

VEER NARMAD SOUTH GUJARAT UNIVERSITY, SURAT

S.Y. BSc

Electronics

Paper-IV

Digital Electronics & Microprocessor

NUMBER SYSTEM AND CODES :

Various number system (Decimal, Binary, Hexadecimal, Octal), its inter conversion and their arithmetic, various codes (BCD, Weighted and non-weighted, 8421, 5421, excess 3, Gray, ASCII), various error detecting-correcting codes (parity, check sum, Hamming, CRC).

LOGIC GATES AND BOOLEAN ALGEBRA :

Boolean algebra, truth table functions, the AND, OR, NOT operators, Laws and theorems of Boolean algebra, DeMorgan's theorem, basic duality 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 5 variable function, various decoder-encoder tristate-buffer, priority encoder, circuit design using multiplexer-demultiplexer, various application of XOR-XNOR gate.

BINARY ARITHMETIC :

Binary 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 (TTL, CMOS) family, digital IC specification terminology, fan-in and fan-out, noise margin, characteristics and performance of TTL and CMOS logic family, merits-demerits and choice of various logic families for digital design, interfacing of TTL, ECL, CMOS.

FLIP-FLOPS AND MEMORY :

Flip-flop as memory element, concept of timing-clock in flip-flop, design-construction of RS, D, JK, T, master-slave JK flip-flops, various triggering methods of flip-flop as memory element, types of semiconductor

memories, concept and operation of ROM,PORM, EPROM, RAM,DRAM,SRAM etc, basic concept of memory organization (address-data lines, chip select-enable line requirement) and its functioning,

COUNTERS AND REGISTERS :

Application of flip-flop to counters, various types (Binary, ripple, up, down, ring, BCD, modulus) and kinds (synchronous-asynchronous) of counters, its operational and applications, concept of frequency division in counter and digital clock, Registers, various types of shift registers and its operations study of various chips for flip-flop, counters and registers.

DESIGN OF SEQUENTIAL AND COMBINATIONAL LOGIC CIRCUITS :

Code converters, Binary multipliers, parity bit generator/checker, comparator, decoders- encoders, priority encoders, finite state model, state diagram, state table, transition and output table, excitation table, synthesis of synchronous sequential circuits.

MICROPROCESSOR :

Introduction to 8085A architecture, block diagram, pin diagram and functions of various pins, concept of address-data-control bus and requirement of multiplexing of various bus 8085A microprocessor, operation of various bus during read-write-fetch operations, various registers (general and special purpose) and its importance in 8085A, concept of memory organization (memory mapped I/o and I/O) in 8085A, various addressing modes and instructions (data transfer, logical, arithmetic branch) of 8085A, instruction format (1,2,3 byte instruction), sequence of instruction execution, concept of instruction cycle, machine cycles along with associated control and status signals, simple programming in 8085A.

LIST OF RECOMMENDED BOOKS :

1. A. Anand kumar, Fundamentals of Digital circuits, (2001), PHI,New Delhi.
2. B. S. Sonde, Introduction to System Design Using Integrated Circuits (1992),New Age International (P) Ltd, Publishers.
3. B. Ram, Fundamentals of Microprocessors and Microcomputers, Danpat Rai & Sons.
4. M. Morris Mano, Digital Logic and Computer Design, PHI, New Delhi
5. A.K. Mulhopadhyay, Textbook on Microprocessor based laboratory experiments and projects, (1996), Wheeler Publishing.
6. Malvino & Leach,
7. R. Tokheim, Digital Principles, Schaum Series, McGraw Hill

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Electronics

Paper-V

Industrial Electronics

POWER SUPPLIES AND FILTERS :

Introduction, half and full wave rectification, capacitor filter: capacitor filter with full wave rectifier, ripple voltage, Inductor filter: Inductor filter with full wave rectifier, L section filter.

DESIGN OF REGULATED POWER SUPPLIERS :

Introduction stabilization, reference element, Zener shunt regulator : designing the Zener shunt regulator, ripple, other features, limitations basic Zener shunt regulator, Extending power and current range of the basic Zener diode : Transistor shunt regulator, design of shunt regulator, emitter follower regulator, series pass regulator, feedback regulator : sampler, reference, comparator and controller.

DESIGN OF IC REGULATED POWER SUPPLY USING THREE TERMINAL REGULATORS :

Introduction, basic circuit function of a three terminal regulator: the voltage reference, operation of regulator under fault modes, applications of three terminal regulator :basic regulator, current source, high current regulator, adjustable output voltage, variable output voltage regulator, high output voltage, dual power supply, adjustable voltage regulator with current limit protection.

SWITCH MODE POWER SUPPLIES (SMPS):

Introduction comparison of SMPS and linear type power supplies principle, flyback converters, forward type converters, selection of components of SMPS: selection of transformer, transistors, diodes and capacitors, control IC for SMPS, applications of SG 3524.

