Shiksha Mandal's
BAJAJ COLLEGE OF SCIENCE, WARDHA.
(Formerly, Jankidevi Bajaj College of Science, Wardha)

SYLLABUS AS PER NEP-2020 FOR B.Sc. PART I (ELECTRONICS MAJOR) TO BE IMPLEMENTED FROM ACADEMIC SESSION 2023-24 APPROVED IN BoS MEETING HELD ON 12/05/2023

B.Sc. PART I - SEMESTER II
Course Name: Major: Electronics DSC – II
Analogue and Digital Electronics – II

Course code: UEL120T

Credits: 6 (4 Th, 2 Pr) **No. of Lectures: 60** **No. of Practical Hrs.:60**

Course Description:

The second semester of the UG course focuses on advance analogue and digital electronics, which deals with JFET and MOSFET devices, power amplifier circuits, power electronics semiconductor devices, sequential logic circuits, counters, shift registers, TTL and CMOS logic family, memory expansion and analysis techniques in both analogue and digital electronic circuits.

Course Objectives and Course Learning Outcomes

SN	Course Objectives *Students will try to learn:*	Course Learning Outcomes *After successful completion of the course student will be able to:*
1	To introduce hybrid parameters and their interrelationship and operation of JFET and MOSFET devices.	Learn the various h parameters and their interrelationship, able to solve numerical using two port parameters, assemble and analyse the basic operations of JFET and MOSFET.
2	To understand the operation and design of various types of power amplifier circuits.	Know about different power amplifier circuits, their design and use in electronics circuits.
3	To understand operation of various power electronics semiconductor devices.	Understand the current voltage characteristics of various power electronics semiconductor devices.
4	To understand concepts of various flip-flops.	Analyse, assemble and verify the truth tables of flip-flop circuits.
5	To understand concepts of counters and shift registers.	Analyse assembles and verify truth tables of various counters and shift registers.
6	To understand characteristics of TTL and CMOS logic family, memory and its expansion and their classification.	Classify different logic families, semiconductor memories, know their characteristics and expand the memory capacity.

B.Sc. PART I - SEMESTER II
Course Name: Major: Electronics DSC – II
Analogue and Digital Electronics – II

Course code: UEL120T

Course Outline

Unit I

Amplifier parameters, notations, concept and definition of h-parameters, open circuit and short circuit tests, Introduction to input impedance, output impedance, current, voltage and power gains using h parameters, classification of amplifiers (Descriptive ideas only). Construction, working, characteristics and applications of FET and MOSFET (depletion and enhancement type), Parameters of JFET and their relationship parameters of MOSFET and their relationship.

Unit II

Introduction to power transistor, difference between Voltage and power amplifiers, transformer coupled class A power amplifier and its efficiency, class B Push-pull amplifier, derivation for efficiency, complementary symmetry power amplifier with two power supplies.

Unit III

Construction, working, characteristics and applications of Silicon Controlled Rectifier (SCR), DIAC, TRIAC , UJT and UJT as relaxation oscillator.

Unit IV

Sequential Logic Circuits- Concepts of Edge and Level Triggering, Propagation Delay, Set up time, Hold time of FF, R-S Flip Flop, Clocked R-S Flip Flop, Limitations of R-S FF, D FF, JK FF, preset and clear terminals of FF, Race around Condition of JK FF, JKMS FF.

Unit V

Counters: Asynchronous, Up/down, Decade, Synchronous, Modified counter, Ring Counter, Johnson counter (Truth tables and timing diagrams up to 4 bit). Registers: Left shift, Right shift, SISO, SIPO, PISO and PIPO Registers.

Unit VI

Introduction to memories, classification, Memory expansion (word size and word capacity). Logic Families: Characteristics of digital ICs, construction and working of TTL NAND and NOR gates, construction and working of CMOS NAND and NOR gates, Tristate logic, comparison of TTL and CMOS logic families with respect to propagation delay, power consumption, noise immunity, noise margin, fan in and fan out.

B.Sc. I (SEM II) ELECTRONICS PRACTICAL
Course Name: Major: Electronics DSC – II Practical
Analogue and Digital Electronics – II

Course code: UEL120P

Students are expected to perform at least 5 experiments from section A and 5 experiments from section B.

Section A

1. Study of JFET characteristics.
2. Study of MOSFET characteristics.
3. Study of SCR characteristics.
4. Study of DIAC characteristics.
5. Study of UJT characteristics.
6. Study of UJT as relaxation oscillator.
7. Study of Transistor as a switch.
8. Study of transistor as voltage amplifier using CRO.
9. Study of class A power amplifier.
10. Study of TRIAC characteristics.
11. Study of Band width in single stage amplifier.
12. Study of complementary symmetry power amplifier.

