K. C. E. Society's
Moolji Jaitha College
An 'Autonomous College' Affiliated to
K.B.C. North Maharashtra University, Jalgaon.
NAAC Reaccredited Grade - A (CGPA : 3.15 - 3rd Cycle)
UGC honoured "College of Excellence" (2014-2019)
DST(FIST) Assisted College

KNOWLEDGE IS POWER
ESTD. 1945

के. सी. ई. सोसायटीचे
मूळजी जेठा महाविद्यालय
क.ब.चौ. उत्तर महाराष्ट्र विद्यापीठ, जळगाव संलग्नित
'स्वायत्त महाविद्यालय'
नॅकद्वारा पुनर्मानांकित श्रेणी – 'ए' (सी.जी.पी.ए. : ३.१५ – तिसरी फेरी)
विद्यापीठ अनुदान आयोगाद्वारा घोषित 'कॉलेज ऑफ एक्सलन्स' (२०१४-२०१९)
डी.एस.टी. (फीस्ट) अंतर्गत अर्थसहाय्य प्राप्त

Date :- 01/08/2024

NOTIFICATION

Sub :- CBCS Syllabi of B. Sc. in Electronics (Sem. I & II)

Ref. :- Decision of the Academic Council at its meeting held on 27/07/2024.

The Syllabi of B. Sc. in Electronics (First and Second Semesters) as per **NATIONAL EDUCATION POLICY – 2020 (2024 Pattern)** and approved by the Academic Council as referred above are hereby notified for implementation with effect from the academic year 2024-25.

Copy of the Syllabi Shall be downloaded from the College Website (www.kcesmjcollege.in)

Sd/-
Chairman,
Board of Studies

To :

1) The Head of the Dept., M. J. College, Jalgaon.
2) The office of the COE, M. J. College, Jalgaon.
3) The office of the Registrar, M. J. College, Jalgaon.

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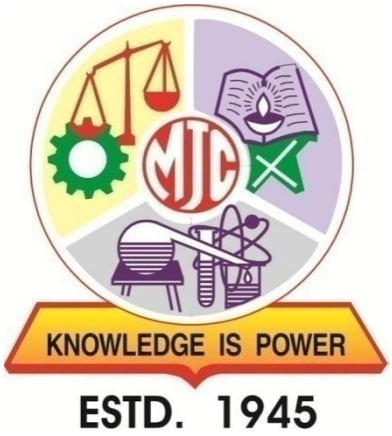
समर्थ कॉलनी जवळ, जळगांव – ४२५ ००२. (महाराष्ट्र, भारत) । दूरध्वनी क्र. : +९१ २५७–२२३७३६३, २२३४२८१ । ई–मेलः mjcollege@kces.in । वेबसाईटः mjcollege.kces.in

Khandesh College Education Society's

Moolji Jaitha College,Jalgaon

An "Autonomous College"

Affiliated to
Kavayitri Bahinabai Chaudhari
North Maharashtra University, Jalgaon-425001



STRUCUTRE AND SYLLABUS

B.Sc Hounour/Honours with Research (F.Y. B.Sc. Electronics)

Under Choice Based Credit System (CBCS)
and
as per NEP-2020 Guidelines

[w.e.f.AcademicYear:2024-25]

Preface

Skilled human resource is a prerequisite in higher education, and it is to be acquired through thorough knowledge of theoretical concepts and hands-on laboratory methods of the subject. The MooljiJaitha College (Autonomous) has adopted a department-specific model as per the guidelines of UGC, NEP-2020 and the Government of Maharashtra. The Board of Studies in Electronics of the college has prepared the syllabus forthe first-year undergraduate of Electronics.The syllabus cultivates theoretical and practical knowledge required in the different fields of Electronics. The contents of the syllabus have been prepared to accommodate the fundamental aspects of various fields of Electronics and to build the foundation for various applied sectors of Electroncis. Besides this, in the first year, the students will be enlightened with the skill related to basic electronic circuits/ system and testing, which will enhance students' employability.

