

CLASS - B.SC. I  
SEMESTER- I  
SUBJECT- ELECTRONICS

A.C. FUNDAMENTAL & PASSIVE CIRCUIT ELEMENT, CIRCUIT CONTROL  
DEVICES & BASIC ELECTRONICS-I

**UNIT-1**

Resistors: Symbol, type- carbon, metal filament, wire wound, thin film, thick film, fixed & variable, potentiometers, non linear resistors, tolerance, temperature coefficient, application in potential dividers, specification, color code, testing of resistors, area of application.

Inductors: Symbol, type- fixed inductor: air core, iron core, ferrite core, variable inductors and measurement of inductance, self inductors and mutual inductance, choke, types- AF., RF. their uses and area of application.

**UNIT-2**

Transformers: principle, type's auto & main transformers, design of main & step down transformers (constructional details not needed), problem related to core loss, eddy loss. Simple idea of AF, RF, IF, driver transformers.

Capacitors: symbol, code, types- mica paper, ceramic, tantalum, polytheism, their construction, gang condenser, electrolytic condenser their construction & uses specification, testing of condenser, area of application problem related to electrical energy stored, design of capacitor.

**UNIT-3**

Concept of ideal current & voltage sources, practical current and voltage sources, zener diode as a constant voltage source, numerical related to constant current and voltage sources.

AC. Current and voltage, R.M.S. and mean values, LR, CR, LCR circuits, series and parallel resonant circuit, Q factor and band width.

Basic of semi conductors: conductors, semi conductors, insulators, their classification on the basis of band theory intrinsic & extrinsic semiconductor Fermi level, N type & P type semiconductors, current in semi conductor drift & diffusion.



#### UNIT-4

P-N junction: P-N junction, forward and reverse bias of diode, diode current equation, effect of temperature on characteristics, dynamic and static resistance, voltage dependent resistance concept, voltage dependent junction of P-N junction.

Special purpose diodes: zener diode construction characteristics, equivalent circuit and applications, tunnel diode: VI characteristics, equivalent circuit applications, varactor diode, schottky diode and their applications, LED, PIN diode and their applications.

#### UNIT-5

Opto-electronic devices: liquid crystal display, advantage and applications, photo diodes, dust sensors, photo conductive cell, photo voltaic cell, laser diode, optical disk, optical fiber communications system.(their construction and uses).

Bipolar junction transistor, their construction manufacturing techniques, symbols, unbiased and biased BJT, operations of NPN & PNP junction transistors, circuit configuration, current gain in BJT.

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CLASS BSC.I  
SEMESTER-II  
SUBJECT- ELECTRONICS  
ELECTRICAL CIRCUIT AND NETWORK ANALYSIS

UNIT-1

Tuning circuits: tuned circuits, parallel circuits, coupled circuits, simple coupled circuits, coefficient of coupling, numerical related to power factor, phase relation between I and V variation of I, V & Z as a function of frequency.

Network theorem: thevenin theorem, Norton's theorem, max power transmission theorem, reciprocity theorem, super position theorem, proof and problems related to them.

UNIT-2

Semiconductor diode as rectifier half wave full wave rectifier, ripple factor, efficiency voltage regulation and center tapped full wave rectifier, full wave bridge rectifier, comparative merits demerits, problem related to them.

Filter circuit: filter, types of filter circuit-low pass filter, high pass filter, band pass filter, band stop filter, multi section filter circuit, serial inductor, capacitor filter,  $\Lambda$  filter and uses of filter.

UNIT-3

BJT characteristics: transistor in different modes, characteristics curves of CB & CC mode, maxi power dissipation, maxi output voltage, H parameter of CE mode and emitter follower in terms of input impedance and voltage gain and current gain, photo transistor.

Single stage BJT amplifiers: transistor as an amplifier in CB, CE mode, AC load, analysis of transistor amplifier (CE), gain stability in CE amplifiers, class A, class B, class AB & class c operation & their field of applications.

UNIT-4

Multi stage BJT amplifiers, RC coupled amplifiers, voltage gain of RC coupled amplifiers, frequency response advantage and disadvantage of RC, coupled amplifiers, class power amplifiers its limitation, class B push pull amplifiers, problem related to amplifier.

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Controlled rectifiers : half wave rectifier, controlled full wave rectifier, silicon controlled rectifier, construction and characteristics constant, its application as controlled rectifier, SCR half rectifier, average value of lode voltage and current, BIAC, TRIAC, phase control circuit characteristics and their simple uses.

