M.Sc Physics Semester IV Paper XXIX

Electronics – II 23PHY24DA2

Theory Marks:80
Internal Assessment Marks:20
Time: 3 Hours

COURSE OUTCOMES

After successful completion of the course, the students will be able to

CO1 express numbers, alphabets, special characters etc. in binary representation, perform mathematical operation in digitally and application of different codes.

CO2 implement Boolean expression with basic gates and design circuits to achieve desired output.

CO3 design basic building blocks of ICs for different electronics operations such as addition, subtraction, code generation, data register, counting etc.and develop various building blocks for ICs using MOSFET as MOS devices

CO4 Understand the various types of modulation and microwave devices

Unit I

Binary numbers, Octal numbers, Hexadecimal numbers, Inter-conversions of numbers. Binary addition, subtraction, multiplication, division, Hexadecimal addition, subtraction, Octal addition, subtraction signed numbers, 1's complement arithmetic, 2's complement arithmetic, 9's complement arithmetic, BCD code and arithmetic, Gray code, excess-3 code.

Positive and negative logic designations, OR gate, AND gate, NOT gate, NAND gate, NOR gate, XOR gate, Circuits and Boolean identities associated with gates, Boolean algebra-DeMorgans Laws, Sum of products and product of sums expressions, Minterm, Maxterm, K-maps, don't care condition, deriving SOP and POS expressions from truth tables.

Unit II

Combinational Digital circuits: Binary adders:half adders & full adders,Decoders, Multiplexer, Demultiplexer, Encoders, ROM and its application (binary, BCD, Excess-3 Code, Gray Code & BCD to seven segment), Digital comparator, Parity checker and generator

Sequential Digital Circuits: 1-bit memory, Flip-Flops- RS, JK, master slave JK, T-type and D-type flip flops, Shift-register and applications, Asynchronous counters and Synchronous counters

Unit III

Metal oxide semiconductor field effect transistors, enhancement mode transistor, depletion mode transistor, p-channel and n-channel devices, MOS invertors- static inverter, dynamic inverter, two phase inverter, MOS NAND gates, NOR gates, complementary MOSFET technology, CMOS inverter, CMOS NOR gates and NAND gates, MOS shift register and RAM

Unit IV

Fundamentals of modulation, Frequency spectra in AM modulation, power in AM modulated class C amplifier, Efficiency modulation, frequency conversion, SSB system, Balanced modulation, filtering the signal for SSB, phase shift method, product detector, Pulse modulation, Microwave Devices: Resonant Cavity, Klystrons and Magnetron

Note: The syllabus is divided into four units. Nine questions will be set in all. Question No.1 will be compulsory having four to eight parts covering the whole syllabus. In addition there will be two questions from each unit and the student is to answer one question from each unit. A student has to attempt five questions in all.

Text and Reference books:

[1] Integrated Electronics by J. Millman and C.C. Halkias (Tata McGraw Hill).
[2] Digital Electronics by William Gothmann (Parentice Hall of India)
[3] Digital logic by J. M.Yarbrough (Thomson Publication).
[4] Electronic Fundamentals And Applications by John D. Ryder (Prentice-Hall)
[5] Foundation for Microwave Engineering by Robert E. Collin (Wiley)
[6] Digital Principles and Applications by Donald P leach, Albert Paul Malvino (McGraw-Hill)