triggered D flip-flops, Edge triggered JK flip-flops, JK master slave flip flop, **Registers and Counters**: Buffer registers, Shift registers, Controlled shift registers, Ripple counters, Synchronous counters, Ring counters, Other counters	
III	**Introduction to Electronic Communication (EC)** Importance of Communications, The Elements of a communication system, Types of EC , Electromagnetic Spectrum, Bandwidth, **Amplitude Modulation**: Amplitude Modulation Principles, Modulation Index and Percentage of Modulation, Sidebands and Frequency Domain, Single Sideband Communication, Amplitude modulators, Analog Multiplication, Non-Linear Mixing, Amplitude Modulator Circuit (with a diode), Amplitude Demodulators(Diode detector), **Frequency Modulation:** Frequency Modulation Principles, Phase Modulation, FM versus AM, Frequency Modulators, Voltage variable capacitor, Varactor modulator	
IV	**Devices for VLSI Technology** **Introduction:** General classification of integrated circuits, Advantages of ICs over discrete components, **Monolithic diodes**: Monolithic planar diode configurations, Avalanche diode, Schottky diode, **Monolithic junction FETs**: n- channel JFET, p-channel JFET, **MOSFET technology**: An overview of MOSFET technology, Simple MOSFET structures, PMOS and NMOS structures, PMOS vs NMOS, **Complementary symmetry MOSFET (CMOS FET) technologies**: CMOS as dominant technology for VLSI fabrication, Metal-Gate CMOS process, Silicon-Gate CMOS process, **Monolithic Resistors:** Base diffused resistor, **Monolithic Capacitors**: Junction capacitors, MOS capacitor for Bipolar technology	

Basic Text & Reference Books :-

- Digital Computer Electronics
  P Malvino and J A Brown, Tata McGraw Hill Publishing Co. Led., New Delhi
- Communication Electronics
  Louis E Frenzel, Tata McGraw Hill Publications, New Delhi
- Electronic Devices and Circuits
  G K Mittal, Khanna Publishers, New Delhi
- Integrated electronics: analog and digital circuits and systems
  Jacob Millman and Christos C. Halkias, Tata McGraw Hill Publishing Co. Ltd, New Delhi
- Basic Electronics (Solid State)
  B L Theraja, S. Chand & Company Ltd.