Section B

1. Switching characteristics of NOR.
2. Switching characteristics of NAND.
3. Study of RS Flip Flop using NAND/NOR gate.
4. Study of clocked RS Flip Flop using NAND/NOR gate.
5. Study of D Flip Flop using NAND/NOR gate.
6. Study of JK MS FF.
7. Construction and study of decade counter.
8. Study of mod-counter.
9. Study of ring counter.
10. Study of Johnson counter.
11. Study of SISO register.
12. Study of SIPO register.
13. Study of PISO register.
14. Study of PIPO register.
15. Construction and study of synchronous counter.

Reference books:

1. Principles of Electronics, V. K. Mehta, Rohit Mehta
2. Functional Circuits in Electronics, S. G. Pimpale, Sushama Pimpale, Mcmillan

India ltd.
3. Electronics, Fundamental and applications, Ryder PHI
4. Elements of electronics M. K.Bagde, S. P. Singh, Kamal Singh, S.Chand
5. Op-Amp and Linear Circuits, Gaikwad, PHI
6. Electronic Instrumentation, Khedkar
7. Monograph on electronic design principles, Goel, Khaitan Khanna publisher
8. Basic Electronics and Linear Cicuits, Bhargava, Kulshreshtha, Gupta, Technical publication series
9. Electronic Devices & Circuits I & II, A. P. Godse, U. P. Bakshi Technical publishers Pune.
10. Digital principles and applications A. P. Malvino, D. P. Leach, McGraw Hill Book
11. Principles of Digital Electronics, M. B. Matsagar, V. S.Kale, Vision publication
12. Modern Digital Electronics, R.P.Jain, Tata McGraw Hill publishing co. ltd
13. Digital fundamentals, Floyd, Jain, Pearson
14. 2000 solved problems in digital Electronics, S. P. Bali, Tata McGraw Hill publishing co.ltd.
15. Electronic circuits and systems: Analog and digital,Y. N. Bapat, Tata McGraw Hill publishing co.ltd.
16. Digital Electronics and Logic Design, B. S. Nair, Prentice Hall
17. Digital Computer Electronics, Malvino, Brown, Tata McGraw Hill
18. Fundamentals of Digital Electronics, C.V.Dhuley and V.M. Ghodki

Web Resources:

Students are advised to make use of the resources available on the internet. Some useful links related to electronics are given below.

1. M.I.T. open course ware video lectures are available at http://ocw.mit.edu/OcwWeb/Electrical-Engineering-and-Computer-Science/6-002Spring-2007/VideoLectures/index.htm
2. www.electronics-tutorials.com
3. http://electronics .howstuffworks .com
4. www.science-ebooks.com/electronics
5. http://computer.howstuffworks.com
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. http://101 science.com/eleclinks.htm www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electronic-links.html
8. www.discovercircuits.com/resources/tutorials.html

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SYLLABUS AS PER NEP-2020 FOR B.Sc. PART I (ELECTRONICS MINOR) TO BE IMPLEMENTED FROM ACADEMIC SESSION 2023-24 APPROVED IN BoS MEETING HELD ON 12/05/2023

B.Sc. PART I - SEMESTER II
Course Name: Analogue and Digital Electronics – II
(Electronics Minor-II)

Course code: UEL121T

Credits: 6 (4 Th, 2 Pr) **No. of Lectures: 60** **No. of Practical Hrs.: 60**

Course Description:

The second semester of the UG course focuses on advance analogue and digital electronics, which deals with JFET and MOSFET devices, power amplifier circuits, power electronics semiconductor devices, sequential logic circuits, counters, shift registers, TTL and CMOS logic family, memory expansion and analysis techniques in both analogue and digital electronic circuits.

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B.Sc. PART I - SEMESTER II
Course Name: Analogue and Digital Electronics – II
(Electronics Minor-II)

Course code: UEL121T

Course Outline

Unit I

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Unit IV

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Unit VI

Introduction to memories, classification, Memory expansion (word size and word capacity). Logic Families: Characteristics of digital ICs, construction and working of TTL NAND and NOR gates, construction and working of CMOS NAND and NOR gates, Tristate logic, comparison of TTL and CMOS logic families with respect to propagation delay, power consumption, noise immunity, noise margin, fan in and fan out.

B.Sc. I (SEM II) ELECTRONICS PRACTICAL
Course Name: Electronics Minor – II Practical
Analogue and Digital Electronics – II

Course code: UEL121P

Students are expected to perform at least 5 experiments from section A and 5 experiments from section B.

Section A

1. Study of JFET characteristics.
2. Study of MOSFET characteristics.
3. Study of SCR characteristics.
4. Study of DIAC characteristics.
5. Study of UJT characteristics.
6. Study of UJT as relaxation oscillator.
7. Study of Transistor as a switch.
8. Study of transistor as voltage amplifier using CRO.
9. Study of class A power amplifier.
10. Study of TRIAC characteristics.
11. Study of Band width in single stage amplifier.
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Section B