#### UNIT-5

Field effect transistor, uni-junction transistor its construction and characteristics, FPT as a constant current device, as switch and VVR, MOSFETS, types construction characteristics and simple uses.

Thermionic emission, space charge effect, AC & DC values child's law and its proof, Richardson's equation (with proof), problems related to child's law, Richardson equation work function, diode and its characteristics.

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B.Sc. semester III  
Subject: ELECTRONICS  
DIGITAL ELECTRONICS

UNIT 1

**NUMBER SYSTEM AND CODES:** Decimal, Binary, hexadecimal, Octal number and their inter conversion, Binary addition, subtraction, division and multiplication, BCD numbers Gray & ASCII codes unsigned & signed integers.  
**LOGIC GATES:** Introduction of gates inverter (Not gate), OR gate, AND gate, Boolean algebra, NOR gate, De Morgan's I & II Theorem, NAND gate, EXCLUSIVE OR gate. The CONTROLLED INVERTER EXCLUSIVE NOR gates

Unit 2

**TTL CIRCUITS:** Digital integrated circuit, 7400 devices standard TTL High speed TTL, Low power TTL, Schottky TTL & Low power Schottky TTL, difference between TTL types including low power Schottky, standard TTL and high speed TTL, TTL characteristics, TTL overview, AND or INVERTOR gate, OPEN COLLECTOR gate.

**BOOLEAN FUNCTIONS AND SIMPLIFICATION METHODS:** Boolean relation (laws and operations) sum of product method algebraic simplification, Karnaugh maps (up to four variable only), pair quads and octets, Karnaugh simplification.

UNIT 3

**ARITHMETIC LOGIC CIRCUITS AND COMBINATIONAL CIRCUITS:**

Arithmetic circuits – half adder, full adder, half subtractor, full subtractor, and common combinational circuits used in digital system – Multiplexer, Demultiplexer, Encoder, Decoder and comparator.

**FEED BACK:** General theory of feedback, classification of feedback, closed loop gain open loop gain & their return differences advantage of negative feedback, gain stability decreases distortion, increased band width, form of negative feedback: voltage series feedback, current shunt feedback. (Numerical exercises related to feedback)

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## Unit 4

**MULTISTAGE AMPLIFIERS : General** - amplifier-coupling RC coupled two-stage amplifier, advantage of impedance coupling transformers coupled two-stage amplifier, advantage of transformer coupling Direct coupled two-stage amplifier, advantages of direct coupling and conventional problem related to them.

**FIELD EFFECT TRANSISTOR AMPLIFIER:** Introduction, biasing, of FET, JFET, gate bias, Q point, voltage divider bias, source bias, current source bias, biasing of enhancement MOSFET and depletion MOSFET, FET amplifier, common source amplifier, common drain amplifier, common gate amplifier (numerical exercises related to different FET amplifier).

## UNIT 5

**SINUSOIDAL OSCILLATORS:** Introduction, comparison between amplifier and oscillator, classification, applications, nature, circuit, frequency stability of an oscillator, Barkhausen criterion, tuned circuit oscillator, Hartley oscillator, Colpitts oscillator, Clapp oscillator, Wein bridge oscillator, (qualitative study).

**NON SINUSOIDAL OSCILLATORS :** Introduction, classification, transistor as a switch, Multivibrator, types of Multivibrator, Astable Multivibrator, Monostable Multivibrator, Bistable Multivibrator, application of Multivibrator, blocking oscillator (qualitative study).

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## B.Sc. Semester IV

### Subject : Electronics

#### UNIT 1

FLIP-FLOPS: RS flip-flop (different latches), D latches, Edge Triggered D flip-flop, JK flip-flop, JK master slave flip-flop, concept of racing and level clocking.

REGISTERS AND COUNTERS: Buffer register, Shift register, Controlled shift register, Ripple counters, Synchronous counters, ring counters, Decade counters, Pre settable counters.

MEMORY: Basic terms and ideas of memory, Magnetic memory, Optical memory, Memory addressing, ROMs, PROMs, EPROMs, and RAMs.

#### UNIT 2

DIGITAL TO ANALOG CONVERTER: Digital and analog representation D/A conversion, Weighted-resistor digital to analog converter, Ladder-type D/A converter, binary ladders, 4-bit D/A converter, multiple signals, performance characteristics of D/A converter applications of D/A converter.

