Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2015
'B' Grade (CGPA 2.62)

Name of the Faculty: Science & Technology

CHOICE BASED CREDIT SYSTEM

Syllabus: Electronics

Name of the Course: B.Sc. II (Sem.– III & IV)

(Syllabus to be implemented from w.e.f. June 2020)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Syllabus
For B.Sc. II Electronics
(CBCS Pattern)

Choice Based Credit System (CBCS) Pattern

To be implemented from Academic Year 2020-21

1. Preamble:

B.Sc. II syllabus is designed to provide an insight into applications of various circuit blocks, design analog and digital systems, methods to analyze working of systems and some of consumer products. Training on system design and simulations. In the theory courses adequate knowledge of analog systems design, digital system design and communication systems will be acquired by the students. Student taking admission at S.Y. B. Sc. Electronics has to complete 4 theory courses 2 each semester, two practical courses (Annual). In the practical course of 100 marks there are compulsory experiments for practical course Sem III and IV. The details are mentioned in the syllabus.

2. Objectives of the course:

The aim of the course is to generate trained manpower with adequate theoretical and practical knowledge of the various facets of electronic circuits and systems. Due care is taken to inculcate conceptual understanding in basic phenomena, materials, devices, circuits and products and development of appropriate practical skills suitable for industrial needs. Objectives are

- To design the syllabus with specific focus on key Learning Areas.
- To equip student with necessary fundamental concepts and knowledge base.
- To develop specific practical skills.
- To impart training on circuit design, analysis, building and testing.
- To prepare students for demonstrating the acquired knowledge.
- To encourage student to develop skills for accepting challenges of upcoming technological advancements.

3. Course Structure:

Paper No.	Subject	Title of the course	Marking Scheme			L	T	P	Credits
			UA	CA	Total				
Semester –III Electronics									
V	Electronics	Electronic Circuits	40	10	50	3	-	-	2
VI	Electronics	Pulse and Switching Circuits	40	10	50	3	-	-	2
		Total	**80**	**20**	**100**	**6**	-	-	**4**
Semester –IV Electronics									
VII	Electronics	Operational Amplifier and Applications	40	10	50	3	-	-	2
VIII	Electronics	Digital Techniques and Microprocessor	40	10	50	3	-	-	2
		Total	**80**	**20**	**100**	**6**	-	-	**4**
Practicals		Practical III & IV	80	20	100	-	-	8	4
		Total	**80**	**20**	**100**	**-**	-	8	**4**
		Grand Total	**240**	**60**	**300**	**12**	-	8	**12**

4. Distribution of each Theory paper (Marks 50)

a. University Assessment (UA) **:** 40 Marks
b. College Assessment (CA) **:** 10 Marks

Scheme of College Assessment

1. Unit Test **:** 5 Marks
2. Home Assignment **:** 5 Marks

5. Distribution of Practical Marks (100)

Practical examination will be at the end of fourth semester. The candidate has to perform four practicals, one from each group.

A. University Practical Examination (80) Marks : (UA)

a) Practical from group A **:** 18

b) Practical from group B **:** 18

c) Practical from group C **:** 18

d) Practical from group D **:** 18

e) Journal **:** 08

B. Break up of 18 marks for each practical (UA)

a) Circuit diagram / Flow Charts **:** 03

b) Assembly of the circuit /Programming **:** 03

c) Procedure / Observations **:** 03

d) Graph /Calculations/ Execution **:** 03

e) Results/Comments **:** 03

f) Oral **:** 03

C. Practical: Internal Continuous Assessment (20 marks)

Scheme of Marking

- Internal Test on practical's / Skill enhancement mini project **: 1**0 Marks
- Home assignment/Seminars/conference/workshop/industrial visit : 10 Marks

B.Sc. II-Electronics (CBCS Pattern)
Semester – III
Paper –V-Electronic Circuits

Total Marks: 50
(45 periods)

1. **Rectifiers, Filters and Regulators** **(07)**

   Diode rectifiers: Half wave, full wave and bridge rectifier, derivation of Ripple factor, Efficiency and PIV of half wave and full wave rectifier (center tapped), Capacitor filter, Zener regulator

2. **Transistor Biasing** **(07)**

   Transistor biasing, DC load line, Operating point, Stability factor,
   Methods of transistor biasing: Fixed Bias, Emitter Bias, Voltage divider bias with mathematical treatment

3. **Transistor Amplifiers** **(17)**

   Basic action of transistor amplifier, DC (Thevenin's) and AC analysis of CB, CE, CC configurations, comparison of CB, CE, CC configuration, FET as CS amplifier (Analysis and its applications)

   Multistage Transistor Amplifier: RC Coupled, Transformer Coupled, Direct Coupled amplifier, Darlington pair amplifier

   Power Amplifiers: Types of power amplifiers - Class A, Class B and Class C amplifiers by Graphical Method, Class A and Class B push pull amplifier, cross over distortion, Class AB amplifier, complementary-symmetry amplifier, harmonic distortion in power amplifiers,

