**B. Sc. Part – I (Computer science Entire) CBCS Syllabus with effect from June, 2018**

**Semester: I   Electronics -Paper- I**

**Electronics GEC-1301 A**

**Electronics circuits and digital electronics – I**

**Theory: 60 Hours (75 Lectures) credits -4**

**Section – I**

**UNIT 1: Liner components in computer** (12)

Definition of active and passive elements

Resistors:  Classification, color code, specifications of resistors

Types of resistors: - Linear Resistors (Fixed): -Carbon composition, carbon film, wire wound. Linear resistors (Variable): -Wire wound, Potentiometer, Preset.

Non-Linear resistors: - Thermistors, LDR and Varistors.

Capacitors: Definition, Capacitance, capacitive reactance (XC), Charging and discharging of capacitor,

Types of capacitors: -Fixed electrostatic capacitors: -ceramic, mica, paper, etc

Fixed electrolytic capacitors: - Aluminum and Tantalum.(Construction of electrolyte capacitor).

Variable capacitors: -Air dielectric capacitor and Trimmers.

Inductors and Transformers:

Inductors: - Definition, symbol, Inductance, Inductive reactance (XL), Types of Inductors: - Air core, Iron core and ferrite core inductors.

Transformers:-  Principle and construction of transformer, Specification of transformer. Types of Transformer: - Step-up, step-down transformer

Types of Switches: (Explanation using Symbols)

Relays: - Principle, construction and working of electromagnetic relays

**UNIT 2: DC circuit analysis** (10)

Basic laws: Ohm's law, Kirchoff's current and voltage law, concept of current source, Voltage source.

Application of Kirchoff's laws to simple circuits,

Network Theorems: - (only for dc resistive circuit) Thevenin's Theorm, Norton's Theorem, superposition Theorem, Maximum power transfer theorem, (only statement and examples)

**UNIT 3: Semiconductor Diode** (06)

Formation of P-N junction, depletion layer, internal potential barrier, working and  I-V characteristics of PN junction diode. Diode applications,

zener diode: Breakdown mechanism, Zener and Avalanche Break down I-V characteristics.

Photodiode and LED, current limiting resister for LED, Applications- Optocoupler, dot matrix display of LED, 7-segment display.

**UNIT4: Bipolar junction Transistor** (09)

Structure and working of bipolar junction transistor: CB, CC, CE configurations, CE mode characteristics, Relation between $\alpha$ and $\beta$, DC load line and Q point, potential divider Biasing, Concept of transistor as an amplifier and transistor as a switch.

## Section – II

**UNIT 1: Number System, Binary Codes and Binary Arithmetic** **(10)**

Different types of number system (Decimal, Binary, Octal, Hexadecimal Number system, Inter conversion from one system to another ) and codes (BCD code, Gray code, Exess-3 code, ASCII code, EBCDIC code). Concept of parity, Signed and unsigned numbers, 1's complement and 2's complement of binary numbers, binary arithmetic (addition, subtraction, multiplication, division).

**UNIT 2: Logic Gates, Boolean algebra and Logic Families** **(10)**

Logic gates: All Logic gates -AND, OR, NOT, NOR, NAND, EX-OR, EX-NOR
(Defination, Symbol,Expression and Truth Table), Universal gates (NAND and NOR)

Boolean algebra: Rules and laws of algebra, De-Morgan's Theorems, Simplifications of logic Expressions using a) Boolean algebra, b) K-map,

Logic families: Introduction (Bi-polar and unipolar logic family), Characteristics, TTL NAND gate, tristate logic

**UNIT 3: Combinational Circuits** **(07)**

Concept of Combinational Circuits, Half adder, Full adder, half  subtractor, 4-bit adder/subtractor, Arithmetic logic unit, Encoder (Decimal to BCD, Octal to binary), Decoder (3:8), Multiplexer, Demultiplexer ,tree multiplexing, tree demultiplexing

**Unit 4: sequential circuits** **(10)**

Concept of sequential circuits, Flip-flops: RS, Clocked RS, JK, Master Slave JK, D Flip-flop,

Counter- Asynchronous, up/down, Decade, Synchronous, Ring Counter, Johnson counter (Truth tables and timing diagrams) (4 bit)

Shift Registers:  SISO (left shift, right shift), SIPO, PISO, PIPO Registers (4-bit)

**B. Sc. Part – I (Computer science Entire) CBCS Syllabus with effect from June, 2018**

**Semester II   Electronics -Paper- I**

**Electronics  GEC-1301 B**

**Electronics Devices and Circuits – II**

**Theory: 60 Hours (75 Lectures) credits -4**

**UNIT 1: Field Effect Transistor**                                    **(08)**
Comparison between BJT and FET, classification of FETs, Structure and working of JFET, I-V characteristics and parameters (transconductance, drain resistance, amplification factor) concept of MOSFET-depletion and Enhancement (construction and application only)
Applications: FET as-Voltage Variable resistance, switch, memory cell, DRAM

