# Solapur University, Solapur

## Syllabus for **B.Sc.II-Electronics**

### To be implemented from Academic Year 2015-16

1. **Course Structure:**

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

2. **Nature of Theory Question Paper:**
   The nature of theory question paper is attached according to the General Structure as per Credit and Grading System.
3. **Distribution of Practical Marks (200):**
4. **University Practical Examination (140) Marks:**

1. Practical from group A          :     35
2. Practical from group B          :     35
3. Practical from group C          :     35
4. Practical from group D          :     35

             Break up of 35 marks for each practical

a. Circuit diagram / Flow Charts      :     06
b. Connections/Programming        :     06
c. Procedure / Observation         :     06
d. Graph /Calculations/ Execution     :     06
e. Results/Comments              :     06
f. Oral                         :     05

**Practical : Internal Continuous Assessment (60 marks)**
Scheme of Marking: **40 Marks:** Internal Test on any four practicals,
**20 Marks:** Lab Journal/viva, attendance, attitude etc.

**Theory : Internal Continuous Assessment**
There shall be theory examination of 70 marks (UA) and 30marks (CA) internal assessment for each papers.

**Scheme of Marking Theory :** 20 Marks : Internal Text

**10 Marks :** Home assignment/Tutorials/Seminars/Group Discussion/Viva/Field visit/Industry visti.

# B.Sc.II-Electronics
## Semester – III
## Paper –III-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
## Semester – III
## Paper–IV-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
   Basic principle of 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)**: O**peration, 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
## Semester - IV
## Paper-V-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
## Semester-IV
## Paper-VI-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 (4th 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
# 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 / Colpitt's (Design & testing)
9) Crystal oscillator (Colpitts / Pierce oscillator )
10) Complementary symmetry Amplifier

## 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) Study of transreceiver (IC 74245)
5) Data transfer using 8085
6) Arithmetic operations using 8085 (8-bit Addition/ 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.

# Solapur University, Solapur

# Faculty of Science

# B.Sc.Part- II

**General Structure as per**

# Credit and Grading System

(June, 2015)

# Solapur University, Solapur

## Faculty of Science

## Credit and Grading System

(W.e.f. June, 2015)

- **Title of the Course:** B.Sc.- Part II
- **Subject :** Electronics
- **The Credit and Grading System :**
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With the view to ensure worldwide recognition, acceptability, horizontal as well as vertical mobility for students completing under graduate degree, Solapur University has implemented Credit and grading system of Evaluation at Undergraduate level.

Credit is a numerical value that indicates student's work load (Lectures, Lab work, Seminars, Tutorials, Field work, etc.) to complete a course unit. In most of the universities 15 contact hours constitute one credit. The contact hours are transformed into Credits. As per present norms, there are 4 contact hours per paper (subject) per week which works out to be 60 contact hours per paper (subject) per semester.

In Solapur University, for B. Sc.-II, there are 3 optional subjects and Environmental Studies. For B. Sc.-II, there are 6 contact hours per paper (subject) per week for each optional subject. Therefore, total contact hours per week are 18. Each subject has 90 contact hours, which are transformed into 6 credits. As there are 4 contact hours per week for Environmental Studies, 4 credits shall be assigned for Environmental Studies.

Moreover, the grading system of evaluation is introduced for B. Sc. course, wherein process of Continuous Internal Evaluation is ensured. The candidate has to appear for Internal Evaluation of 30 marks and University Evaluation for 70 marks. It is 70 + 30 pattern of evaluation. It is applicable for theory and practical as well. The details regarding this evaluation system are as under.

- **Conversion of marks into Grades :**

A table for the conversion of the marks obtained by a student in each paper (out of 100) to grade and grade points is given below.

| Sr. No | Range of Marks | Grade | Grade Point |
|--------|----------------|-------|-------------|
| 1. | 80-100 | O | 10 |
| 2. | 70-79 | A+ | 9 |
| 3. | 60-69 | A | 8 |
| 4. | 55-59 | B+ | 7 |
| 5. | 50-54 | B | 6 |
| 6. | 45-49 | C+ | 5 |
| 7. | 40-44 | C | 4 |
| 8. | <39 | FC | 0 (Failed in Term Exam) |
| 9. | <39 | FR | 0 (Failed in Internal Assesment) |

1. **Grade Point Average at the end of the Semester (SGPA)**

$$SGPA = \frac{(G_1 x C_1) + (G_2 x C_2) + \ldots\ldots}{\Sigma C_i}$$

($\Sigma C_i$ - The total number of credits offered by the student during a semester)

2. **Cumulative Grade Point Average (CGPA)**

$$CGPA = \frac{(G_1 x C_1) + (G_2 x C_2) + \ldots\ldots}{\Sigma C_i}$$

$\Sigma C_i$ - the total number of credits offered by the student upto and including the semester for which CGPA is calculated.)