1. Switching characteristics of NOR.
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3. Study of RS Flip Flop using NAND/NOR gate.
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4. Elements of electronics M. K.Bagde, S. P. Singh, Kamal Singh, S.Chand
5. Op-Amp and Linear Circuits, Gaikwad, PHI
6. Electronic Instrumentation, Khedkar
7. Monograph on electronic design principles, Goel, Khaitan Khanna publisher
8. Basic Electronics and Linear Cicuits, Bhargava, Kulshreshtha, Gupta, Technical
9. publication series
10. Electronic Devices & Circuits I & II, A. P. Godse, U. P. Bakshi Technical
11. publishers Pune.
12. Digital principles and applications A. P. Malvino, D. P. Leach, McGraw Hill Book
13. Principles of Digital Electronics, M. B. Matsagar, V. S.Kale, Vision publication
14. Modern Digital Electronics, R.P.Jain, Tata McGraw Hill publishing co. ltd
15. Digital fundamentals, Floyd, Jain, Pearson
16. 2000 solved problems in digital Electronics, S. P. Bali, Tata McGraw Hill
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18. Electronic circuits and systems: Analog and digital,Y. N. Bapat, Tata McGraw Hill
19. publishing co.ltd.
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21. Digital Computer Electronics, Malvino, Brown, Tata McGraw Hill
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2. www.electronics-tutorials.com
3. http://electronics .howstuffworks .com
4. www.science-ebooks.com/electronics
5. http://computer.howstuffworks.com
6. www.geocities.com/CapeCanaveral/1221/elec1.htm
7. http://101 science.com/eleclinks.htm www.electro-tech-online.com/blogs/gayan-soyza/23-useful-electronic-links.html
8. www.discovercircuits.com/resources/tutorials.html
9. www.electronics-lab.com/
10. www.glolab.com/links/links.html etc

Department of Electronics

B.Sc. PART I - SEMESTER II

Course Name: Skill Enhancement Course (SEC) – I

Course code: UEL122P

Transducers, Sensors & its applications

Credits: 2 (4 Pr) No. of Practical Hrs.:60

Course description:

This course offers a comprehensive introduction to transducers and their practical applications. Through a combination of theoretical concepts and hands-on activities, students will acquire a solid understanding of both active and passive transducers commonly used in electronics. Additionally, students will gain fundamental knowledge of sensors and their use in modern electronic systems. Throughout the course, students will learn to apply various techniques in electronic instrumentation, providing a strong foundation for designing and constructing basic electronic systems. By the end of the course, students will possess the skills and knowledge required to design and build simple electronic instrumentation systems, and will be well-equipped to pursue further studies in the field of electronic instrumentation.

Course Objectives:

1. Develop an understanding of the fundamental concepts of transducer and its types.
2. Learn about the use of various transducers in electronic instrumentation and its basic properties.
3. Gain familiarity with sensors to sense and measure various physical parameters, commonly used in modern electronics.
4. Acquire the skills needed to convert physical parameter to its equivalent electrical parameter using transducer principle.
5. Understand the basic principles of signal conditioning and data acquisition system used in modern electronic instrumentation system development.

Course learning outcomes:

Upon completion of this course, learners will be able to:

1. Demonstrate an understanding of basic principles of various active and passive transducers.
2. Understand the static and dynamic characteristics of transducers.
3. know the various transducers to convert various types of physical parameters to its equivalent electrical parameter or vice versa.
4. Understand the various sensors to sense or measure various physical parameters.
5. Implement the Signal conditioning and DAQ system with different transducers and sensors for real time applications.

Unit I:

Transducer: Definition and explanation of transducer, general requirements of transducer, classification of Transducer: active and passive transducers, static and dynamic characteristics of transducers, Introduction to sensors, types of sensors, typical applications of sensor, actuators.

Unit II:

Transducers: Definition, construction and working of: moving coil microphone and loud speaker, Thermistor (NTC & PTC), Thermocouple, LVDT, Piezo-electric, Strain Gauge, Capacitive Transducer, Tachometer, photo-multiplier tube, L.D.R., photo-transistor.

Unit III:

Signal Conditioning and DAQ Systems: Introduction, Functions of signal conditioning equipment, need for amplification of signals, Filtering, Sample and Hold circuits, Applications of Transducer: Measurement of temperature using thermistor, Lux meter and Colorimeter using LDR, Insect Repellent using Piezo buzzer.

List of Practical:

1. Measurement of resistance from its physical parameters.
2. Measurement of inductance by using Terman's equation.
3. Measurement of Capacitance by using parallel plate capacitor.
4. Measurement of displacement by using LVDT.
5. Measurement of displacement by using LDR.
6. Measurement of temperature by using thermistor.
7. Study of level sensors.
8. Study of flow Sensors.
9. Study of proximity sensors.

Reference Books:

1. Principle of Electronics by V. K. Mehta
2. Basic Electronics by B L Theraja
3. Element of Electronics by M.K.Bagde and S.P.Singh
4. Electronic instrumentation and Measurement Technique by W.D. Cooper.
5. Principles of Electronics by Malvino
6. An introduction to Electronics by R.G. Kale and Puranik
7. Electrical Measurement and Instrumentation by A. K. Sawhney.
8. Electronic Instrumentation by S. K. Khedkar