UNINTERRUPTIBLE POWER SUPPLIES (UPS) :

Types of UPS: continuous duty UPS, stand by UPS, comparison of continuous duty UPS and stand by UPS characteristics, UPS configurations: forward and reverse transfer, selection of UPS component: battery charger, battery bank and transfer switch.

BATTERY AND BATTERY CHARGERS :

Electric current, electro chemical action in simple cell, primary and secondary cell, dry cell, lead acid accumulator or secondary cell, battery charging, testing of storage battery, maintenance of battery, button cells, resistance of battery, measurement of Internal resistance of a cell, Nickel cadmium rechargeable cell, comparison between Ni-Cad cell and lead acid cell, other sources of emf, solar cell, battery charger circuits.

POWER CONVERTOR CIRCUITS :

SCR : brief introduction, commutation of SCR's, current and voltage ratings of SCR's, series and parallel operations, gate triggering circuits : R, RC,UJT as a SCR trigger, ramp triggering circuits, phase controlled rectifiers : single phase half wave and full wave controlled rectifier with resistive load, three phase half wave controlled rectifier with resistive load.

INVERTERS AND CHOPPERS :

Principle of inverters: series, parallel and bridge inverter, McMurray inverter, McMurray Bedford inverter, voltage controlled and current source inverters, principles of chopper: single and two thyristor chopper, step up chopper, AC chopper.

NOISE IN ELECTRONIC CIRCUITS :

Noise: types, reduction of induced voltage, evaluation of noise, noise in BJT and FET, signal to noise power ratio, noise figure.

BASIC MEASUREMENTS AND TRANSDUCERS :

Static characteristics, static calibration, errors: relative and absolute, types: gross, systematic and random errors, method of correction : statistical analysis, Gaussian distribution, probable error, AC bridges, general equation, Maxwells bridge, Owen, Desauty, Schering and Wein bridge, DC bridge: Kelvin bridge, transducers : Classification, active and passive, selection of transducer, resistive transducer, strain guage, types: bonded and unbonded, temperature measurement : electrical methods, capacitive transducers, applications.

LIST OF RECOMMENDED BOOKS :

1. N.C.Goyal and R.K.Khetan, Monograph on electronics design principles, 5th edition, Khanna publishers,
2. M.D.Singh and K.B.Khanchandani, Power electronics, TMH New Delhi.
3. S.K.Bhattacharya and S. Chatterjee, Industrial electronics and control, TMH New Delhi.
4. Noel Morris, Industrial electronics, 2nd Ed., TMH, New Delhi.
5. A.K.Sawhney, Electrical and Electronic measurements and instrumentation.
6. S.K.Singh, Industrial Instrumentation and Control, (1998), TMH, New Delhi.

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Electronics

List of Experiments/Laboratory work

The students will be examined for two practicals from within the list of experiments each of 40 marks (30% Internal & 70% External exam.) and one minor project (optional) to be carried out during the year. The minor project will carry 40 marks (30% Internal & 70% External exam.) based on the viva-voce and demonstration of the minor project done. In case of students not opting for the minor project, he/she will be examined for three practicals from the list of the practical/experiments each of 40 marks (30% Internal & 70% External exam.).

Group : I

- 1) Study and design of rectifiers (with filters) and regulated power supply.
 - a) L,C and Π filter circuits
 - b) Zener regulators circuit
 - c) Feedback regulator circuit
 - d) Three terminal regulator.
- 2) Design, build and test transistorized multivibrator with triggering.
 - a) Astable Multivibrator
 - b) Bistable Multivibrator
 - c) Monostable multivibrator
- 3) Study of RC coupled (class A) amplifier.
- 4) Study of effect of feedback on an amplifier.
- 5) Study of Push-pull amplifier.
- 6) Study of an oscillatory circuits
 - a) LC oscillators (Harley and Colpitt)
 - b) RC oscillators (Phase shift and Wein Bridge)

Group : II

- 1) Study of basic and universal logic gates.
- 2) Design, build and test of
 - c) adder and subtractor circuits.
 - d) BCD adder/subtractor circuit.
- 3) Design, build and test 4-bit parallel adder/subtractor circuit.
- 4) Study of Flip-flops like RS-FF, D-FF, JK-FF, T-FF
- 5) Design,build and test counters
 - 1) Binary counters
 - 2) Modulus counters
 - 3) Decade counter
 - 4) Up-Down counter

- 6) Design, build and test code converter
 - 1) Binary-to-Gray-to-Binary
 - 2) Binary-to-BCD
- 7) Study and Design with multiplexer and demultiplexer.
- 8) Programmes based on 8085A microprocessor.

Group – III

- 1) Study of UJT relaxation oscillator and its application to SCR gate control.
- 2) Measurements of specific resistance of the material, inductance, capacitance, frequency with bridges.
- 3) Study of Owen's bridge.
- 4) Study of characteristics of LVDT.
- 5) Study of load cell.
- 6) Study of Thermistor as temperature sensor.
- 7) Study of strain gauge.
- 8) Study of phase shift control of SCR.
- 9) Study of Battery charger.