Scheme & Syllabus

of

New
B.Sc. Electronics
(Pass /Maintenance) Course
I to VI Semester

w.e.f. July 2011

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w.e.f. 2011-14 Batch Onwards

SEMESTER SYSTEM, 2011-2014

PROPOSED SCHEME FOR B.Sc. ELECTRONICS (Pass/Maintenance) 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 and Op-Amps	15	05	85	28	100	33
	EL-2102: Practical	-	-	-	-	50	17
Sem-IV	EL -2201: Digital Electronics	15	05	85	28	100	33
	EL-2202: Practical	-	-	-	-	50	17
Sem-V	EL -3101: Microprocessor and Interfacing	15	05	85	28	100	33
	EL -3102: Practical	-	-	-	-	50	17
Sem-VI	EL-3201: Electronics Communication & Instrumentation	15	05	85	28	100	33
	EL-3202: Practical	-	-	-	-	50	17

Note:

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

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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.

Unit5: Filters

Types of filters: Choke input (inductor) filter, Shunt Capacitor filter, L section, π 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

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.

4. Verification of KCL / KVL, Network Theorems: Thevenin's, Norton's, Maximum Power Transfer, Superposition Theorem.

5. Design, build and test Low pass and High pass RC Filters.

6. 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.

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.

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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, μ, 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.

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 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.

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: Arithmatic & 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

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.

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SEMESTER - V

EL -3101: MICROPROCESSOR AND INTERFACING

Maximum Marks: 85 **Min Pass Marks: 28**

Unit I : Microprocessor Introduction

Microprocessor architecture and Block diagram, pin out diagram, ALU and Control unit, concept of Fetch Cycle, Execution cycle, machine cycle and instruction cycle.

Unit II: Assembly Language Programming

8085 based instructions, Data Transfer, Arithmetic and Logical Branch I/O and machine control instruction and timing diagram, Stack, Stack pointer, Stack related instruction, code conversion, subroutines, conditional/unconditional call and return instructions.

Unit III: Assembly Language Programs (Interrupts)

Hardware and Software interrupt, Maskable and Non Maskable, vectored and Non vectored interrupt, priority interrupt and interrupt service routine DMA, Memory mapped I/O and I/O mapped I/O techniques, In and Out instruction & Timing diagrams.

Unit IV: Memory Interfacing

RAM, ROM, EPROM, Memory interface, Interfacing ROM, 2Kx8, 4Kx8, Interfacing. RAM 2Kx8 and 4Kx8. Timing diagram for memory read and memory write Instruction and T Cycle.

Unit V: Peripheral Interfacing

Interfacing peripheral devices, programmable, peripheral, interface, 8255 – Internal architecture, control register and control word 8255. Functional description-Operational programming in mode 0, mode 1 and mode 2.

BOOKS RECOMMENDED :

1) Digital Computer Electronics : Malvino
2) Microprocessor Architecture, Programming and Applications with 8085: R.S. Gaonkar

SEMESTER - V

EL 3102 : Practical

Using Microprocessor 8085:-

1. Addition and Subtraction of 8 bit Numbers.
2. Addition and Subtraction of 16 bit Numbers.
3 Addition of 8 bit numbers in BCD Code.
4. Addition of two string of numbers placed in memory location.
5. Multiplication and Division of 8 bit and 16 bit numbers.
6. Find the Largest and Smallest number from a given set of numbers loaded in the memory.
7. To arrange the numbers in Ascending and Descending order.
8. Find 1's & 2's Complement of Numbers.
9. Block Data Transfer in Memory.
10. Display 'HELP'
11 Interfacing of Peripheral IC 8255 with 8085 Microprocessor.

SEMESTER VI

EL -3201: ELECTRONICS COMMUNICATION & INSTRUMENTATION

Maximum Marks: 85 **Min Pass Marks: 28**

Unit I : Measuring Instruments

Measurement and Error Definition, accuracy and precision, Types of errors, probability of errors, limiting errors. PMMC mechanism, DC Voltmeter, Ammeter sensitivity, series and shunt type ohm meter, multimeter or VOM.

True RMS voltmeter Digital voltmeter: Rectifier – amplifier and amplifier – Rectifier type.

Unit II: Bridges & Transducers

DC and AC Bridges, Wheat stone Bridge, Kelvin Bridge, Maxwell Hay, Schering, Wien Bridges, Cathode ray oscilloscope, Block diagram, Basic operation, Transducers and their classification, strain gauge and displacement transducer.

Unit III: Amplitude Modulation and Demodulation

Definition of AM and Detection of AM, Modulation index, power in AM wave, linear and square law modulation technique, Numerical problems.

Definition of Amplitude Demodulation Generation and detection of amplitude demodulation, linear diode detection, choice of RC, Numerical problems

Unit IV: Frequency Modulation and Demodulation

Definition of frequency modulation, modulation index, frequency spectrum of frequency, frequency modulation wave, direct and indirect method of FM, Pre-emphasis and de-emphasis.

Frequency demodulation: Foster seeley and phase locked loop. Numerical problem related to FM demodulation.

Unit V: Digital Modulation

Pulse code modulation (PCM), Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), Phase Shift Keying (PSK)

BOOKS RECOMMENDED :

1) B.P. Lathi : Modern Digital and Analog Communication Systems.
2) Schaum Series: Analog and Digital Communication
3) A.K. Sawhney: Electrical and Electronic Measurements and Instrumentation.

SEMESTER - VI

EL 3202 : Practical

1. Study of AM Modulation and Demodulation.
2. Study of FM Modulation and Demodulation.
3. Study of PCM Modulation and Demodulation.
4. Study of Phase Locked Loops 565 and 566.
5. Study of CRO(Block Diagram of Internal Circuit of CRO, Measurement of Phase Difference between two waveforms , Frequency , Average DC and Peak Voltage Measurements for Sine, Triangular and Square Waves).
6. Study of Strain Gauge Characteristics
7. Study of LVDT Characteristics.
8. Study of Kelvin Bridge.
9. Study of Maxwell Bridge.
10. Study of Wien Bridge.

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