SOLAPUR UNIVERSITY, SOLAPUR

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

Faculty of Science

CBCS Pattern Syllabus

B.Sc.II (Sem-III&IV)

Electronics

With effect from June-2017

B.Sc.II -Electronics :

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 have 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..

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.

Following are the objectives-

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

Solapur University, Solapur
Faculty of Science
Syllabus for B.Sc.II-Electronics
Semester System
Choice Based Credit System (CBCS) Pattern
To be implemented from Academic Year 2017-18

1. Course Structure:

Sr. No	Semester	Paper No.	Title	No. of Lectures	Credit Point	Total Marks
1.	Semester-III	V	Electronics Circuits	45	3	100
		VI	Pulse and Switching Circuits	45	3	100
2.	Semester-IV	VII	Fundamentals of Operational Amplifier	45	3	100
		VIII	Digital Techniques and Microprocessor	45	3	100
3.	Semester III and IV (Annual)		Practical Course (Annual)		8	200
			Total Marks		20	600

2. Distribution of each Theory paper (Marks 100)

University Assessment (UA) : 70 Marks
College Assessment (CA) : 30 Marks

Scheme of College Assessment

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

3. 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) Connections/Programming : 05
c) Procedure / Observation : 05
d) Graph /Calculations/ Execution : 05
e) Results/Comments : 05
f) Oral : 05

C. Practical : Internal Continuous Assessment (60 marks)

Scheme of Marking: **30 Marks:** Internal Test on any four practicals,
30 Marks: Home assignment/oral/Seminars/Conference /Industrial Visit/Group Discussion/Viva, etc.

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

Total Marks:100
(UA-70+CA-30)
(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, D.C. and A.C. analysis of CB, CE, CC Configuration using small signal low frequency model, 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

Class A, Class B, Class C amplifiers, circuit description (Graphical Method) Distortion in power 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).

References:

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 T. M. H. Publication.

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

Total Marks:100
(UA-70+CA-30)
(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, Miller integrator

3. **Multivibrators using BJT:** **13**
   Transistor as a switch, Switching characteristics, Types of multivibrator and applications,
   Astable multivibrator (collector coupled): Operation, Wave forms, Expression of output frequency.
   Monostable multivibrator (collector coupled)**:** Operation, Triggering methods, Wave forms, Expression of gate width.
   Bistable Multivibrator (collector coupled): Operation, Triggering methods, Wave forms,
   Schmitt's Trigger: Operation, Hysterises curve (UTP, LTP), Applications
   (Numerical Examples)

4. **Multivibrators using Gates** **05**
   Astable multivibrator using NAND gates, Monostable Multivibrator using NAND gates and IC74121.

5. **IC 555 Timer** **10**
   IC-555 timer- Pin configuration, functional block diagram
   Astable multivibrator: Operation, Wave forms, Expression for frequency and duty cycle.
   Monostable multivibrator: 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 - IV
Paper-VII-Fundamentals of Operational Amplifier

Total Marks:100
(UA-70+CA-30)
(45 periods)

1. **Differential Amplifier** 09
   Need of differential amplifier, Emitter coupled differential amplifier, Operation, Common mode gain and Differential mode gain, Derivation of CMRR, Constant current bias, Current mirror bias.

2. **Operational Amplifier** **09**
   Introduction, Block diagram, Equivalent circuit of op-amp, Ideal characteristics, Open loop configuration, 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, Saw tooth oscillator (without mathematical treatment)
   Astable multivibrator, Monostable multivibrator, 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 (Mc Graw Hill, 2000)

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

Total Marks:100
(UA-70+CA-30)
(45 periods)

1. Semiconductor Memories: [7]
Memory cell, Memory organization, operation and parameters.
Classification of ROM, RAM (Static, Dynamic) and Flash memory
Study of memory chips: 2764, 6264 (Features & Architecture)

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: Successive approximation method, Dual slope technique
Study of DAC (IC 0808) & ADC (IC 0804) (Features & functional description)

3. Digital Devices: [9]
Tristate Logic, Line driver (IC 74244), Line transceiver (IC 74245), Address latch (IC 74373)
Concept of PLA, PAL, CPLD, FPGA

4. Fundamentals of Microprocessor: [11]
Introduction to microprocessor, Basic system with Bus Architecture
Intel 8085 Microprocessor: Features, Architecture, Pin Description.
Clock & reset circuit, Concepts of T-state, Machine cycle, Instruction cycle.
Concept of I/O mapped I/O and Memory mapped I/O techniques.

5. Programming with Microprocessor: [9]
Instruction set of 8085, Instruction format, Addressing modes, Classification of instructions
Algorithm, Flowchart, Assembly language programming of Data transfer, Arithmetic, logical & Branch operations. (8-bit only),Time delay subroutine.

Recommended Books:

1. Modern Digital Electronics by R.P. Jain (4^{th} Ed), McGraw Hill.
2. Digital Principles and Applications by A. P. Malvino & D.P. Leach (TMH), New Delhi
3. Digital Fundamental by Floyd, Pearson Education.
4. Microprocessor Architecture, Programming and Applications with the 8085 by Ramesh S. Gaonkar
5. 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 using 8085
10) Time delay Subroutine using 8085

N.B.
1) Minimum 30 experiments must be performed out of which at least seven from each group.
2) The student should be exposed to make use of data sheet, specifications, manuals etc.

Equivalent Subject for Old Syllabus

Sr. No.	Name of the Old Paper	Name of the New Paper
1)	Electronic Circuits Paper-III	Electronic Circuits Paper-V
2)	Pulse and switching circuits Paper-IV	Pulse and switching circuits Paper-VI
3)	Fundamentals of operational amplifier Paper-V	Fundamentals of operational amplifier Paper-VII
4)	Digital techniques and microprocessor Paper-VI	Digital techniques and microprocessor Paper-VIII