**UNIT 2: Amplifier and Oscillators**                          **(09)**
General classification of amplifier ,Idea of Multistage amplifier, different coupling methods (Direct coupling, RC coupling, Transformer coupling) Concept of positive and negative feedback. Barkhausen criteria; Types of oscillators RC coupled, wein bridge, Hartley, Colpitts oscillator

**UNIT 3: Operational Amplifiers**                             **(10)**
Concept of operational amplifier; ideal characteristics of Opamp; Different parameters of Op Amp, Virtual ground concept, Applications; inverting amplifier, noninverting amplifier, Unity gain amplifier, buffer, Adder, subtractor, integrator and differentiator, comparator, schmitt trigger

**UNIT 4 Power Supply**                                          **(10)**
Working of rectifier (Half, Full, Bridge);different parameters of rectifiers; filter circuits; concept of Regulator; concept of load and line regulation; Zener diode As a regulator; concept of Three pin IC regulator(Block Diagram)  positive and negative voltage regulator ICs; SMPS block diagram; UPS: online and offline (block diagram)

**Section – II**

**UNIT 1: Multivibrator**                                        **(08)**
Types of multivibrator, block diagram of IC 555; Application of  IC 555 as Astable, and Monastable (Calculation of frequency and Pulse width) Crystal clock using inverter.Clock circuit using NAND gate

**UNIT 2: Memory devices and memory Organization**                  **(10)**
Types of Memory – volatile and nonvolatile, SRAM and DRAM, Classification and Working principle of memory devices; RAM, ROM, PROM, EPROM, and EEPROM; Concept of Diode Matrix ROM, speed and cost range of memory devices, Memory organization - building the required memory size by using available memory chips, memory address map

**UNIT 3 Introductions to Microprocessor**                         **(10)**
Introduction, Types (8, 16, 32 Bits), Pin Diagram and Architecture of 8085, Pin Diagram and Architecture of 8086

**UNIT 4 Programming of process**                                **(10)**
Instruction Set of 8085, ALP Programs for Addition, Subtraction, Multiplication, Division, Data transfer,  Block Transfer

**RECOMMENDED BOOKS**:
1. Principles of Electronics:                    A.P. MALVINO, (TMH)
2. A text Book of Applied Electronics R. S. Sedha(S chand Publication)
3. Electronic Devices and Circuits Allen Mottershead (PHI)
4. Principles of Electronics V.K. Mehta (New Edn.)

5. Basic Electronics and Linear Circuit N.N. Bhargava, D.C. Kulshreshtha, S.C. Gupta(TMH)
6. Digital principals and applications; Malvino Leach, Tata McGraw Hill, 4<sup>th</sup> Edition
7. Fundamentals of Digital Electronics; A. Anand Kumar PHI Publications 2001
8. Digital Principles; T.L Floyd 3<sup>rd</sup> edition
9. Digital Electronics; C.F. Strahglo
10. Modern digital Electronics; R.P Jain, Tata Mc-Graw Hill Publication
11. Digital logic and computer design-Morris Mano
12. First course in Digital System Design; John P. Uyemura, Brooke/cole, Thompson Learning.
13. Computer Organization -J.P. Hays TMH

# Electronics -Lab- I and II
# GEC-1301 A and 1301 B

**Analog Electronics**
1. Positive & Negative Voltage regulators using 3 in IC's
2. Verification of Kirchhoff's Laws
3. To verify Thevenin, Norton theorem for a resistive circuit.
4. To study forward bias characteristic of rectifier diode.
5. Study of CRO
6. Transistors as switch (Application for LED & Relay)
7. Study of full wave rectifier with & without filter (calculation of ripple)
8. Transistor characteristics (CE) configuration
9. RC phase shift oscillator
10. Hartley Oscillator
11. Colpitts Oscillator
12. Op Amp as adder
13. Op Amp as subtractor
14. Characteristics of JFFT calculation of parameters

**Digital Electronics**
1. Study of basic gates
2. Universal building block using NAND and NOR gates
3. Verification of De-Morgans Theorems
4. Study of Flip-Flops (D & JK)
5. Half & full adder
6. Study of Flip Flop: RS, Clocked RS, D.
7. Study of astable Multivibrator circuit using IC 555
8. Study of monostable Multivibrator circuit using IC 555
9. Study of Multiplexer
10. Study of De multiplexer
11. Arithmetic Operation using uP8085 – I
12. Arithmetic Operation using uP8085 – II
13. Block transfer using uP8085
14. Block Exchange using up8085
At least 12 experiments from each group

**Nature of Question Paper for all (Theory) papers U.G. Courses under Faculty of Science.**

Nature of Question Paper ----- Total 80 Marks

**Section-I**

Q.No.1 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q.No. 2 Attempt any two of the following –long Answers (out of three) 16 Marks

Q.No. 3 Attempt any four of the following -Short Answers - (out of six) 16 Marks

**Section-II**

Q.No.4 Multiple Choice based objective type question 08 Marks

(Four options for each question be given)

Q.No.5 Attempt any two of the following –long Answers (out of three) 16 Marks

Q.No. 6 Attempt any four of the following -Short Answers - (out of six) 16 Marks