Distribution of credits for B.Sc. Electronics (Optional)

Under Faculty of Science

## B. Sc. Syllabus structure

Semester Pattern effective from June 2016

## Subject: Electronics

| Semester | Paper No. | Name of the Course | Periods/ Week | Total period | Internal Evaluation | Marks of Semester | Total Mark | Credits |
|---|---|---|---|---|---|---|---|---|
| I | CCEI (Section A) | Electronic Components & circuit analysis ((PI) | 03 | 45 | 10 | 40 | 50 | 2 |
| | CCEI (Section B) | Fundamentals of Digital Electronics (PII) | 03 | 45 | 10 | 40 | 50 | 2 |
| II | CCEII (Section A) | Semiconductor Devices & Instrumentation (PIII) | 03 | 45 | 10 | 40 | 50 | 2 |
| | CCEII (Section B) | Combinational & Sequential logic circuits (PIV) | 03 | 45 | 10 | 40 | 50 | 2 |
| | CCEP I [CCE I & II (Section A & B)] | Practical's based on Section A & Section B of CCE I & CCE II ( PV) | 03 | | 20 | 80 | 100 | 4 |
| | | | | | | | **Total credits semester I and II: 12** | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| III | CCE III (Section A) | Amplifiers, Oscillators & Multivibrators (P-VI) | 03 | 45 | 10 | 40 | 50 | 2 |
| | CCEIII (Section B) | Fundamentals of Microprocessors (P-VII) | 03 | 45 | 10 | 40 | 50 | 2 |
| | CCEP II [CCE III & IV (Section A)] | Practical's based on P-VI & P-VIII (P-X) | 03 | | 10 | 40 | 50 | 2 |
| | CCEP II [CCE III & IV ( Section B)] | SEC I (1 Skill/ optional) | | | 15×3 = 45 | - | - | (02)* |
| IV | CCE IV (Section A) | Op-Amp, It's Applications & Some specialized ICs (P-VIII) | 03 | 45 | 10 | 40 | 50 | 2 |
| | CCE IV (Section B) | Microprocessor Interfacing (P-IX) | 03 | 45 | 10 | 40 | 50 | 2 |
| | CCEP III [CCE III & IV (Section B)] | Practical's based on P-VII & P-IX (P-XI) | 03 | | 10 | 40 | 50 | 2 |
| | CCEP III [CCEIII & IV (Section B)] | SEC II (1 Skill / optional) | | | 15×3 = 45 | - | - | (02)* |
| | | | | | | | **Total credits semester III and IV** | 12(04)* |

| Semester | Course No. | Name of the Course | Instruction Hrs/ week | Total period | Internal Evaluation | Marks of Semester | Total Marks | Credits |
|---|---|---|---|---|---|---|---|---|
| V | DECE I (Section A) | Communication Electronics – I (P-XII) | 03 | 45 | 10 | 40 | 50 | 2 |
| | DECE I [(Section B) Elective] | Power Electronics - I Or Introduction to Microcontroller 8051 (P-XIII) | 03 | 45 | 10 | 40 | 50 | 2 |
| | DECCEP I [DECE I & II (Section A)] | Practical's based on P- XII & PXIV (P-XVI) | 03 | | 10 | 40 | 50 | 2 |
| | DECEP II [DECE I& IV (Section B)] | SEC III (1 Skill/ optional) | | | 15×3 = 45 | - | - | (02)* |
| VI | DECEII (Section A) | Communication Electronics - II (P-XIV) | 03 | 45 | 10 | 40 | 50 | 2 |
| | DECE II [(Section B) Elective] | Power Electronics - II Or 8051 Microcontroller & Embedded systems (P-XV) | 03 | 45 | 10 | 40 | 50 | 2 |
| | DECEP II) [DECE I & II (Section B)] | Practical's based on P- XIII & P-XIV (P-XVII) | 03 | | 10 | 40 | 50 | 2 |
| | DECEP II(Section B) | SEC IV (Project)) | | | 5O | - | 50 | (2)* |
| **Total credits semester V and VI** | | | | | | | | 12(04)* |

# Paper-I
# Electronic Components and Circuit Analysis

***SEMESTER: I ( CBCS PATTERN)***

**CCE-I Section :A**

**Periods: 45** **(Maximum Marks: 50)** **Credits:2**

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**Unit – I : Passive components:** (15 periods)

**Resistors:** wire-wound resistors, carbon composition resistors, carbon film resistors, cermet film resistors, metal film resistors, power rating, variable resistors, fusible resistors, resistor colour code and Bands.

**Inductor:** Types of Inductor, Inductance of an inductor, another definition of inductance, mutual inductance, variable inductors, inductors in series or parallel without M, reactance offered by a coil, impedance offered by a coil, Q-factor of a coil.

