

# Scheme & Syllabus

of

New

B.Sc. Electronics

(Honours) Course

**I<sup>st</sup> to IV<sup>th</sup> Semester**

w.e.f. July 2011



**Devi Ahilya Vishwavidyalaya,**

**Indore (M.P.) 452001**

**w.e.f. 2011-14 Batch Onwards**

SEMESTER SYSTEM, 2011-2014

PROPOSED SCHEME FOR B.Sc. ELECTRONICS (HONOURS) COURSE

CLASS/ SEMESTER	Subject	CCE	Min Marks	Term End Exam	Min Marks	Total	Min Marks
Sem -I	EL-1101 Components & Networks	15	05	85	28	100	33
	EL-1102 Practical	-	-	-	-	50	17
Sem-II	EL-1201 Electronic Devices	15	05	85	28	100	33
	EL-1202 Practical	-	-	-	-	50	17
Sem -III	EL-2101 Analog Electronics & Op-Amps	15	05	85	28	100	33
	EL-2102 Practical	-	-	-	-	50	17
	EL-2103 Linear Circuits	15	05	85	28	100	33
Sem-IV	EL-2201 Digital Electronics	15	05	85	28	100	33
	EL-2202 Practical	-	-	-	-	50	17
	EL-2203 Fundamentals of Computers	15	05	85	28	100	33

**Note:**

1. CCE – Continuous Comprehensive Evaluation.
2. Individual passing required for theory and practical subjects.

**w.e.f. 2011-14 Batch Onwards**

**SEMESTER - I**  
**EL1101: Components and Networks**

**Maximum Marks: 85**

**Min Pass Marks: 28**

**Unit 1: Basic Components**

Circuit symbols, working principle, classification according to construction, specifications, and applications of passive components – Resistors & Color Coding, Inductors, Transformers, Switches, Relays(Electromagnetic), Thermistor, LDR, Micro-Phone and Loud-Speakers.

**Unit 2: Capacitors**

Capacitors: - Capacitance, Capacitor Specifications, Classification of Capacitor- Fixed (Mica, Paper, Ceramic, Plastic, Electrolytic etc.), Variable capacitor (Trimmer, Padder, Gang). Stray Capacitance, Leakage Resistance, Testing of Condenser, Area of Application, Problem related to Electrical Energy Storage.

**Unit 3: Basic Circuits**

Concept of Ideal and Practical Voltage and Current Sources, Internal Resistance, AC and DC Sources, Ohms Law, AC Currents & Voltages, Expression for RMS value & Mean Value, j Operator, study of LR, CR, Series & Parallel resonance circuit, Expression for Q factor & Band width in resonance circuit, Phase relationship between Current & Voltage in different circuits. Numerical on Quality Factor, Power Factor, Bandwidth Calculations.

**Unit 4: Network Theorems**

Kirchhoff's Current and Voltage Law, Application of KVL & KCL to simple DC Resistive Networks. Thevenin's and Norton's Theorems and corresponding equivalent of simple Resistive Networks. Superposition Theorem, Maximum Power Transfer Theorem, Loop Current and Node Voltage Analysis Methods.

**Unit 5: Filters**

Types of filters: Choke input (inductor) filter, Shunt Capacitor filter, L section,  $\pi$  section and T filters, Low Pass, High Pass, Band Pass and Band Reject Filters.

**Text Books**

1. B.L. Theraja : Electrical Technology, S. Chand & Co Ltd.
2. Bernard Grob: Basic Electronics, McGraw-Hill Publishing Co.

**Problem Solving Book**

1. Schaum Series : Electric Circuits, TMH

**w.e.f. 2011-14 Batch Onwards**

## Semester – I

### EL1102: Practical

#### 1. Identification of Components / Tools

- a) Minimum 10 different types of components must be given.
- b) Identification based on visual inspection / data sheets be carried out.

#### 2. Use of Multimeter (Analog and Digital)

- a) Measurement of AC/DC voltage and Current – on different ranges.
- b) Measurement of R.
- c) Testing of L, C, Diodes & Transistors.

#### 3. Study of Function Generator / CRO

- a) Understand how to use Function Generator / CRO.
  - b) Study of Front panel controls.
  - c) Measurement of Amplitude and Frequency of different Waveforms.
  - d) Demonstrate the use of Component Testing.
3. Verification of KCL / KVL, Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Superposition Theorem.
  4. Design, build and test Low pass and High pass RC Filters.
  5. Charging and Discharging of Capacitors in R-C Circuits.

