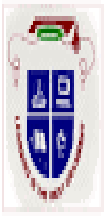

Government Degree College for Women (Autonomous)

Begumpet, Hyderabad-500016

Affilated to Osmania University, Re-Accredited with'B+' Grade by NAAC

CHOICE BASED CREDIT SYSTEM (CBCS)

DEPARTMENT OF ELECTRONICS (PO`S,CO`S)

SYLLABUS

2020-21

ELECTRONICS

Department of ELECTRONICS

B.Sc. ELECTRONICS II Year course structure(2020-21)

Paper	Semester	Hours per week	Hours per week	Max Marks	

			Theory	Practicals	Theory	Practicals	Credits
B.Sc-II	**III**	**6**	**4**	**3**	**100**	**50**	**5**
B.Sc-II	**IV**	**6**	**4**	**3**	**100**	**50**	**5**

Practicals for each 20 students per batch

OSMANIA UNIVERSITY

B.Sc. ELECTRONICS SYLLABUS

SCHEME OF INSTRUCTIONS

UNDER CBCS (w.e.f 2016-2017 academic year onwards)

Year	Semester	Title of the Paper[Theory and Practical]	Instructions Hrs/week	Number of Credits	Marks
1st Year	I Sem	Paper – I : Circuit Analysis	4	4	100
		Practical – I : Circuit Analysis Lab	3	1	25
	II Sem	Paper – II : Electronic Devices	4	4	100
		Practical – II : Electronic Devices Lab	3	1	25
2nd Year	III Sem	Paper – III : Analog Circuits	4	4	100
		Practical – III : Analog Circuits Lab	3	1	25
	IV Sem	Paper – IV : Linear Integrated circuits and basics of Communication	4	4	100
		Practical – IV : Linear Integrated Circuits and basics of communication Lab	3	1	25
3rd Year	V Sem	Paper –V : Digital Electronics	3	3	75
		Practical – V : Digital Electronics Lab	3	1	25
		Paper – VI : Discipline Specific Elective – i. 8085 Microprocessor and applications ii. Electronic Instrumentation	3	3	75
		Practical – VI : i. 8085 Microprocessor and applications Lab II. Electronic Instrumentation Lab	3	1	25
	VI Sem	Paper – VII : Digital Communication	3	3	75
		Practical – VII : Digital Communication Lab	3	1	25
		Paper – VIII : Discipline Specific Elective – II: i. 8051 Micro Controller and applications ii. Digital System Design using VHDL	3	3	75
		Practical – VIII : Elective-II : i. 8051 Micro Controller and applications Lab ii. Digital System Design using VHDL Lab	3	1	25

Total Credits: 36

ELECTRONICS COURSE OBJECTIVES

- To provide an experimental foundation for the theoretical concepts introduced in the lectures

- To teach how to make careful experimental observations and how to think about draw conclusions from such data
- To help students understand the role of direct observations in physics and to distinguish between interferences based on theory and the outcomes of experiments.
- To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
- To teach how to write a technical report which communicates scientific information in a clear and concise manner;

ELECTRONICS COURSE OUTCOMES

- **To apply and integrate knowledge of computing to the engineering discipline.**
- **To identify, analyze, formulate and solve complex problems related to computer science and engineering.**
- **To design, construct and evaluate a computer based system, process or component, to meet the evolving needs.**
- **To demonstrate application of engineering skills and techniques for efficient development of projects and products.**
- **To use modern techniques and tools necessary for computing practice that drives towards entrepreneurship.**
- **To develop innovative ideas that can be translated into commercial products benefiting the society and the economic growth.**
- **To understand the impact of engineering science solutions in a social, global, environmental and economic context.**
-
- **To posses leadership and management skills with best professional, ethical practices and social concern.**
- **To interact professionally with others in the workplace and to function effectively as an individual and in a group.**
- **To demonstrate quality skills so as to speak, listen and present effectively the acquired technical knowledge to a range of audience.**
- **To utilize project management skills and principles of finance and economics in the construction of hardware and software systems with business objective.**
-

- **To substantiate contemporary knowledge and technological developments by being a continuous learner.**

B.Sc. ELECTRONICS SYLLABUS
B.Sc. I YEAR
Semester – I

DSC- Paper –I : Circuit Analysis

Total number of hours: 60
No of hours per week:4
Credits:4

UNIT - I

AC Fundamentals : The sine wave –average and RMS values – The J Operator –Polar and Rectangular forms of complex numbers – Phasor diagram-Complex impedance and admittance.