The overall curriculum of three / four-year covers some basic and advanced electronics courses such as Basic electronic Components, Digital Electroncis, Analog Electronics and Applications, Linear Intetgrated Circuits, Microprocessor, Microcontrollers, Analog and Digital Communication, Sensor and Transducer, Electronic Instrumentation, Physics of Semiconductor Devices, Power Electronics, Industrial Electronics, optoelectronics, control system componets, Network Analysis, Biomedical instrumentation, Progrmmable Logic Control, Digital Signal Processing and included skilled enhacement courses such as ARDUINO, Embedded System, PCB designing etc. Also covers various designing and simulation tools such as VHDL, OrCAD, MATLAB, Python, LabVIEW. Furthermore, the syllabus is structured to devlope practical skills as per reqirement in the Industrial Sector, research field, and Entrepreneurship etc. Hence, the curriculum is endowed with more experiments that shall run hand-in-hand with theory. The detailed syllabus of each paper is appended with a list of suggested readings.

Program Outcomes (PO) for B.Sc. Electronics Honours/ Honours with Research:

Upon successful completion of the B.Sc. program, student will be able to:

PO No.	PO
1	Graduates should have a comprehensive knowledge and understanding of the fundamental principles, theories, and concepts in their chosen field of study.
2	Graduates should possess the necessary technical skills and competencies related to their discipline, including laboratory techniques and data analysis.
3	Graduates should be able to identify, analyze, and solve complex problems using logical and critical thinking skills. They should be able to apply scientific methods and principles to investigate and find solutions.
4	Graduates should be proficient in effectively communicating scientific information, both orally and in writing.
5	Graduates should have a basic foundation in research methods and be capable of designing and conducting scientific investigations.
6	Graduates should be able to work effectively as part of a team, demonstrating the ability to collaborate with others, respect diverse perspectives, and contribute to group projects.
7	Graduates should recognize the importance of ongoing learning and professional development. They should be equipped with the skills and motivation to engage in continuous learning, adapt to new technologies and advancements in their field, and stay updated with current research.

Program Specific Outcome (PSO) B.Sc. Electronics Honours/ Honours with Research:

After completion of this course, students are expected to learn/understand the:

PO No.	PSO
1	Core knowledge in electronics, including the major areas of Analog and Digital Electronics, operational amplifiers, power electronics, instrumentation, optoelectronics, microprocessor, electronic communication, sensors and transducers.
2	Advanced electronics application areas such as embedded system, biomedical instrumentation, Agri Electronics, Mechatronics, Programmable Logic Control, LabVIEW, ARDUINO.
3	Laboratory skills enabling them to take measurements in an electronics laboratory and analyze the measurements to draw valid conclusion.
4	Design and simulation of electronics devices/ system and develop research oriented skills.
5	Critically thinking and work independently.
6	Skills and modern technological/scientific/engineering software/tools for professional practices.

Multiple Entry and Multiple Exit options: The multiple entry and exit options with the award of UG certificate/ UG diploma/ or three-year degree depending upon the number of credits secured;

Levels	Qualification Title	Credit Requirements		Semester	Year
		Minimum	Maximum		
4.5	UG Certificate	40	44	2	1
5.0	UG Diploma	80	88	4	2
5.5	Three Year Bachelor's Degree	120	132	6	3
6.0	Bachelor's Degree- Honours **Or** Bachelor's Degree- Honours with Research	160	176	8	4

Credit distribution structure for Three/ Four year Honors/ Honors with Research Degree Programme with Multiple Entry and Exit

F.Y. B.Sc.