**SEMESTER - II**  
**EL1201: Electronic Devices**

**Maximum Marks: 85**

**Min Pass Marks: 28**

**Unit 1: Semiconductors**

Conductors, Semiconductors and Insulators. Their classification on the basis of Band Theory, Intrinsic and Extrinsic semiconductor, Diode current equation (Derivation not required), Drift & Diffusion.

**Unit 2: P-N junction**

P-N junction- Forward and Reverse bias of Diode. Concept of recombination of carriers, temperature variation of Forward and Reverse Current through the P-N Junction. Characteristics of Forward & Reverse Bias Diode, Dynamic and Static Resistances, Voltage dependent Junction Capacitance of a P-N junction.

**Unit -3: Special Diodes**

Zener Diode, its construction and characteristics. Temperature coefficient of Zener Diode. Zener Diode as Voltage Regulator, Schottky Diode, Power Diode, Tunnel Diode, LED, Solar Cell, Photodiodes.

**Unit -4: BJT**

BJT, construction and characteristics in different configuration, comparative merits and demerits, biasing of transistor: different methods, load line, Q point and thermal stability. Transistor as an ON/OFF switch. Transistor as a black box: h-parameter concept only. Qualitative analysis of h-parameter model in CE, CB and CC mode.

**Unit -5: Power Devices**

Construction, characteristics and uses of SCR, DIAC, TRIAC, UJT and Optocoupler devices.

**Text Books**

- 1) R. Boylestad, L.Nashelsky : Electronic Devices and Circuit Theory, Pearson. Education
- 2) Kamakhya Prasad Ghatak and Debashis De : Basic Electronics, Pearson Publication

**Reference Books**

- 1) Malvino : Electronics Principles, TMH
- 2) Millman and Halkias : Integrated Electronics, TMH
- 3) Bernard Grob : Basic Electronics, McGraw-Hill Publishing Co.

**w.e.f. 2011-14 Batch Onwards**

## SEMESTER - II

### EL1202 : Practical

1. Study of Forward and Reverse Bias characteristics of PN Junction Diode.
2. Study of Forward and Reverse Bias characteristics of LED.
3. Study of Breakdown Characteristics and Voltage Regulation action of Zener Diode.
4. Study of Forward and Reverse Bias Characteristics of Power Diode.
5. Study of Forward and Reverse Bias Characteristics of SCR.
6. Study of Forward and Reverse Bias Characteristics of DIAC.
7. Study of Forward and Reverse Bias Characteristics of TRIAC.
8. Study of Forward and Reverse Bias Characteristics of UJT.
9. To study the characteristics of PNP transistor in CB and CE configuration.
10. To study the characteristics of NPN transistor in CB and CE configuration.
11. To study the characteristics of Emitter Follower.
12. To study photo diode characteristics
13. To study optocoupler
14. To find the Q- point of a bipolar junction transistor
15. To study transistor as a switch
16. To study I-V characteristics of a solar cell as a function of light intensity.

**w.e.f. 2011-14 Batch Onwards**

**SEMESTER – III**  
**EL -2101: ANALOG ELECTRONICS AND OP-AMP**

**Maximum Marks: 85**

**Min Pass Marks: 28**

**Unit I: Power Supplies**

Rectifiers: Half wave, Full wave and Bridge Rectifiers, Efficiency, Ripple factor and voltage regulation. Block Diagram of Regulated Power Supply, Series and Shunt Regulation. Three terminal Regulators (78XX and 79XX).

**Unit II: FETs & Amplifiers**

JFET and MOSFET, Construction and Characteristics, Depletion and Enhancement type MOSFET, problems related to pinch off voltage,  $I_{DSS}$ ,  $V_{gs}$ , transfer characteristics,  $\mu$ ,  $r_d$ ,  $g_m$ ,  $I_D$ ,  $I_{DSS}$  relation for FET and threshold voltage.

Transistor as an amplifier: Class A, Class B, Class AB and Class C operation and their Applications, Class B push pull amplifier, Noise and Distortion in Amplifier.