4. **Feedback Amplifiers** **(08)**

   Theory of feedback amplifier, positive and negative feedback, Effect of negative feedback on Gain, Bandwidth, Distortion, Noise, Input impedance and Output impedance, Types of negative feedback, Analysis of current series feedback circuit (Numerical Examples)

5. **Transistor Oscillators** **(06)**

   Barkhausen criterion, **RC oscillators:** Wien bridge oscillator, Phase shift oscillator, **LC oscillators:** Hartley oscillator, Colpitt's oscillator (Without mathematical treatment), Piezoelectric crystal and its equivalent circuit, Pierce Crystal oscillator (Circuit description, condition for oscillation and Numerical Examples)

Reference Books:

1. A text book of Applied Electronics by R. S. Sedha. S. Chand Publication.
2. Electronic Devices and Circuits by Boylstead
3. Basic Electronics (Solid State) by B. L. Theraja, S. Chand & Company Ltd.
4. Basic Electronics and Linear Circuits by N. N. Bhargaya D. C. Kulshreshtha & S. C. Gupta TMH

B.Sc. II-Electronics (CBCS Pattern)
Semester – III
Paper –VI- Pulse and Switching Circuits

Total Marks: 50
(45 periods)

1. Wave shaping Circuits (08)

Need of wave shaping circuit, linear wave shaping circuits: Differentiator and Integrator Non linear wave shaping: Diode Clipping and Clamping circuits.

2. Time base Circuits (09)

General features of Time base signals, Concept of RC time base circuit, UJT as a relaxation oscillator, Linearity considerations with constant current source, Miller integrator and bootstrap circuit.

3. Multi-vibrators using BJT (13)

Transistor as a switch, switching characteristics, Types of multivibrator

Astable multivibrator (collector coupled): Operation, Wave forms, Derivation of output frequency.

Monostable multivibrator (collector coupled): Operation, Triggering methods, Waveforms, Derivation of gate width.

Bistable Multivibrator (collector coupled): Operation, Triggering methods, Wave forms,

Schmitt's Trigger: Operation, Hysterises curve (UTP, LTP),

(Uses and Numerical Examples)

4. Multi-vibrators using Gates (05)

Astable multivibrator using gates, Monostable Multivibrator using gates and IC74121.

5. IC 555 Timer (10)

IC-555 timer- Pin configuration, functional block diagram, Astable multivibrator: Operation, wave forms, Derivation of frequency and duty cycle, Monostable multivibrator: Operation, wave forms, Derivation of gate width, Applications of IC 555 as Sequential Timer, Battery charger, Voltage controlled Oscillator.

(Numerical examples)

Reference Books

1. Pulse and Switching circuits by Millman and Taub
2. Hand book of Electronics by Sony Gupta.
3. A Text of Applied Electronics by R.S.Sedha, S. Chand Publication
4. Electronic Devices and Circuit by Boylestead
5. Linear Integrated Circuit – D. Roy Choudhari, Shail Jain (Wiley Eastern Ltd.)

B.Sc. II-Electronics (CBCS Pattern)
Semester – III
Paper –VII : Operational Amplifier and Applications

Total Marks: 50
(45 periods)

1. Differential Amplifier (09)

Need of differential amplifier, Types of differential amplifiers, Emitter coupled differential amplifier, Operation, Common mode gain and Differential mode gain, Derivation of A_d, A_c and CMRR, Constant current bias, Current mirror bias.

2. Operational Amplifier (09)

Introduction, Block diagram, Equivalent circuit of op-amp, Ideal characteristics, open loop and closed loop configuration and its need,

Op-amp parameters: Output offset voltage, Input offset voltage, Input bias current, Input offset current, Input impedance, Output impedance, CMRR, Slew rate, Maximum power bandwidth, PSRR, Specifications of IC 741

3. Operational Amplifier Linear Systems (11)

Concept of virtual ground, Inverting amplifier, Non-inverting amplifier, Voltage follower, summing amplifier (Adder), Op-amp differential amplifier (subtractor), Differentiator, Integrator, Current to Voltage converter and Voltage to Current converter

4. Operational Amplifier Non-linear Systems (07)

Basic comparator, Zero-crossing detector, Regenerative comparator (Schmitt Trigger), Precision rectifier (Half wave)

5. Wave form Generators (09)

Oscillators - Phase shift oscillator, Wien Bridge oscillator, (without mathematical treatment)

Astable multivibrator, Monostable multivibrator (with mathematical treatment)

Triangular wave generator, Saw tooth oscillator,

Reference Books:

1. Linear Integrated Circuit – D. Roy Choudhari, Shail Jain (Wiley Eastern Ltd.)
2. Integrated Circuit (New Edition) – K. R. Botkar
3. Integrated Electronics – Millman , Halkies (MGH)
4. Op-Amps and Linear circuits – Ramakant A. Gaikwad (PHI)
5. Operational Amplifiers and Linear ICs – Caughlin and Driscoll (PHI)
6. Design with Operational Amplifiers and Analog ICs – Franco (McGraw Hill, 2000)