Year (Level)	Sem	Subject-I (M-1)	Subject-II (M-2)	Subject-III (M-3)	Open Elective (OE)	VSC, SEC (VSEC)	AEC, VEC, IKS	CC, FP, CEP, OJT, RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
I (4.5)	I	DSC-1(2T) DSC-2(2P)	DSC-1(2T) DSC-2(2P)	DSC-1(2T) DSC-2(2P)	OE-1(2T)	---	AEC-1(2T) (Eng) VEC-1(2T) (ES) IKS(2T)	CC-1(2T)	22	**UG Certificate**
	II	DSC-3(2T) DSC-4(2P)	DSC-3(2T) DSC-4(2P)	DSC-3(2T) DSC-4(2P)	OE-2(2T) OE-3(2P)	---	AEC-2(2T) (Eng) VEC-2(2T) (CI)	CC-2(2T)	22	
	Cum. Cr.	**8**	**8**	**8**	**6**	**---**	**10**	**4**	**44**	
Exit option: Award of UG Certificate with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor.										

S.Y. B.Sc.

Year (Level)	Sem	Subject-I (M-1) Major*		Subject-II (M-2) Minor #	Subject-III (M-3)	Open Elective (OE)	VSC, SEC (VSEC)	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
		Mandatory (DSC)	Elective (DSE)	(MIN)							
2 (5.0)	III	DSC-5(2T) DSC-6(2T) DSC-7(2P)	---	MIN-1(2T) MIN-2(2T) MIN-3(2P)	---	OE-4(2T)	SEC-1(2T)	AEC-3(2T) (MIL)	CC-3(2T) CEP(2)	22	**UG Diploma**
	IV	DSC-8(2T) DSC-9(2T) DSC-10(2P)	---	MIN-4(2T) MIN-5(2P)	---	OE-5(2T)	SEC-2(2T) SEC-2(2P)	AEC-4(2T) (MIL)	CC-4(2T) ۞ FP(2)	22	
	Cum. Cr.	**12**	**---**	**10**	**---**	**4**	**6**	**4**	**8**	**44**	
	Exit option: Award of UG Diploma in Major and Minor with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major & Minor.										

***** Student must choose one subject as a Major subject out of M-1, M-2 and M-3 that he/she has chosen at First year

Student must choose one subject as a Minor subject out of M-1, M-2 and M-3 that he/she has chosen at First year (Minor must be other than Major)

۞ OJT/Internship/CEP should be completed in the summer vacation after 4th semester

T.Y. B.Sc.

Year (Level)	Sem	Subject-I (M-1) Major		Subject-II (M-2) Minor	Subject-III (M-3)	Open Elective (OE)	VSC, SEC (VSEC)	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
		Mandatory (DSC)	Elective (DSE)	(MIN)							
3 (5.5)	V	DSC-11(2T) DSC-12(2T) DSC-13(2T) DSC-14(2P) DSC-15(2P)	DSE-1A/B (2T) DSE-2A/B (2P)	---	---	---	VSC-1(2T) VSC-2(2P)	---	OJT/Int (4)	22	**UG Degree**
	VI	DSC-16(2T) DSC-17(2T) DSC-18(2T) DSC-19(2T) DSC-20(2T) IKS DSC-21(2P) DSC-22(2P)	DSE-3A/B (2T) DSE-4A/B (2P)	---	---	---	VSC-3(2T) VSC-4(2P)	---	---	22	
	Cum. Cr.	**24**	**8**	**---**	**---**	**---**	**8**	**---**	**4**	**44**	
	Exit option: Award of UG Degree in Major with 132 credits OR Continue with Major and Minor										

Fourth Year B.Sc. (Honours)

Year (Level)	Sem	Major Core Subjects		Research Methodology (RM)	VSC, SEC (VSEC)	OE	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
IV (6.0)	VII	DSC-23(4T) DSC-24(4T) DSC-25(4T) DSC-26(2P)	DSE-5A/B (2T) DSE-6A/B (2P)	RM(4T)	---	---	---	---	22	UG Honours Degree
	VIII	DSC-27(4T) DSC-28(4T) DSC-29(4T) DSC-30(2P)	DSE-7A/B (2T) DSE-8A/B (2P)	---	---	---	---	OJT/Int (4)	22	
	Cum. Cr.	**28**	**8**	**4**	**---**	**---**	**---**	**4**	**44**	
Four Year UG Honors Degree in Major and Minor with 176 credits										