Kirchhoff's Current and Voltage Laws: Concept of Voltage and current sources-KVL and KCL-application to simple circuits (AC and DC) consisting of resistors and sources – Node voltage analysis and Mesh analysis.

UNIT-II

Network Theorems (DC and AC): Superposition Theorem ,Thevenin's Theorem, Norton's Theorem, Maximum power transfer Theorem, Reciprocity Theorem, Milliman's Theorem, Application to simple Networks.

UNIT-III

RC and RL Circuits : Transient Response of RL and RC Circuits with step input, Time constants. Frequency response of RC and RL circuits ,Types of filters – Low pass filter and High pass filter-frequency response, passive differentiating circuit and passive integrating circuit.

UNIT-IV

Resonance :RLC Series and parallel resonance circuits –Resonant frequency –Q Factor- Bandwidth-Selectivity.

Cathode Ray Oscilloscope: Cathode Ray Tube (CRT) and its working, electron gun focusing, deflection sensitivity, florescent screen. Measurement of Time period, Frequency ,Phase and amplitude.

Text Books:

1) Basic Electronics-Bernard Grob10th edition (TMH)
2) Circuit Analysis-P.Gnanasivam Pearson Education
3) Circuit and Networks-A. Sudhakar& S. Pallri (TMH)
4) Pulse, digital & switching waveforms-Milliman & Taub.
5) Networks, Lines and Fields-John Ryder (PHI)
6) Network theory-Smarajit Ghosh (PHI)

B.SC LABORATORY COURSE OBJECTIVES

- To provide an experimental foundation for the theoretical concepts introduced in the lectures
- To teach how to make careful experimental observations and how to think about draw conclusions from such data
- To help students understand the role of direct observations in physics and to distinguish between interferences based on theory and the outcomes of experiments.
- To introduce the concepts and techniques which have a wide application in experimental science but have not been introduced in the standard courses
- To teach how to write a technical report which communicates scientific information in a clear and concise manner;

LAB OUT COMES

- By the end of the course students will be able
- To make careful experimental observations and draw conclusions from such data
- To distinguish between inferences based on theory and the outcomes of experiments
- To write a technical report which communicates scientific information in a clear and concise manner.
-

B.Sc. I Year, Semester – I : Electronics Practical

Paper – I : Circuit Analysis Lab

No. of hours per week : 3

1. Measurement of peak voltage, frequency using CRO.
2. Measurement of phase using CRO.
3. Thevenin's theorem and Norton's theorem – verification.
4. Maximum power transfer theorem – verification.
5. CR circuit – Frequency response - (Low pass and High pass)
6. CR and LR circuits – Differentiation and integration – tracing of waveforms.
7. LCR – Series resonance circuit – frequency response – Determination of f_o, Q and band width.
8. Simulation: i) verification of KVL and KCL.

   ii) study of network theorems.

   iii) study of frequency response (LR).

Note: Student has to perform minimum of <u>Six</u> experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

B.Sc. ELECTRONICS SYLLABUS

B.Sc. I YEAR

Semester - II

DSC- Paper –II : Electronic Devices

Total number of hours : 60
No of hours per week: 4
Credits :4

UNIT-I

PN Junction: Formation of PN junction, Depletion region, Junction capacitance, Diode equation (no derivation) Effect of temperature on reverse saturation current , V - I characteristics and simple applications of i) Junction diode, ii) Zener diode, iii) Tunnel diode and iv) Varactor diode.

UNIT-II

Bipolar Junction Transistor(BJT) : PNP and NPN transistors, current components in BJT, BJT static characteristics (Input and Output) , Early effect , CB , CC , CE configurations of transistor and bias conditions (cut off, active, and saturation regions), CE configuration as two port network, h – parameter model and its equivalent circuit. Determination of h – parameters from the characteristics, Load line analysis (AC and DC). Transistor Biasing – Fixed and self bias.

UNIT-III

Field Effect Transistor (FET): Construction and working of JFET, output and transfer characteristics of FET, Determination of FET parameters. Application of FET as Voltage variable resistor. Advantages of FET over BJT.**MOSFET** :: construction and working of enhancement and depletion modes , output and transfer characteristics Application of MOSFET as a switch .

Uni Junction Transistor (UJT): Construction and working of UJT and its Characteristics. Application of UJT as a relaxation oscillator.