**Unit III: Feedback and Oscillators**

General theory of feedback, classification of feedback, closed loop gain, open loop gain and return difference, stabilization of gain, Negative feedback in amplifier, Effect of negative feedback on gain, non linear distortion, Band width, Noise, Input and output impedance, Topologies of feedback.

Positive feedback and Barkhausen criterion for oscillator, RC phase shift oscillator, Wien Bridge oscillator, RF oscillator, effect of L and C on RF oscillator frequency, Hartley oscillator, Colpitts oscillator, crystal oscillator.

**Unit IV: Operational Amplifier**

Basic Building Block of Op-Amp, Differential amplifier and its types. DC and AC analysis of Differential amplifier, Concept of Virtual ground.

Op-amp Parameters: Concept of ideal op-amp, Input and output offset voltage, Input offset current, Input bias current, CMRR, PSRR and slew rate, open loop gain, Input and output resistance, frequency response. Calculation of CMRR and Slew rate.

**Unit V: Linear and Non linear applications of op-amp**

Voltage Amplifier: Inverting and non inverting amplifier, summing amplifier, Differential and Instrumentation Amplifiers.

Comparator, Zero crossing and limit detector. Schmitt trigger, Differentiator, Integrator and logarithmic amplifier and problems related to above topics.

**w.e.f. 2011-14 Batch Onwards**

**BOOKS RECOMMENDED:**

1. Ramakant Gaikwad : Operational Amplifier
2. D. Roy Choudhary & Shail B. Jain : Linear Integrated Circuits
3. R. Boylestad, L.Nashelsky : Electronic Devices and Circuit Theory, Pearson. Education
4. Malvino : Electronics Principles, TMH
5. Millman and Halkias : Integrated Electronics, TMH

**SEMESTER – III****EL-2103: LINEAR CIRCUITS****Maximum Marks: 85****Min Pass Marks: 28****Unit I : OP-AMP Applications**

Precision Half Wave and Full Wave Rectifiers, Peak Detectors, Clipper and Clamper Circuits, Sample and Hold Circuits, V to I & I to V converters, Multiplier and Divider, Log & Antilog Amplifier. Problems related to above topics.

**Unit II : OP AMP as Waveform Generators**

Introduction, OP AMP as Sine, Triangular, Square wave & Pulse generator.

**Unit III : 555 Timer & its Applications**

Introduction, Description of Functional Diagram, Monostable Operation, Astable Operation, Schmitt Trigger. Problems related to above topics.

**Unit IV : Voltage Regulators**

Introduction, Series Op-Amp regulator, IC voltage regulator, 723 general purpose regulator, switching regulator. Problems related to above topics.

**Unit V : Phase Locked Loop**

Introduction, Basic Principles, Phase Detector/ Comparator, Voltage Controlled Oscillator (VCO), Low Pass Filter, Monolithic PLL, PLL Applications. Problems related to above topics.

**BOOKS RECOMMENDED:**

1. Operational Amplifier : Ramakant Gaikwad
2. Linear Integrated Circuits : D. Roy Choudhary & Shail B. Jain

**w.e.f. 2011-14 Batch Onwards**



## **SEMESTER - III**

# **EL 2102: PRACTICAL**

### **SCHEME OF PRACTICAL EXAMINATION**

1. Study of Half Wave, Full Wave and Bridge Rectifiers.
2. Study of Regulated Power Supply Using IC 7805/7905.
3. Study of output and transfer characteristics of JFET/MOSFET.
4. Study of Wien Bridge Oscillator.
5. Study of Hartley Oscillator.
6. Study of Colpitt's Oscillator.
7. Op-Amp 741C as an inverting and non-inverting amplifier.
8. Op-Amp 741C as adder and Subtractor.
9. Op-Amp as Voltage Comparator.
10. Op-Amp as Differential and Instrumentation Amplifier.
11. Op-Amp as Integrator and Differentiator.

**w.e.f. 2011-14 Batch Onwards**

## **SEMESTER - IV**

### **EL -2201: DIGITAL ELECTRONICS**

**Maximum Marks: 85**

**Min Pass Marks: 28**

#### **Unit I : Number Systems, Codes and Logic Gates**

Decimal, Binary, Octal, Hexadecimal number systems and their interconversions, Signed and fractional binary number representation. BCD, Excess-3, Gray, ASCII & EBCDIC Codes. Basic logic gates & Derived gates(AND, OR, NOT, NAND, NOR, XOR, XNOR): Symbols, Truth Tables and Circuit diagrams using switches, diodes and transistors.