ANALOG TO DIGITAL CONVERTER: Analog to digital conversion, Simultaneous A/D converter, stair step – ramp A/D converter, single slope A/D converter, dual slope A/D converter, successive approximation A/D converter, parallel conversion parallel/serial conversion performance characteristics of A/D converter applications of A/D converter.

#### UNIT 3

WAVE SHAPING 1: Introduction to Wave shaping, different, non-sinusoidal wave shapes, types of wave shaping circuits, linear wave shaping circuits, differentiating circuit, applications. Generation of narrow pulse from square wave, generation of

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voltage step from a ramp ,generation of square wave form triangular wave, integrating circuits applications, generation of triangular wave square wave, generation of saw tooth wave from triangular wave(Qualitative study and numerical) .

WAVE SHAPING 2 : Non-linear wave shaping circuits, Clipping circuit: positive clippers, negative clippers, biased clippers, combination clippers, two level slicer, clamping circuits, biased clampers practical clamper circuit, applications voltage multipliers, voltage doublers, voltage tripler and quadrupler.(Qualitative study and numerical ).

#### UNIT 4

INTEGRATED CIRCUITS AND OPERATIONAL AMPLIFIER : Introduction to ICs & operational amplifiers, classification of IC scale of integration, fabrication of IC, components fabrication of monolithic IC , operational amplifiers: introduction op-amp supply voltage, op-amp parameters, op-amp offset voltage and current, concept of virtual ground characteristics of ideal op-amp, architecture of a typical IC op-amp.(Qualitative study and numerical).

#### UNIT 5

APPLICATION OF OP-AMP I : Op-amp as a voltage amplifier, inverting amplifier, scale changer, phase shifter, non inverting amplifier, unity gain follower, the voltage follower, adder or summing amplifier, differential amplifier, op-amp frequency response, frequency versus gain , characteristics of an op-amp.(Qualitative study and numerical).

APPLICATION OF OP-AMP II: Subtractor , integrator, differentiator, voltage to current converter, current to voltage converter, voltage comparator, square wave generator, regenerative comparator , triangular wave generator , logarithmic amplifier active half wave rectifier active peak detector analog computation.(Qualitative study and numerical).

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**Syllabus of electronics**

**B.Sc. V semester**

**Subject: electronics**

**Paper I: Micro processor, Microcomputer  
and communication principles**

**UNIT 1**

PERIPHERAL DEVICES I : peripherals introduction, input devices or input peripherals – punch card, card readers, tape readers, key to tape/ disk, character recognition devices-MICR, OCR,OMR.

PERIPHERAL DEVICES II : output peripherals devices – printers- line printer, dot matrix printer, daisy- wheel printer, thermal printer, ink jet printer, laser printer, printer plotters, graphic display device, mouse, computer output microfilm.

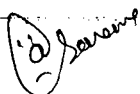
**UNIT 2**

MICROCOMPUTER FUNDAMENTALS-I: MICROPROCESSOR (8085) : introduction . 8085 microprocessor, 8085 microprocessor architecture, 8085 microprocessor based microcomputer pin out diagram of 8085 microprocessor, the 8085 microprocessor instruction set - data transfer instruction, arithmetic instruction, logical instruction, branch I/O instructions.

MICROCOMPUTER FUNDAMENTALS- II : microprogramming, addressing modes, instruction and execution cycle, subroutines-JMP, CALL and RET, RST, Programming a microcomputer, flowchart, programming languages, assembly language, assembler, editor, high level language (introduction), system software.

**UNIT 3**

PROPOGATION OF ELECTROMAGNATIC WAVE : atmosphere of earth; ionosphere, propagation of radio wave- ground or surface wave propagation, space or tropospheric wave propagation, sky or ionospheric wave propagation, artificial scatter wave, propagation of radio wave in absence of magnetic field :- role of ionosphere, Bending of radio waves and total internal reflection in ionosphere, secant law, skip distance.



COMUNICATION PRINCIPLE : Elementary principle of television system- TV transmitter, TV receivers, and important terms associated with TV system-camera tube, scanning, synchronization, TV channels, aspect ratio, and picture tube, difference between radio and TV communications, radar communication, microwave and satellite communications.

#### UNIT 4

MODULATION : Introduction, carrier wave, radio frequency spectrum , sound, need for modulation, radio broadcasting(basic), modulation, methods of modulation-amplitude modulation, frequency modulation, phase modulation, distinction between AM, FM and PM advantages and disadvantages.