3. **Final Grade Point Average (FGPA)** will be calculated in the similar manner for the total number of credits offered for completion of the said course.

   Where: $C_i$: Credits allocated for the ith course

   $G_i$: Grade point scored in ith paper (Subject)

4. **Conversion of average grade points into grades:**

| SGPA/CGPA/FGPA | Letter Grade |
|---|---|
| 9.5 - 10 | O |
| 8.5 -9.49 | A+ |
| 7.5 – 8. 49 | A |
| 6.5 – 7.49 | B+ |
| 5.5 – 6. 49 | B |
| 4.5 – 5. 49 | C+ |
| 4.0 – 4. 49 | C |
| < 3.99 | FC /F |
| | FR |

# Solapur University, Solapur
## Faculty of Science
### Credit System Structure for B.Sc.II Semester III

| Class | Sem | Subject | No. of Papers/ practicals | Hrs/Week L | T | P | Paper Marks | UA | CA | Credits | Total credits |
|-------|-----|---------|---------------------------|---|---|---|---|---|---|---|---|
| B.Sc.II | III | | | | | | | | | | |
| | | Subject 1 | Paper III | 3 | - | - | 100 | 70 | 30 | 3 | |
| | | | Paper IV | 3 | | | 100 | 70 | 30 | 3 | 6 |
| | | Subject 2 | Paper III | 3 | - | - | 100 | 70 | 30 | 3 | |
| | | | Paper IV | 3 | | | 100 | 70 | 30 | 3 | 6 |
| | | Subject 3 | Paper III | 3 | - | - | 100 | 70 | 30 | 3 | |
| | | | Paper IV | 3 | | | 100 | 70 | 30 | 3 | 6 |
| | | | | | | | | | | | |
| Total | | | | 18 | | | 600 | | | 18 | 18 |
| **Grand Total** | | | | **18** | | | **600** | | | **18** | **18** |

Abbreviations: L: lectures, T: Tutorials, P: Practicals; UA: University Assessment by End Semester Examination; CA: College assessment by Internal Continuous Examination

UA (University Assessment): University Theory paper shall be of 70 marks for 3.0 hrs duration

CA (College Assessment): The internal examination for Theory and Practical course.

# Solapur University, Solapur
## Faculty of Science
## Credit System Structure for B.Sc.II Semester IV

| Class | Sem | Subject | No. of Papers/ practicals | Hrs/Week | | | Paper Marks | | | Practical | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | UA | CA | Marks | UA | CA | |
| B.Sc. II | IV | Environmental Studies | (compulsory) | 4 | - | - | 100 | 70 | 30 | | | | 4 |
| | | Subject 1 | Paper V | 3 | - | - | 100 | 70 | 30 | | | | 3 |
| | | | PaperVI | 3 | | | 100 | 70 | 30 | | | | 3 |
| | | Subject 2 | Paper V | 3 | - | - | 100 | 70 | 30 | | | | 3 |
| | | | PaperVI | 3 | | | 100 | 70 | 30 | | | | 3 |
| | | Subject 3 | Paper V | 3 | - | - | 100 | 70 | 30 | | | | 3 |
| | | | PaperVI | 3 | | | 100 | 70 | 30 | | | | 3 |
| **Total Theory** | | | | **22** | | | **700** | | | | | | **22** |
| | | Practical 1 | | - | - | 8 | | | | 200 | 140 | 60 | 4 |
| | | Practical 2 | | - | - | 8 | | | | 200 | 140 | 60 | 4 |
| | | Practical 3 | | - | - | 8 | | | | 200 | 140 | 60 | 4 |
| | | | | | | | | | | | | | |
| **Total Pract.** | | | | | | **24** | | | | **600** | | | **12** |
| Grand Total | | | | | | | | | | **1300** | | | **34** **18** |
| **B.Sc. Part II** | | | | | | | | | | **1900** | | | **52** |

Abbreviations: L: lectures, T: Tutorials, P: Practicals; UA: University Assessment by End Semester Examination; CA: College assessment by Internal Continuous Examination

UA (University Assessment): University Theory paper shall be of 70 marks for 3.0 hrs duration

CA (College Assessment): The internal examination for theory and Practical course.

# General Guidelines for Credit and Grading System
## B.Sc.II

1. The University follows Semester system
2. An academic year shall consist of two semesters
3. Each B.Sc. course shall consist of three years i.e. six semesters
4. Environmental Studies paper shall remain compulsory for B.Sc.Part- II students in IVth Sem.
4. B.Sc.Part-II shall consist of two semesters: Semester III and Semester IV.

