SOLAPUR UNIVERSITY, SOLAPUR

B.Sc.-II Electronics

Choice Based Credit System

(CBCS)

(Revised from June,2018)

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

Choice Based Credit System (CBCS) Pattern

To be implemented from Academic Year 2018-19

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 200 marks there are compulsory experiments for practical course I and II. 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	Electronics Circuits	70	30	100	3	-	-	3
VI	Electronics	Pulse and Switching Circuits	70	30	100	3	-	-	3
		Total	**140**	**60**	**200**	**6**	-	-	**6**
Semester –IV Electronics									
VII	Electronics	Operational Amplifier and Applications	70	30	100	3	-	-	3
VIII	Electronics	Digital Techniques and Microprocessor	70	30	100	3	-	-	3
		Total	**140**	**60**	**200**	**6**	-	-	**6**
Practicals		Practical II & III	140	60	200	-	-	8	8
		Total	**140**	**60**	**200**	-	-	8	**8**
		Grand Total	**420**	**180**	**600**	**12**	-	8	**20**

4. Distribution of each Theory paper (Marks 100)

a. University Assessment (UA) : 70 Marks
b. College Assessment (CA) : 30 Marks

Scheme of College Assessment

1. Unit Test : 15 Marks
2. Home Assignment : 15 Marks

5. Distribution of Practical Marks (200)

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 (140) Marks : (UA)

a)Practical from group A : 30

b)Practical from group B : 30

c)Practical from group C : 30

d) Practical from group D : 30

e) Journal : 20

B. Break up of 30 marks for each practical (UA)

a) Circuit diagram / Flow Charts : 05

b)Assembly of the circuit /Programming : 05

c)Procedure / Observations : 05

d)Graph /Calculations/ Execution : 05

e)Results/Comments : 05

f)Oral : 05

C. Practical: Internal Continuous Assessment (60 marks)

Scheme of Marking

- Internal Test on any four practical's : 30 Marks
- Mini projects/Home assignment/oral/ Seminars/conference/industrial visit/ Groupdiscussion/viva/ etc : 30 Marks

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

Total Marks: 100
(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 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 Amplifier (17)

Basic action of transistor amplifier, DC (Thevenin's)and AC analysis of CB, CE, CC configurationusing (h model), comparison of CB, CE, CC configuration, FET asCS amplifier (Analysis and its applications)

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

Power Amplifiers: Class A, Class B, Class C amplifiers, circuit description (Graphical Method) distortion inpower amplifiers, Class B push pull amplifier, complementary-symmetry amplifier

4. Feedback Amplifier (08)

Theory of feedback amplifier, 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. 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 (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. GuptaTMH

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

Total Marks: 100
(45 periods)

1. **Wave shaping Circuits** **(08)**

   Need of wave shaping circuit, linear wave shaping circuits: Differentiator and IntegratorNon 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, Miller integrator

3. **Multi-vibrators using BJT** **(13)**

   Transistor as a switch, switching characteristics, Types of multivibrator and applications,

   Astable multivibrator (collector coupled): Operation, Wave forms, Expression of outputfrequency.

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

   Bistable Multivibrator (collector coupled): Operation, Triggering methods, Wave forms,Schmitt's Trigger: Operation, Hysterises curve (UTP, LTP),Applications(NumericalExamples)

4. **Multi-vibrators using Gates** **(05)**

   Astablemultivibrator using NAND gates, MonostableMultivibrator using NAND gates andIC74121.

5. **IC 555 Timer** **(10)**

   IC-555 timer- Pin configuration, functional block diagram, Astablemultivibrator: Operation, wave forms, Expression for frequency and duty cycle, Monostablemultivibrator: Operation, wave forms, Expression of gate width, Application 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: 100
(45 periods)

1. Differential Amplifier (09)

Need of differential amplifier, Emitter coupled differential amplifier, Operation, Commonmode gain and Differential mode gain, Derivation of CMRR, Constant current bias, Currentmirror bias.

2. Operational Amplifier (09)

Introduction, Block diagram, Equivalent circuit of op-amp, Ideal characteristics, open loop andclosed 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, Saw tooth oscillator, (without mathematical treatment) Astablemultivibrator, Monostablemultivibrator, Triangular wave generator

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: 100
(45 periods)

1. Semiconductor Memories: (7)

Memory cell, Memory organization, memory parameters (type, size, speed, timing),Classification of memory volatile, non volatile, type of volatile and non volatile memory and their comparison, Concept of flash memory, study of memory chips: 2764, 6264 (Features &Pin description)

2. Data Converters: (9)

Basic concepts of DAC and ADC, specifications, Digital to analog conversion: Binary weighted and R - 2 R ladder networks ,Analog to digital conversion: 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, as per size, 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,
De-multiplexing of Address/data bus using 74373,
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 and Memory mapped I/Omode, comparative study,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 byRamesh 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.
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 (Design & testing)
8) Hartley oscillator (Design & testing)
9) Crystal oscillator (Pierce oscillator)
10) Colpitt's (Design &testing)

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)
6) Schmitt's trigger (hysterysis curve & square wave testing)
7) Astable multivibrator using IC 555.
8) Monostable multivibrator Integrator using IC 555
9) Astable multivibrator using IC7400
10) Monostable multivibrator using IC74121

Group C

1) Op-amp parameters (any three)
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
8) Astable multivibrator using op-amp
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) (Without carry)
8) Arithmetic operations using 8085 (8-bit Division) (Without Barrow)
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.