**Capacitors:** capacitor connected to a Battery, capacitance, factors controlling capacitance, fixed capacitors, voltage ratings of capacitors, capacitors in series, capacitors in parallel, capacitor connected across an AC source, capacitive Reactance.

Transformer, transformer working.

(Numerical Problems)

(Book – I )

**Unit II : Circuit analysis- I** (07 periods)

Kirchhoff's current law, Kirchhoff's voltage law, determination of algebraic sign, proportional voltage formula in a series circuit, series voltage dividers, proportional current formula, opens in parallel circuit, shorts in a parallel circuit.

(Numerical Problems)

(Book – I)

**Unit III : Circuit analysis – II.** (10 periods)

Ideal constant voltage source, Ideal constant current source, super position theorem, Thevenin's theorem, Norton's theorem, maximum power transfer theorem (with steps for simplification.)

(Numerical Problems) (Book – I )

**Unit – IV : A.C. Fundamentals:** (13 periods)

Introduction, types of alternating waveforms.

**Definitions:** Cycle, time period, frequency, amplitude.

Characteristics of a sine wave, Audio and radio frequencies. Different values of sinusoidal voltage and current, phase of an AC, phase difference, vector representation of an alternating quantity, Harmonics, R-L-C circuit, resonance in series R-L-C circuit, Resonance curve, Bandwidth of series resonant circuit.

(Numerical Problems) (Book – I )

**References:**


1. Basic Electronics Solid State (Multicolour illustrative edition), by B.L. Theraja, Pub.: S.Chand &Company Ltd., Ramnagar, New Delhi – 110055.
2. Basic Electronics (eighth edition), by Bernard Grob, Pub.: Glencoe Mc Graw Hill, Pub. Company.
3. A Textbook of Electrical Technology, by B.L. Theraja, Vol.1, Nirja Construction & Development Company.
4. Principles of Electronics (Multicolour revised edition), by V.K. Mehta, Rohit Mehta, S. Chand & Company, Ram Nagar, New Delhi - 110055.

## Paper – II
## Fundamentals of Digital Electronics

**Periods: 45** **(Maximum Marks: 50)** **Credits:2**

**Unit-I :** **(1**5 Periods)

**Number Systems and Codes**

Decimal numbers, binary numbers, binary arithemetic, 1's and 2's complements, octal numbers, hexadecimal numbers, inter-conversions of number systems, Digital codes: Binary coded decimal (BCD), Gray code, Excess-3 code, Format of ASCII code.

(Numerical Problems)

**Unit – II :** (15 Periods)

**Logic Gates**

Positive and negative logic,Definition, Symbol and Truth table of NOT gate, OR gate, AND gate, NAND gate, NOR gate, EX-OR gate and EX-NOR gate. universal properties of NAND and NOR gates.

**Unit – III:** (07 Periods)

**Boolean Algebra**

Boolean operations, logic expressions, rules and laws of Boolean algebra, DeMorgan's theorems, simplification of Boolean expressions using Boolean algebra techniques.

(Numerical Problems)

**Unit – IV :** (08 Periods)

**K-mapTechniques**

SOP and POS for of Boolean expressions for logic network, minterms, maxterms, simplification of Boolean expressions using Karnaugh map techniques (up to 4 variables) for SOP.

(Numerical Problems)

**References:**


1. Digital Principles and Applications – A.P. Malvino, McGraw Hill International Editions (Fourth Edition)
2. Modern Digital Electronics – R.P. Jain, Tata McGraw Hill Pub. Company (Third Edition)
3. Digital Fundamentals – Thomas L. Floyd, Universal Book Stall.
4. Digital Electronics: An Introduction to Theory and Practice-William H. Gothmann, Prentic Hall, India.
5. Digital Electronics with Practical Approach – G.N. Shinde, Shivani Pub., Nanded.

## Paper – III
## Semiconductor Devices and Instrumentation

**Periods: 45** **( Maximum Marks: 50)** **Credits:2**

**Unit – I :** (10 Periods)

**Semiconductor Diodes:**

Construction, working and V/I characteristics of P-N Junction diode, Zener diode, LED, Photodiode, varactor diode.

(Numerical Problems)

**Unit – II :** (15 Periods)

**Transistors :**

Construction of NPN and PNP transistor, F-F, R-R-, F-R biasing, $\alpha_{dc}$ and $\beta_{dc}$ of a transistor and their relationship, C-E transistor Characteristics: Collector curves and base curves. Construction, working and characteristics of JFET, construction,working and characteristics of MOSFET.

(Numerical Problems)

**Unit – III :** (10 Periods)

**Rectifiers and Voltage Regulators**

Block diagram of a power supply, half and full wave rectifiers, bridge rectifier, load regulation and line regulation, zener shunt regulator.

