VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

F.Y. BSc

Electronics (Computer Science)

Paper-I

Basic Electronics
(2004)

Electronics Devices & Components :

RESISTORS : Colour code, nominal values, tolerance and limitations, different kinds of resistors (viz linear carbon, carbon film, metallic film,wire wound, non-conductive type etc.), CAPACITORS : construction, dielectric and their types, dielectric constant, Q-factor, power factor, polar and non-polar capacitors, kinds of capacitors and its specification.

Inductors :

Construction, types, core material, their kinds and specifications.

Chemical bonding, crystalline structure, classification of materials, Band model, metals, insulators, semiconductors, N and P type semiconductors, current transport mechanisms in a semiconductor.

P-N junction diodes, V-1 characteristics, capacitance and voltage characteristics, Zener and avalanche breakdown mechanism in a p-n junction diode, junction-diffusion-transition capacitances, noise in diodes, Schottky diodes, switching, mechanism.

Construction Bipolar Junctio Transistor (BJT), fundamentals of BJT operation, transistor current components, BJT characteristics, load line operating point saturation and cutoff conditions, BJT as switch, types of transistors (power, switching, and general purpose transistor) and its application.

Field Effect Transistors comparison of JFET and BJT, advantages of unipolar devices, construction and fundamentals of JEET, operation characteristics curves, MOSFET construction, principles of operation.

Concept of Opto Electronic Devices; photoconductive cell, light activated PN junction devices, LED,LDR, Photo diodes, photovoltaic, cell or solar cell, phototransistor, opto couplers, opto isolators, semiconductor laser, photo detectors.

Number System and Codes :

Concepts of various number system used in Computers (Decimal, Binary, Hexadecimal, Octal) its inter conversion, Various codes (BCD, weighted and

non-weighted, 842), excess 3, Gray, ASCII,etc), various error detecting-correcting codes used in Computers (parity, check sum, Johnson, Hamming, CRC,etc).

Logic Gates and Boolean Algebra :

Boolean algebra, truth table functioning, the AND, OR, NOT operators, Laws and theorems of Boolean algebra, De'Morgan's theorem, basic equality of Boolean algebra, dual expression in Boolean algebra, Positive and negative logic, various basic and universal logic gates (AND, OR,NOT,XOR,XNOR,NAND,NOR), its ANSI/IEEE symbols,logic and truth table, logic diagram/circuit from expression and vice versa using basic and universal logic gates, necessity and various techniques for reducing Boolean expressions, Don't care condition and redundant group in K-map, K-map representation of 4 variable function, concept of various decoder-encoder tristate-buffer, priority encoder, multiplexer-demultiplexer, various application of XOR-XNOR gate.

Binary Arithmetic :

Binary and Hexadecimal addition, subtraction, multiplication, division, various method for representation of negative number in Binary 1's-2's-9's-10's and BCD arithmetic, design of half-full adder-subtractor, parallel adder-subtractor, BCD adder-subtractor, concept and construction of ALU chip.

Logic Family :

Introduction to logic family, digital IC specification terminology, fan-in and fan-out, logic (TTL & CMOS) family, circuits and their performance, merits-demerits and choice of various logic families for digital design, interfacing of TTL & CMOS.

Flip-flops, Counters and Registers :

Flip-flop as memory element, concept of timing-clock in flip-flop, design-construction and operation of RS,D,JK,T, master-slave JK flip-flops, various triggering methods of flip-flop, application of flip-flop to counters, synchronous asynchronous counters, various types of counters (Binary, ripple, up, down, ring , Decade, modulus) Registers, various types of shift registers and its operations, concept of various memory chips.

Semiconductor Memory :

Types of Semiconductor memories, sequential memory, concept and operation of ROM,PROM,EPROM, RAM, DRAM, SRAM etc. basic concept of memory organization (address-data lines, chip select-enable line requirement) and its functioning, study of various memory chips (6116,2716,41256 etc.)

List of Recommended Books :

1. M Mano Digital Logic and Computer Design, PHI, New Delhi.
2. A Anand Kumar, Fundamentals of Digital Ciorcuits, PHI, New Delhi.
3. B S Sonde, Introduction to system Design using Integrated Circuits, New Age International Ltd.
4. Malvino Leach, Digital Principles and Application, TMH, New Delhi.
5. Paul Zabar, Electronics Text-Lab Manual, TMH, New Delhi.
6. Streeman, Solid State Electronics Devices, PHI, New Delhi.
7. Grob,Basic Electronics, PMH, New Delhi.

Experiments/ Laboratory work

There will be two days of laboratory/practical per week each of three hours duration. There will be ten students per batch for laboratory/practical work.
List of Experiments/Practical for Electronics Paper : 1 for F Y B.Sc (Computer Science)

1. Identification and testing of various Electronics Devices and components.
2. Study of diode characteristics.
3. Study of transistors as a switch.
4. Study of AND,OR and NOT gates.
5. Study of NAND and NOR as Universal logic gates.
6. Study of Half and Full Adder circuit.
7. Study of parallel adder.
8. Study of BCD adder and subtractor.
9. Study of multiplexer and demultiplexer.
10. Study of D and RS flip-flop.
11. Study of JK flip-flop.
12. Study of ripple counter.
13. study of modulus counter.
14. study of ALU.
15. Study of code converter.