#### **Unit II: Boolean Algebra and K-map**

Boolean Algebra, minterms, maxterms, Boolean expression in SOP form and POS form, conversion of SOP/POS expression to its standard SOP/POS form, Demorgan's Theorem. Universal Gates, Simplification of Logic equations using laws of Boolean algebra and Karnaugh map (upto 4 variables)

#### **Unit III: Arithmetic & Combinational Circuits**

Binary addition, subtraction, multiplication & division, 1's and 2's complement, Half adder and Full Adder, Half Subtractor and Full Subtractor, Binary Adder, 2's complement Adder/Subtractor circuit, Digital Comparator, Multiplexer, Demultiplexer, Encoder, Decoder and code converters.

#### **Unit IV: Sequential Circuits**

RS & D Latches, RS, D, JK & T Flip Flops, Concept of racing and JK Master-Slave Flip Flops, Registers & Counters and their different types.

#### **Unit V: A/D and D/A Converter**

Basic D/A Converters: R-2R, Binary Weighted Resistor type, A/D Converters: Counter, Ramp, Flash and Successive Approximation. Sample and Hold Circuits: Basic Concept and Working.

#### **BOOKS RECOMMENDED:**

1. Malvino and Leach : Digital Principles and Applications
2. R.P. Jain : Modern Digital Electronics
3. Malvino and Brown : Digital Computer Electronics

**w.e.f. 2011-14 Batch Onwards**

## SEMESTER - IV

### EL – 2203: FUNDAMENTALS OF COMPUTERS

**Maximum Marks: 85**

**Min Pass Marks: 28**

#### **UNIT I :**

Computer generation and Classification: First Generation, Second Generation, Third Generation, Fourth Generation, Fifth Generation computers, Block Diagram of computer, algorithms. Flow chart, stored program concept, working of a computer, word length & processing speed of a computer, user interface. Hardware, Software and Firmware concepts, Microprocessor and single chip microcomputer concept.

#### **UNIT II :**

Input and Output Units, Floppy disk, Hard disk, Keyboard, Mouse, Joystick, Scanner, Serial printers, Letter quality printers, Plotters, Laser printers, Graphic display device, Input output port, serial port, serial data transfer, programmable interval timer/counter, supporting peripherals.

#### **UNIT III :**

Computer memory, memory cell, Memory organization, Read only memory, Random access memory, PROM, EPROM, EEPROM, serial access memory. Magnetic hard disk & Floppy disk driver, magnetic tape drives, cache memory, memory controllers, optical disks, program and data memory. Memory Management unit.

#### **UNIT IV :**

Distributed Processing or multiprocessing, Batch processing, Multiprogramming and Multiuser system, Dumb and smart terminals. Computer network, Local Area Network, Parallel Processing, central processing unit.

#### **UNIT V :**

Operating System: Introduction to operating system in a computer. Batch operating system, Multiprogramming operating system. Time sharing operating system, On time and real time operating system. Basic commands of UNIX.

#### **BOOKS RECOMMENDED :**

1. Computer Fundamentals, Architecture and Organization : B. Ram
2. Computer Architecture and Organization: Nicholas Carter, Second Edition, TMH  
(Adaptation) Schaum Series, 2009
3. UNIX Manual

**w.e.f. 2011-14 Batch Onwards**

## **SEMESTER - IV**

# **EL 2202: PRACTICAL**

### **SCHEME OF PRACTICAL EXAMINATION**

1. Study of Basic Logic Gates and Universal Gates.
2. Verification of Demorgan's Theorem.
3. Study of Binary Half and Full Adder Circuit.
4. Study of Binary Half and Full Subtractor Circuits.
5. Study of code conversion binary to gray and gray to binary Circuits.
6. Study of 4 bit Parity Generator/ Checker Circuits.
7. Study of Multiplexer and Demultiplexer Circuits.
8. Study of Decoder and Encoder Circuits.
9. Study of R-S, D and J-K flip flop.
10. Study of 4 - Bit Ripple Up/Down Counter.
11. Study of Left and Right Shift Registers.
12. Study of Digital Comparator.
13. Study of D/A Conversion.
14. Study of A/D Conversion.
15. Study of Ring Counter and Decade Counter.

**w.e.f. 2011-14 Batch Onwards**