Fourth Year B.Sc. (Honours with Research)

Year (Level)	Sem	Major Core Subjects		Research Methodology (RM)	VSC, SEC (VSEC)	OE	AEC, VEC, IKS	CC, FP, CEP, OJT/Int/RP	Cumulative Credits/Sem	Degree/ Cumulative Credit
IV (6.0)	VII	DSC-23(4T) DSC-24(4T) DSC-26(2P)	DSE-5A/B (2T) DSE-6A/B (2P)	RM(4T)	---	---	---	RP(4)	22	UG Honours with Research Degree
	VIII	DSC-27(4T) DSC-28(4T) DSC-30(2P)	DSE-7A/B (2T) DSE-8A/B (2P)	---	---	---	---	RP(8)	22	
	Cum. Cr.	**20**	**8**	**4**	**---**	**---**	**---**	**12**	**44**	
Four Year UG Honours with Research Degree in Major and Minor with 176 credits										

Sem- Semester, **DSC**- Department Specific Course, **DSE**- Department Specific Elective, **OE/GE**- Open/Generic elective, **VSC**- Vocational Skill Course, **SEC**- Skill Enhancement Course, **VSEC**- Vocation and Skill Enhancement Course, **AEC**- Ability Enhancement Course, **IKS**- Indian Knowledge System, **VEC**- Value Education Course, **T**- Theory, **P**- Practical, **CC**-Co-curricular **RM**- Research Methodology, **OJT**- On Job Training, **FP**- Field Project, **Int**- Internship, **RP**- Research Project, **CEP**- Community Extension Programme, **ENG**- English, **CI**- Constitution of India, **MIL**- Modern Indian Laguage

- Number in bracket indicate credit
- The courses which do not have practical 'P' will be treated as theory 'T'
- If student select subject other than faculty in the subjects M-1, M-2 and M-3, then that subject will be treated as Minor subject, and cannot be selected as Major at second year.

Details of F.Y. B.Sc. (Electronics)

Course	Course Type	Course Code	Course Title	Credits	Teaching Hours/ Week			Marks			
					T	P	Total	Internal		External	
								T	P	T	P
Semester I, Level – 4.5											
DSC-1	DSC	ELE-DSC-111	Introduction to Electronic Components and Network Theorems	2	2	---	2	20	---	30	---
DSC-2	DSC	ELE-DSC-112	Practicals on Electronic Components and Network Theorems	2	---	4	4	---	20	---	30
OE-1	OE	ELE-OE-111	Electronics for Agriculture	2	2	---	2	20	---	30	---
Semester II, Level – 4.5											
DSC-3	DSC	ELE-DSC-121	Basic Digital Electronics	2	2	---	2	20	---	30	---
DSC-4	DSC	ELE-DSC-122	Practicals on Digital Electronics	2	---	4	4	---	20	---	30
OE-2	OE	ELE-OE-121	Electrical Circuits	2	2	---	2	20	---	30	---
OE-3	OE	ELE-OE-122	Practicals on Electrical Circuits	2	---	4	4	---	20	---	30

Examination Pattern

Theory Question Paper Pattern:

- 30 (External) +20 (Internal) for 2 credits
    - External examination will be of 1½ hours duration
    - There shall be 3 questions: Q1 carrying 6 marks and Q2, Q3 carrying 12 marks each. The tentative pattern of question papers shall be as follows;
    - Q1 Attempt any 2 out of 3 sub-questions; each 3 marks
    - Q 2 and Q3 Attempt any 3 out of 4 sub-question; each 4 marks.