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

F.Y. BSc

Electronics (Computer Science)

Paper-II

Microprocessors

Introduction :

Evolution of microprocessors, functional block diagram of a digital computer, microcomputer organization, computer languages, single chip microcomputers.

Architecture of Microprocessor :

Microprocessors (8085A) architecture and its operation, memory, input-output, interfacing devices, instruction classification, instruction format, machine cycle, execution cycle, T-states, instruction timings and operation status, timing diagram for execution ,read –write, fetch,I/O operation, memory operation cycle.

Instruction set of microprocessor :

Overview of the 8085A instruction set, data transfer instructions, arithmetic instructions, logicoperation, branch and machine control operaion, addressing modes, stack, subroutine, conditional call, jump and return instructions.

Programming techniques :

Looping, counting, indexing, additional data transfer and 16-bit arithmetic, operation related to memory, logical operation rotate compares and delays.

Peripheral Chip Organisation :

Basic interfacing concepts, interfacing keyboards, memory-mapped I/O and I/O mapped I/O, interfacing memory, interrupts, 8279 programmable keyboard/display interface, 8255A programmable peripheral interface, 8259A programmable interrupt controller, DMA controller, DMA modes and operation.

Introduction to Advance Microprocessor :

Architecture of 8086 microprocessor, functional block diagram, internal operation, addressing modes, instruction formats, instruction queue and pipling concepts, minimum mode maximum mode, 8087 numeric data processor architecture, Brief introduction to Pentium processor.

List of Recommended Books :

1. M Mano Digital Logic and Computer Design, PHI, New Delhi.
2. R S Gaonkar, Micriprocessor & Application, Preram International Pub.
3. B Ram, Fundamentals of Microprocessor,
4. Lie & Gibbson, Microcomputer System 8086/8088, PHI, New Delhi.
5. D Hall, Microprocessor & Interfacing, TMH New Delhi.

Experiments /Laboratory Work

There will be two days of laboratory/practical per week each of here hours duration. There will be ten students per batch for laboratory/practical work.

List of Experiments/Practical for Electronics

1. Write a program, which loads register, A,B,C and D with the same Constant.

2. Assume that 4 bytes of data memory are stored at consecutive location of data memory location X, Write a program which loads register E with X,D with X+1 mC with X+2, and A with X+3.

3. Assume that two bytes of data are stored at consecutive location of data memory starting at location X, write a program which moves the data from location X,X+1 to Y,Y+1.

4. Assume that 1 byte of data is stored at data memory location X write a program which tests bit 5 of (X) Write FF into X+1, if bit 5=0, And write 00 at the same location if bit 5 = 1.

5. Write a p[rogram which tests the zero condition of a data byte specified at data memory location C. If it is zero, 00 would be stored at x+1 and if non zero FF should be stored at the same location.

6. Write a program which tests the all one condition of a data byte specified at data memory location X. if all bit are one store 01 a X+1 else. Store 00 at the same location.

7. Four bytes of data case specified at consecutive data memory location starting at X. Write a program which increments rthe value of all the 4 bytes by one.

8. Two data types are stored at location X and Y, Interchange them.

9. Two binary numbers are stored at data memory location X and X+1, compute the sum of the two numbers and store the result at location X. ignoring the possible overflow.

10. Four unsigned binary numbers are stored at consumption data memory location starting at X compute the sum of the four number ignoring the possible overflow and store at location Y.

11. Two unsigned binary number are stored at data memory location X, X+1, Write a program for computing (x+1)-(x). The magnitude of the result should be stored a X,Y and the sign (00 if +ve, 01 if –ve) at y + 1.

12. A double precision number is stored at X and X+1, another number is stored at Y and Y+1. Add the two numbers and store them at w and w+1.

13. Substract the above numbers and store the result at w and w+1. Two BCD (2digit) numbers are stored at x and x+1. Write a program for computing the sum and store the result at y (ignore the O.F.)

14. In the above example compute the difference of two BCD numers store the result a y and y+1.

15. Compute the no. of 1's in the given numers and store the result at y.

16. Write a program, which decrement the counters one by one and when it is zero stop the program.

17. Implement the time-delaY FOR GENERATION OF MILLISECONDS. Calculate the exact time delay.

18. Implement the time delay of several seconds test it.

19. Write a programme to find the largest number in the given numbers of block.

20. Arrange the data in the descending order.

21. Arrange the data in the ascending order.

22. Write a programme to glow the LED connected at the port A.

23. Write a programme to flicker the LED connected at the port A.

24. A binary number is stored at data memory location X multiplies the number by 10 and displays the result.