UNIT-IV

Silicon Controlled Rectifier (SCR): Construction and working of SCR. Two transistor representation, Characteristics of SCR. Application of SCR for power control.

Photo electronic Devices: Construction and Characteristics of Light Dependent Resistor (LDR), Photo voltaic Cell, Photo diode, Photo transistor and Light Emitting Diode(LED).

Books Recommended:

1) Electronic Devices and circuits-Millman and Halkias,(TMH)
2) Principles of Electronics-V.K.Mehta & Rohit Mehta
3) Electronic Devices and Circuits-Allen Moltershed (PHI)
4) Basic Electronics and Linear Circuits-Bharghava U
5) Electronic Devices and Circuits-Y.N.Bapat
6) Electronic Devices and Circuits-Mithal.
7) Experiments in Electronics-S.V.Subramanyam.

B.Sc. I Year, Semester – II : Electronics Practical

Paper – II : Electronic Devices Lab

No. of hours per week: 3

1. To draw volt- ampere characteristics of Junction diode and determine the cut – in voltage, forward and reverse resistances.
2. Zener diode V – I Characteristics – Determination of Zener breakdown voltage.
3. Voltage regulator(line and load) using Zener diode.
4. BJT input and output characteristics (CE configuration) and determination of 'h' parameters.
5. FET – Characteristics and determination of FET parameters.
6. UJT characteristics – determination of intrinsic standoff ratio.
7. UJT as relaxation oscillator.
8. Characteristics of LDR/Photo diode/Photo transistor/Solar cell.

Note: Student has to perform minimum of Six experiments.

Reference Books:

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell - PHI

B.Sc. ELECTRONICS SYLLABUS

B.Sc. II YEAR

Semester - III

DSC- Paper - III :Analog Circuits

Total number of hours : 60
No of hours per week: 4
Credits :4

UNIT – I

Rectifiers and filters: Rectifiers– half wave, full wave and bridge rectifiers, Efficiency, Ripple factor, regulation, harmonic components in rectified output, **Filters** – choke input (inductor) filter, Shunt capacitor filter, L section and π section filters.

UNIT – II

Regulated Power Supplies: Block diagram of regulated power supply, Series and shunt transistor regulated power supplies, three terminal IC regulators (78XX and 79XX), Principle and working of switch mode power supply (SMPS). UPS –Principle and working.

UNIT – III

Transistor amplifier: Classification of amplifiers, Hybrid π model of a transistor, RC coupled amplifier frequency response and analysis.

Feedback in amplifiers: Positive and negative feedback, Effect of negative feedback on gain, bandwidth, noise, input and output impedances. Emitter follower, Darlington pair and its advantages

UNIT – IV

Oscillators: Barkhausen criterion for sustained oscillations, RC oscillators- RC phase shift and Wien's bridge oscillators, LC oscillators- Hartley and Colpitt.

Multi-vibrators: Astable, Mono stable and Bi-stable multi-vibrators (Qualitative treatment using BJT's only)

Recommended Books:

1. Electronic Devices and Circuits-Millman and Halkias (TMH)
2. Basic Electronics and linear circuits - Bhargava, Kulshreshta & Gupta TMH
3. Λ first course in Electronics-ΛΛ Khan and KK Dey-PHI
4. Electronic Devices and Circuit Theory-Robert L Boylestad& Louis Nashelsky
5. Pulse, Digital and Switching circuits by Milliman and Taub

B.Sc. II YEAR, Semester – III : Electronics Practical

Paper - III: Analog Circuits Lab

No. of hours per week : 3

1. Study of HWR, FWR and bridge rectifier, determination of ripple factor.
2. Series inductor, shunt capacitor, L-section and π-section filters; determination of ripple factor using Full wave Rectifier.
3. Study of voltage regulator using IC's - 78XX & 79XX.
4. Colpitt oscillator – determination of frequency.
5. RC Phase shift oscillator- determination of frequency
6. Astable multi-vibrator – determination of time period and duty cycle.

7. **Simulation experiments :**

   i) Rectifiers

   ii) RC coupled amplifier

   iii) Wein bridge oscillator

   iv) Colpitt oscillator

   v) RC phase shift oscillator

   vi) Astable multi-vibrator

Note: Student has to perform minimum of <u>Six</u> experiments

1) Lab manual for Electronic Devices and Circuits – 4th Edition. By David A Bell – PHI
2) Basic Electronics – A Text Lab Manual –Zbar, Malvino, Miller.