Rules of Continuous Internal Evaluation:

The Continuous Internal Evaluation for theory papers shall consist of two methods:

1. Continuous & Comprehensive Evaluation (CCE): CCE will carry a maximum of 30% weightage (30/15 marks) of the total marks for a course. Before the start of the academic session in each semester, the subject teacher should choose any three assessment methods from the following list, with each method carrying 10/5 marks:

i. Individual Assignments
ii. Seminars/Classroom Presentations/Quizzes
iii. Group Discussions/Class Discussion/Group Assignments
iv. Case studies/Case lets
v. Participatory & Industry-Integrated Learning/Field visits
vi. Practical activities/Problem Solving Exercises
vii. Participation in Seminars/Academic Events/Symposia, etc.
viii. Mini Projects/Capstone Projects
ix. Book review/Article review/Article preparation
x. Any other academic activity
xi. Each chosen CCE method shall be based on a particular unit of the syllabus, ensuring that three units of the syllabus are mapped to the CCEs.

2. Internal Assessment Tests (IAT): IAT will carry a maximum of 10% weightage (10/5 marks) of the total marks for a course. IAT shall be conducted at the end of the semester and will assess the remaining unit of the syllabus that was not covered by the CCEs. The subject teacher is at liberty to decide which units are to be assessed using CCEs and which unit is to be assessed on the basis of IAT. The overall weightage of Continuous Internal Evaluation (CCE + IAT) shall be 40% of the total marks for the course. The remaining 60% of the marks shall be allocated to the semester-end examinations. The subject teachers are required to communicate the chosen CCE methods and the corresponding syllabus units to the students at the beginning of the semester to ensure clarity and proper preparation.

Practical Examination Credit 2: Pattern (30+20)

External Practical Examination (30 marks):

- Practical examination shall be conducted by the respective department at the end of the semester.
- Practical examination will be of 3 hours duration and shall be conducted as per schedule.
- Practical examination shall be conducted for 2 consecutive days for 2 hr/ day where incubation conditionis required.
- There shall be 05 marks for journal and viva-voce. Certified journal is compulsory to appear for practical examination.
- External practical examination of SEC will be of 25 marks and there will be no internal exam for SEC practical.

Internal Practical Examination (20 marks):

- Internal practical examination of 10 marks will be conducted by department as per schedule given.
- For internal practical examination student must produce the laboratory journal of practicals completed along with the completion certificate signed by the concerned teacher and the Head of the department.
- There shall be continuous assessment of 30 marks based on student performance throughout the semester. This assessment can include quizzes, group discussions, presentations and other activities assigned by the faculty during regular practicals. For details refer internal theory examination guidelines.
- Finally 40 (10+30) marks performance of student will be converted into 20 marks.

SEMESTER-I

F.Y. B.Sc. Electronics (Major)
Semester-I
ELE-DSC-111: Introduction to Electronic Components and Network Theorems