DEMODULATION: Demodulation or detection, necessity of demodulation, essentials of demodulation, essentials of AM detection, diode detector for AM signal, transistor detector for AM signal, AM transmitters, AM radio receivers, types of AM radio receivers, frequency conversion, stages of super-heterodyne radio receivers, advantages of super heterodyne circuit, FM detection, quadrature detector, FM transmitter, FM receiver, difference between FM and AM receivers.

#### UNIT 5

OPTICAL FIBER COMMUNICATION : Fiber optics, structure, classification, plastic fibres, propagation of light through an optical fiber, acceptance angle and numerical aperture, dispersion, intermodal dispersion, intra modal dispersion, fiber losses, optical fiber cable, multi fiber cable, splicing and connectors -splicing, fusion splices, mechanical splices , connectors, connection losses, fabrication of optical fiber, advantages and disadvantages, application of fiber optics communication.

FIBER OPTICS MEASUREMENT: Optical fiber, sources and detectors, stabilized, calibrated light sources, fiber optic power meter, END TO END measurement of fiber losses, measurement of connector loss, optical time domain reflecto meter (OTDR).

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Syllabus of Electronics

B.Sc. VI semester

Subject: Electronics

Paper I: Electronic Measurement Instrumentation

and

Applied communication

**UNIT 1**

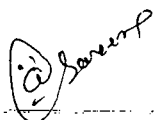
ELECTROMACHANICAL INDICATING INSTRUMENT : classification of analog instrument, principles of operations of analog instruments D'ARSONOVAL galvanometer, PMMC mechanism, construction of PMMC instrument, ammeter shunt- construction and effect of temperature , multi range ammeter, voltmeter multipliers- construction and effect of temperature, multi range d. c. voltmeter, sensitivity of PMMC voltmeter, errors , Ohm meters, advantages and disadvantages of PMMC instrument.

ELECTRONIC MULTIMETER AND VOLT METER : Introduction, multi meter, multi meter as volt meter , as ammeter, as ohm meter , application of multi meter, sensitivity of multi meter, merits and demerits, meter protection, electronic volt meter – vacuum tube voltmeter(VTVM), application of VTVM, merits and demerits of VTVM ,transistor voltmeter, bridge rectifier volt meter.

**UNIT 2**

ELECTRONICS MEASURING INSTRUMENT: Cathode ray oscilloscopic- construction, working, CRO probes, use of CRO – study of wave form, measurement of frequency, phase measurement, Deflection and focusing system in CRO - electrostatic deflection, magnetic deflection, comparison between them, Electrostatic focusing of electron beam, generation of time base signal.

DIGITAL INSTRUMENTS : Digital volt meter- Ramp type DVM, Integrating type DVM, Successive Approximation DVM, Digital multi mete, frequency meters, Low frequency counter, High frequency counter, period measurement, time interval measurement.



### UNIT 3

BRIDGE MEASUREMENT I: D.C. bridges Wheatstone bridge- construction, principle and sensitivity. Kelvin bridge for low resistance- construction, principle.

A.C. bridges: Maxwell bridge- working principle, advantages and disadvantages, Hay's Bridge- working principle, advantages and disadvantages. Schering Bridge- working principle, advantages and disadvantages. Wien's Bridge- working principle, advantages and disadvantages.

### UNIT 4

ANALYSER: Wave analyzers, Frequency selective wave analyzers, heterodyne wave analyzers, applications of it, harmonic distortion analyzers, spectrum analyzers, basic spectrum analyzer, Spectral Displays, Spectra of different signals.

DISPLAY DEVICES: Introduction, electrical indicating instrument, digital display methods, digital display units- segmental display (seven segment and fourteen segment), dot matrix, light emitting diode, liquid crystal displays, Nixie tube, segmental gas discharge display, Display system.

### UNIT 5

TRANSDUSERS I: introduction, classification of transducer, classification based on electrical principle involved, resistive position transducer, resistive pressure transducer, inductive pressure transducer, capacitive pressure transducer, self generating inductive transducer, linear variable differential transducer, piezoelectric transducer, strain gauge.

TRANSDUSERS II: temperature transducer- TRD's, thermistors, thermocouples, introduction of ultrasonic temperature transducer, types of photoelectric transducers, various types of microphones- carbon microphone, ribbon microphone, moving coil microphone, crystal microphone, ceramic microphone, capacitor microphone, electrets microphone, loud speaker.

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