B.Sc. ELECTRONICS SYLLABUS

B.Sc. II YEAR, Semester - IV

DSC Paper IV: Linear Integrated Circuits and Basics of Communication

Total number of hours : 60
No of hours per week: 4
Credits :4

UNIT I

Operational Amplifiers: Emitter Coupled Differential amplifier, Block diagram of Opamp. Characteristics of Opamp, Opamp parameters-Input resistance, Output resistance, Common mode rejection ratio (CMMR), Slew rate, offset voltages, Input bias current, Basic Op-Amp circuits-Inverting Op-Amp, Virtual ground, Non-inverting Op-Amp, Frequency response of Op-Amp. Op Amp as: Summing amplifier, subtractor, Comparator, Voltage follower, Integrator, and Differentiator.

UNIT- II

Applications of Op-Amps: Logarithmic amplifier, Sine wave [Wien Bridge] generator and square wave [Astable] generator, Triangular wave generator, Mono stable multi-vibrator, Solving of simple second order differential equations. Basic Op-Amp series regulator and shunt regulator, IC 555 Timer [Block diagram and its working], IC 555 as mono stable and astable multi-vibrators.

UNIT III

Modulation: Need for modulation-Types of modulation- Amplitude, Frequency and Phase modulation.
Amplitude modulation: Analysis of Amplitude modulation, side bands, modulation index, AM modulator, Balanced modulator, Demodulation – diode detector.

UNIT – IV

Frequency modulation: Analysis of FM, Working of simple frequency modulator, - detection of FM waves – FM Discriminator. Advantages of frequency modulation.AM and FM Transmitters and radio receivers [block diagram approach]. Introduction to PAM, PPM, PWM, and PCM, Delta modulation.

Reference Books:

1. Op amps and linear Integrated Circuits – Ramakant Gayakwad, PHI
2. Linear Integrated Circuits- D Roy Choudhury and Shail B Jain
3. Electronic Communication Systems-George Kennedy & Bernard Davis
4. Principles of Electronic Communication Systems-Louis E Freznel, TMH

B.Sc. II YEAR , Semester – IV: Electronics Practical

Paper - IV: Linear Integrated Circuits and Basics of Communication Lab

Total number of hours per week: 3

Practical :Using IC 741OpAmp and IC 555 Timer :

1. Op amp as inverting Amplifier- determination of gain (with AC and DC).
2. Op amp as non- inverting Amplifier- determination of gain(with AC and DC).
3. OP Amp as Summing amplifier and comparator(Zero crossing detector)
4. Astable multi-vibrator – determination of time period and duty cycle.
5. Mono stable multi-vibrator- determination of gate width.
6. Integrator/ Differentiator – study of wave forms.
7. Astable multi-vibrator using IC 555
8. Mono stable multi-vibrator using IC 555.
9. AM modulator and detector
10. FM modulator and detector

Simulation of all the above experiments:

1. Inverting and Non-inverting amplifiers and comparator
2. Integrator/ Differentiator using op amp
3. Wein bridge oscillator
4. Astable multi-vibrator using Op Amp
5. Astable multi-vibrator using IC 555

B.Sc. ELECTRONICS SYLLABUS

B.Sc. III YEAR, Semester - V

DSC- Paper - V: Digital Electronics

Total number of hours : 45
No of hours per week: 3
Credits :4

UNIT-I

Number system and Logic gates: Conversions of Binary, octal, Decimal & hexadecimal number systems, Binary addition and subtraction (1's and 2's complement methods).
Logic gates OR, AND, NOT, XOR, NAND, NOR gates and their Truth tables – Design of basic gates using the Universal gates- NAND and NOR gates, Half adder, Full adder and parallel adder logic circuits. Logic families and their characteristics – TTL, CMOS and ECL logic circuits.

UNIT-II

Boolean algebra and Combinational logic circuits: Boolean algebra- Laws and identities, DeMorgan's Theorems. Simplification of Boolean expressions using Boolean identities- Reduction of Boolean expressions using Karnaugh Maps - Sum of Products (SOP) representation (up to four variables). Multiplexer, De-Multiplexer, Decoder (3 to 8) and Encoder(8 to 3).

UNIT-III

Sequential logic circuits: Flip-flops - SR, D, JK, T and Master-Slave JK ; **Registers -** Shift Registers- SISO,SIPO, PISO and PIPO Registers, Universal shift register(IC 7496), **Shift register counters** Ring counter , Johnson Counter.