In semester –III, there will be two theory papers of 100 marks for each subject. There shall be three optional science subjects. Similarly, in semester –IV there will be two theory papers of 100 marks for each subject. There shall be three optional science subjects and Environmental Studies paper compulsory for every student in semester IV.

The scheme of evaluation of performance of candidates shall be based on University assessment as well as College internal assessment as given below. For B.Sc.Part II Sem III & IV the internal assessment will be based on Unit tests, Home assignment, viva, practicals, Project Work etc as given below. Practical course examination of 200 marks for each subject shall be conducted at the end of IVth semester. The practical examination of 200 marks shall also consist of 140 marks for University practical assessment and 60 marks for college internal assessment.

The process of evaluation for Environmental Studies shall be based on University theory examination of 70 marks and 30 marks internal assessment. The internal assessment for environmental studies shall be based on internal test/ home assignment/tutorial of 10 marks and project work for 20 marks.

For University practical examination out of two examiners, one examiner will be internal and another examiner will be External. Both examiners will be appointed by the University. The internal practical assessment shall be done as per scheme given below.

5. **Scheme of evaluation:**

As per the norms of the grading system of evaluation, out of 100 Marks, the candidate has to appear for College internal assessment of 30 marks and external evaluation (UniversityAssessment) of 70 marks. The respective B.O.S. may decide the nature of College internal
 Assessment after referring to the scheme given below or may be used as it is.

**Semester - III:**

**Theory : (100 marks)**

University Examination (70 Marks): No. of Theory papers: 2 Papers/Subject (Total 6 Papers)

**Internal Continuous Assessment (30 Marks):**

 Scheme of Marking:  20 Marks: Internal Test
 10 Marks: Home assignment/Tutorials/Seminars/ Group discussion/ Viva/Field visit/Industry visit.

 **Semester - IV: (100 marks)**

**Theory:**

University Examination (70 Marks): No of Theory papers: 2 Papers/Subject (Total 6+1Papers)

**Internal Continuous Assessment (30 Marks):**

Scheme of Marking:  20 Marks: Internal Test

10 Marks: Home assignment/Tutorials/ Seminars/ Group discussion/ Viva/ Field visit/Industry visit.

**Practical : Internal Continuous Assessment (60 marks)**

Scheme of Marking: **40 Marks:** Internal Test on any four practicals,

**20 Marks:** Lab Journal/viva, attendance, attitude etc.

**Theory : Internal Continuous Assessment**

There shall be theory examination of 70 marks (UA) and 30marks (CA) internal assessment for each papers.

**Scheme of Marking Theory :** 20 Marks : Internal Text

**10 Marks :** Home assignment/Tutorials/Seminars/Group Discussion/Viva/Field visit/Industry visti.

6. **Passing Standard**

The student has to secure a minimum of 4.0 grade points (Grade C) in each paper. A student who secures less than 4.0 grade point (39% or less marks, Grade FC/FR) will be declared fail in that paper (subject) and shall be required to reappear for respective paper. A student who failed in University Examination (Theory) & passed in internal assessment of a same paper (subject) shall be given FC Grade. Such student will have to appear for University Examination only. A student who fails in Internal Assessment and passed in University examination (Theory) shall be given FR Grade. Such student will have to appear for both University examination as well as internal assessment. In case of Annual Pattern/Old Semester Pattern Students/candidates from the mark scheme the candidates shall appear for the same 70 marks paper of the external examination and his performance shall be scaled to 100 marks

- **ATKT**

Candidate passed in all the papers except 4 (four) papers combined together of the semester I and Semester II of B.Sc. Part I examination shall be permitted to enter upon the course of Semester III of B.Sc.Part II

# Solapur University, Solapur

Nature of Question Paper for Credit-Grading Semester Pattern
• Faculty of Science
B.Sc.II
(w.e.f. June 2015)
Time: - 3.0 hrs. Total Marks- 70

**Q. No.1) Multiple choice questions**                                (10)
    1) --------------------------------------------
      a)      b)      c)      d)
    2)
    3)
    4)
    5)
    6)
    7)
    8)
    9)
    10)

**Q.No.2) Answer any five (out of seven) of the following**          (15)
    i)
    ii)
    iii)
    iv)
    v)
    vi)
    vii)

**Q.No.3) Answer any three (out of four) of the following**          (15)
    i)
    ii)
    iii)
    iv)

**Q.No.4) Answer any three (out of four) of the following**          (15)
    i)
    ii)
    iii)
    iv)

**Q.No.5) Write short notes on** any **three (out of four) of the following**          (15)
    i)
    ii)
    iii)
    iv)