B.Sc.-II-Electronics (CBCS Pattern)
Semester-IV
Paper-VIII : Digital Techniques and Microprocessor

Total Marks: 50
(45 periods)

1. Semiconductor Memories: (7)

Memory cell (Static and Dynamic), Memory organization, memory parameters (type, size), Classification of memory (volatile and non volatile) and their comparison, Concept of flash memory

Study of memory chips: 2764, 6264 (Features & Pin description)

2. Data Converters: (9)

Basic concepts of Digital to analog conversion (DAC) and Analog to digital conversion (ADC), specifications

Digital to analog conversion: Binary weighted and R - 2 R ladder networks

Analog to digital conversion: Comparative (Flash), Successive approximation, dual slope ADC techniques, Study of DAC (IC 0808) & ADC (IC 0804) (Features & functional description)

3. Fundamentals of Microprocessor: **(10)**

Introduction to microprocessor, Basic system with Bus Architecture

The microprocessor Intel 8085: Salient Features, Block diagram, pin descriptions, Address/data bus, Data bus, control signals, ALU, Accumulator, Flags, Registers, Interrupts, Clock & reset circuit, concepts of T-state, Machine cycle, Instruction cycle.

4. Programming with Microprocessor: (10)

The Instruction, Instruction set of 8085, Instruction format, Addressing modes, Classification of instruction set, as per function, Algorithm, Flowchart, Assembly language programming of Data transfer (Block transfer & exchange), Arithmetic operation (addition, subtraction, multiplication, division), logical operation (AND, OR, NOT, XOR), ALP on Branch operation.

5. Interfacing techniques: (9)

Concept of Tristate logic, Study of IC 74244, 74245, 74373 (Features and Pin diagram)

De-multiplexing of Address/data bus using IC74373

Generation of control signal $\overline{MEMR}, \overline{MEMW}, \overline{IOR}, \overline{IOW}$ (using gates and IC 74138)

Need of Interfacing, Interfacing techniques, I/O mapped I/O, Memory mapped I/O and their comparison

Address decoding (absolute and linear), Interfacing of memory chips 2764 and 6264 to the 8085 microprocessor

Recommended Books:

1. Digital Principles and Applications by A. P. Malvino & D.P. Leach (TMH), Delhi
2. Digital Fundamental by Floyd, Pearson Education.
3. Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh S. Gaonkar
4. Microprocessor by A. P. Godse

B.Sc.–II-Electronics (CBCS Pattern)
Practical Course
List of Experiments

Group A

1) Designing of biasing network by using simulation software.
2) Study of single stage CE / CB amplifier. (Gain, I/P & O/P impedance)
3) FET CS amplifier (Gain, I/P & O/P impedance)
4) Emitter follower (Gain, I/P & O/P impedance)
5) Negative feedback amplifier. (Frequency response & feedback factor)
6) RC Phase shift oscillator (Design & testing)
7) Wein bridge oscillator by using simulation software
8) Hartley oscillator (Design & testing)
9) Colpitt's (Design &testing)
10) Crystal oscillator (Pierce oscillator)

Group B

1) Miller integrator
2) UJT oscillator with constant current source
3) Astable multivibrator using BJT
4) Monostable multivibrator using BJT
5) Bistable multivibrator using BJT (AC & DC) triggering by using simulation software)
6) Schmitt's trigger (hysterysis curve & square wave testing)
7) Astable multivibrator using IC 555.
8) Monostable multivibrator using IC 555
9) Astable multivibrator using IC7400 by using simulation software
10) Monostable multivibrator using IC74121

Group C

1) Op-amp parameters (O/P offset voltage, I/P offset voltage and slew rate)
2) Inverting and non inverting amplifier using op-amp
3) Op-Amp as a Adder / subtractor
4) Op-amp as voltmeter / ammeter
5) Op-amp as Schmitt's trigger
6) Wein-bridge oscillator using op-amp
7) Phase Shift Oscillator using op-amp by using simulation software
8) Astable multivibrator using op-amp by using simulation software
9) Monostable multivibrator using op-amp
10) Integrator / Differentiator using op-amp

Group D

1) DAC using R-2R Ladder network (4 bits)
2) Study of DAC (IC 0808)
3) Study of ADC (IC 0804)
4) Data transfer using 8085
5) Arithmetic operations using 8085 (8-bit Addition)
6) Arithmetic operations using 8085 (8-bit Subtraction)
7) Arithmetic operations using 8085 (8-bit Multiplication) by using simulation software
8) Arithmetic operations using 8085 (8-bit Division) by using simulation software
9) Logical operations (AND and OR) using 8085
10) Logical operations (NOT and XOR) using 8085

N.B:
1) Minimum 30 experiments must be performed out of which at least seven from each group.