Total Hours: 30 **Credits: 2**

Course Objectives	• To introduce passive components such as resistors, capacitors and inductors. • To introduce basic semiconductor devices. • Understanding the operation and application of semiconductor devices. • To introduce an integrated circuit (IC).	
Course Outcomes	After successful completion of this course, students are expected to: • Identify the use of electronic components. • Identify semiconductor devices in the circuit with their uses. • Able to do testing of electronics component in the circuit. • Understand the basics of integrated circuit (IC).	
Unit	**Topic Particular**	**Hours**
Unit I	**Basic Components** Resistor, Capacitor, Inductor, Transformers and RF coils, Relays, Batteries, Switches, Fuses, Cables, Connectors, Soldering iron and materials. (Only expect construction, working principle, symbols, enlists types, specifications and applications, testing), Multimeter, CRO, Signal generator, Function Generator.	09
Unit II	**Network Theorems:** Superposition Theorem. Thevenin's Theorem. Norton's Theorem. Reciprocity Theorem. Maximum Power Transfer Theorem. Problems based on these theorems.	**09**
Unit III	**Semiconductor Devices** PN junction diode, Zener diode, Tunnel Diode, Varactor diode, Light emitting diode (L.E.D), photo diode and Photo voltaic or solar cell, BJT, UJT, FET-JFET, MOSFET, SCR (Only expect Construction, working principle, symbol and Applications).	**08**
Unit IV	**Integrated Circuits:** Types of Integrated Circuit (categories of integrated circuits)- Digital Integrated Circuit, Analog Integrated Circuit, Mixed Integrated Circuit., Basic features of an integrated circuit (Construction, Packaging, Size), Classification of ICs-SSI, MSI, LSI, VLSI, ULSI Applications of ICs, Advantages of IC.	**04**
References	• Nasar, S. A. (2004). Electric Circuits, Schaum's outline series, Tata McGraw Hill. • Nahvi, M. & Edminister, J. (2005). Electrical Circuits, Schaum's Outline Series, Tata McGraw-Hill. • Smith, K.A. & Alley, R.E. (2014). Electrical Circuits, Cambridge University Press. • Ryder, J. D. (1961). Network, Lines and Fields, 2nd edition, Prentice-Hall electrical engineering series, India. • Mahadevan, K. & Chitra C. (2015). Electrical Circuit Analysis, PHI Learning. • Theraja, B. L. (2007). Electronics devices and circuits, Chand Publishing. • Mehta, V. K. & Mehta, R. (1980). Principles of Electronics, S. Chand & company.	

F.Y. B.Sc. Electronics (Major)
Semester-I
ELE-DSC-112: Practicals on Electronic Components and Network Theorems

Total Hours: 60 **Credits: 2**

Course Objectives	• To identify and test various electronic components. • To provide practical uses of electronic component in circuits. • To identify semiconductor devices. • To familiar with integrated circuits.	
Course Outcomes	After successful completion of this course, students are expected to: • Identify and testing R, L& C components. • Handle multimeter, CRO, Function generator. • Troubleshoot the electronics circuit fault. • Familiar with all basic electronics components.	
Unit	**Topic Particular**	**Hours**
1	Identification of electronic components, testing and their specification: (R, C)	4
2	Identification of electronic components, testing and their specification: (Inductor, Transformer)	4
3	Identification of electronic components, testing and their specification (Switches, Fuse and Relay)	4
4	Identification of active electronic components and their specification (Diode and Transistors)	4
5	Forward and reverse biasing of PN diode.	4
6	Study of Thevenin's Theorem	4
7	Study of Norton's Theorem	4
8	Study of Maximum Power theorem.	4
9	PN junction as Clipper.	4
10	PN junction as Clamper.	4
11	Measurement of AC and DC Voltage using Multimeter.	4
12	Measurement of AC and DC current using Multimeter.	4
13	Measurement of Amplitude of sine and square wave signal using CRO.	4
14	Measurement of frequency and Phase of sine and square signal using CRO.	4
15	Circuit for LED ON/OFF.	4
16	Study of Signal generator.	4
17	Study of Function generator.	4
18	Study of Integrated Circuits (IC).	4
References	• Ryder, J. D. (1961). Network, Lines and Fields,(2nd ed), Prentice-Hall electrical engineering series, India. • Mahadevan, K. & Chitra C. (2015). Electrical Circuit Analysis, PHI Learning. • Theraja, B. L. (2007). Electronics devices and circuits, Chand Publishing. • Mehta, V. K. & Mehta, R. (1980). Principles of Electronics, S. Chand & company.	