(Numerical Problems)

**Unit – IV:** (10 Periods)

**CRO and Multimeter:**

Multimeter, applications of multimeter, sensitivity of multimeter.

Cathode ray oscilloscope, cathode ray tube, deflection sensitivity of CRT, applying signal across vertical plates, display signal waveforms on CRO, signal pattern on screen, various controls of CRO, applications of CRO.

(Numerical Problems) (Book-3)

**References:**


1. Electronic principles, A.P. Malvino, Tata Mc. Graw Hill, Pub. Co.Ltd., (Third edition)
2. Basic electronics solid state (multicolour illustrative edition), B.L. Theraja, S.Chand & Company Ltd., Ram Nagar, New Delhi – 110055.
3. Principles of electronics: V.K. Mehta & Rohit Mehta (Multicolour revised edition) S. Chand & Company.
4. Basic electronics (eighth edition) Bernard Grob, Glencoe Mc. Graw Hill Pub., Company.

## Paper – IV
## Combinational and Sequential Logic Circuits

**Periods: 45** **( Maximum Marks: 50)** **Credits:2**

**Unit – I :** (14 Period)

**Arithmetic and Combinational Logic Circuits**

Half adder, full adder, parallel binary adder, introduction of encoder, decoders, multiplexer and demultiplexers with suitable example.

**Unit – II :** (09 Period)

**Flip-Flops**

SR latch , SR flip flop, JK flip flop, Master Slave JK flip flop, D type flip flop, T type flip flop.

**Unit – III :** (17 Period)

**Counters and Registers**

**Asynchronous counters :** two, three, four bit and decade counter.

**Synchronous counters :** two, three, four bit counter and decade counter, modulus of the counter, mod-3 and mod-5 counters, ring counter.

**Shift Registers :** Serial-in Serial-out, Serial in - Parallel out, parallel in - serial out, parallel in - parallel out configurations.

**Unit – IV :** (5 Period)

**ADC and DAC convertors :**

Digital to analog converter (R-2R ladder network), Analog to digital convertor (comparator type)

**References:**


1. Digital Principles and Applications – A.P. Malvino, McGraw Hill International Editions (Fourth Edition).
2. Modern Digital Electronics – R.P. Jain, Tata McGraw Hill Pub. Company (Third Edition)
3. Digital Fundamentals – Thomas L. Floyd, Universal Book Stall.
4. Digital Electronics with Practical Approach-G.N. Shinde, Shivani Pub., Nanded.

## Paper – V

(Practicals based on Paper-I, II, III and IV)

**ELEC V: Laboratory Course Work**

***(CBCS PATTERN)***

**Periods: 80** **( Marks: 100)** **Credits: 4**

**Note :** (i) Every student must perform at least 12 experiments, not less than SIX Experiments from each group.

(ii) Use graphs wherever necessary.

**Group I :**

1. Identification of electronic components: Resistors, Capacitors, Inductors, transformers, diodes & transistors.
2. Study of electronic instruments: Voltmeter, Ammeter and Multimeter.
3. Study of Electronic instruments: Power supply, signal generator and CRO.
4. Determination of value of given resistors by using colour code method & verification of it by multimeter.
5. Determination of amplitude, frequency and time period of observed voltage waveform by using CRO.
6. Verification of Thevenin's theorem.
7. Study of Maximum power transfer theorem and determination of internal resistance of a source.
8. Study of P-N junction diode characteristics and determination of bulk resistance.
9. LED characteristics.
10. Photo diode characteristics.
11. Study of Zener diode characteristics and determination of breakdown voltage.
12. Study of Common-Emitter transistor characteristics and determination of $\beta_{dc}$.
13. JFET characteristics.
14. Study of Series resonance circuit and determination of its bandwidth and Q-factor.
15. Study of Half wave rectifier and determination of ripple factor and efficiency ($\eta$)
16. Study of Full wave rectifier and determination of ripple factor and efficiency ($\eta$)
17. Study of Zener shunt regulator, line and load regulation characteristics.

**Group II :**

1. Study of basic gates (verification of truth table) using ICs.
2. Construction of basic gates using NAND gates.
3. Construction and study of half adder using NAND gates.
4. Construction and study of full adder using NAND gates.
5. Implementation of Boolean expression from the given truth table using K-map.
6. Verification of De Morgan's First theorem.
7. Verification of De Morgan's Second theorem.
8. Construction and study of JK, T-type and D-type flip-flops using IC 7476.
9. Study of decade counter using IC 7490.
10. Construction and study of Serial in – Serial out shift register using IC 7495.
11. Mod-16 asynchronous counter using IC 7493.
12. 4-bit binary to Gray converter using IC 7486.