UNIT-IV

Counters and Semiconductor memories:
4-bit Asynchronous (Ripple) counter, Modulo-N counter, synchronous counter. Up/down counters – ripple counter IC7493 - Decade counter IC7490 – working, truth tables and timing diagrams.
Semiconductor memories :: Organization and working of ROM, types of ROM's - PROM, EPROM, EEPROM, FLASH, RAM- static and dynamic.

Books Recommended:

1. Digital Principles and Applications – Malvino& Leach - TMH.
2. Digital Principles and Applications-Ronald J.Tocci– Pearson Education.
3. Text book of Electronics Bsc III year (vol.III)-Telugu Akademi
4. Digital Fundamentals F.Loyd& Jain Pearson Education.
5. Fundamentals of Digital Circuits – Anand Kumar – PHI
4. Digital Electronics Principles and Integrated circuits – Maini – Wiley India.
5. Digital Electronics - Gothman

B.Sc. ELECTRONICS SYLLABUS

B.Sc. III YEAR , Semester – V Practical

Paper –V : Digital Electronics Lab

No. of h

1. Verification of truth tables of AND, OR, NOT, NAND, NOR, EXOR Gates using series.
2. Construction of basic gates using NAND and NOR gates.
3. Construction of Half Adder using gates. Verification of truth table.
4. Construction of Full Adder using gates and verification of truth table.
5. Verification of truth tables of flip flops: RS, D, and JK using IC's.
6. Construction of binary counters 7493

imulation experiments:

1. 4bit parallel adder using Full adders.
2. Decade counter using JK flip flops.
3. Up/Down counters using JK flip flops.
4. Up/down counter using 74193
5. Multiplexer/De-Multiplexer.
6. Encoder.

B.Sc. ELECTRONICS SYLLABUS
B.Sc. III YEAR, Semester - V

Paper – VI A (Elective)

DSE- 01 :8085 Microprocessor and Applications

Total number of hours : 45
No of hours per week: 3
Credits :4

UNIT-I

Introduction to 8085 Microprocessor & its architecture:: Introduction to Microcomputer, Intel 8085 Microprocessor – Architecture of 8085 microprocessor – CPU – Timing & Control Unit – Instruction cycle, Fetch Cycle , Execute cycle (Timing diagram), Machine cycle and clock states. Interrupts – Hardware and Software, Address space partitioning – Memory mapped I/O & I/O mapped I/O .

UNIT-II

Instruction set of 8085 microprocessor: Classification - Data transfer operations, Arithmetic operations, logical operations, Branch control operations and stack, I/O and Machine control operations. Stack and Subroutines, Addressing modes

UNIT-III

Programming of 8085 microprocessor: Assembly language programming, addition(8 and 16 bit), 8 bit - subtraction, multiplication and division. Finding the largest and smallest number in data array Program to arrange the given numbers in ascending and descending order. Counters and Time delays

UNIT-IV

Interfacing of peripherals: Types of programmable and non programmable interfacing peripherals- 8212(I/O port)– programmable peripheral interface 8255.
D/A Converters(binary weighted, R-2R ladder network), A/D Converters(Dual slope , Successive approximation), Closed loop and open loop process control systems(concept only), Stepper motor control.

Books Recommended:

1) Microprocessor Architecture and Programming – Ramesh S.Goanker – Penram.
2) Fundamentals of Microprocessors and Micro controllers – B.Ram, - Dhanpat rai & sons.
3) Text book of Electronics B.SC III year (Vol.III)-Telugu Academy.
4) Introduction to Microprocessor – Aditya P.Mathur – TMH.
5) Microprocessor Lab Premier – K.A. Krishnamurthy.

B.Sc. ELECTRONICS SYLLABUS
B.Sc. III YEAR , Semester – VI Practical

Paper – VII : 8085 Microprocessor Lab

No. of hours per week

I. 8085 – Software Experiments :

1. Binary addition (8 bit and 16 bit)and subtraction (8 bit).
2. Decimal Addition (DAA).
3. Multiplication and Division (8 bit).
4. Picking of largest/Smallest number from the given data.
5. Arranging the given data in ascending/descending order.
6. Time Delay generation.

II. 8085 - Hardware Experiments:

1. R – 2R ladder network (DAC) (4 bits).
2. Interfacing a Stepper motor and rotating it clockwise/anticlockwise direction through a known angle.
3. Interfacing a seven segment display.
4. Interfacing ADC for temperature measurement.