F.Y. B.Sc. Electronics (Open Elective)
Semester-I
ELE-OE-111: Electronics for Agriculture

Total Hours: 30 **Credits: 2**

Course Objectives	• To identify and test various electronic components. • To provide practical uses of electronic component in circuits. • To aware application of electronics in agriculture. • To acquire knowledge of digital technology used in agriculture.	
Course Outcomes	After successful completion of this course, students are expected to: • Identify and testing R, L& C components, multimeters. • To know sensor for agriculture. • Understand the electronics circuit working. • Apply the knowledge as per their requirements.	
Unit	**Topic Particular**	**Hours**
Unit I	**Basic Electronics** Electrical quantity: current & Voltage; Basic Components of Electronics: Resistor, Capacitor, Inductor; Single phase and Three Phase, Power Supply, Multimeter.	6
Unit II	**Sensors, actuators and Systems:** What is Sensor and actuators, pH sensor, Soil Moisture Sensors, Plant Water Status Sensors, Flow Sensor, Soil Nutrient Sensing, Plant Nutrient Sensing, ARDUINO kit, water pumps, solar system	**8**
Unit III	**Agriculture Electronics:** Role of electronics in farm machinery, Smart-irrigation in Automation, Remote Sensing and Application, Atmospheric investigation, visual image interpretation, GIS/GPS positioning system for farming, Yield monitoring and mapping, soil sampling and analysis	**8**
Unit IV	**Digitalization of agriculture** Impact of Sustainability, Small scale farmers opportunities in self marketing on digital platforms, Sustainable food packing, Drones in Agriculture, Technologies in Food processing, smart Machinery, Automation in smart Greenhouse, Precision Livestock Farming, Irrigation management, Satellite Earth Observation for Smart Agriculture, Robotics, IoT, Artificial Intelligence.	**8**
References	• Floyd, T and Buchla, D. (2009). Electronics Fundamentals: Circuits, Devices &Applications.(8th ed) Pearson. • Srinivasan, A. (2006). Handbook of Precision Agriculture: Principles and Applications, CRC Press ISBN-13: 9781560229551 • Training manual National Training on Sensors and Actuators for Precision Farming, (2014). • Goyal, M.R. (2021). Emerging Technologies in Agricultural Engineering" Apple Academic Press.	

SEMESTER-II

F.Y. B.Sc. Electronics (Major)
Semester-II
ELE-DSC-121: Basic Digital Electronics

Total Hours: 30 **Credits: 2**

Course Objectives	• To get familiar with various numbers systems and conversion • To understand logic gates and its operation. • To understand combinational logic circuits and • To understand sequential logic circuits in digital electronic circuits.	
Course Outcomes	After successful completion of this course, students are expected to: • Do conversions in number systems • Design and analyze combinational circuits. • Design and analyze sequential circuits. • Design and apply for real time digital systems.	
Unit	**Topic Particular**	**Hours**
Unit I	**Number System** Number System, types of Number system, radix, Conversions, BCD, Gray Code, Excess-3 code, Alphanumeric Codes, Error Detecting Codes, Error Correcting Codes	**8**
Unit II	**Logic Gates** OR gate, AND gate, NOT gate (symbol, Truth Table, implementation using diode or Transistor), NAND gate, NOR gate, EXOR gate, EXNOR gate, Integrated IC's, TTL Logic family, CMOS logic family, PMOS and NMOS logic. Demorgon's Theorems, Boolean Algebra.	**10**
Unit III	**Arithmetic Circuits** Boolean Algebra, Binary Addition and Subtraction, 1's and 2's complement Half and Full Adder, Half and Full Subtractor, ALU	**6**
Unit IV	**Digital Circuits**: Multiplexer, Demultiplexer, BCD to Decimal Conversion, encoder, seven segment decoder, Parity Generator and Checker	**6**
References	• Malvino, A.P., Leach D.P. & Saha. (2011). Digital Principles and Applications. Tata McGraw. • Kumar, A. (2009). Fundamentals of Digital Circuits. PHI Learning Pvt. Ltd. • Venugopal, K. R. (2011). Digital Circuits and systems, Tata McGraw Hill Education. • Thomas, L. F. (1994). Digital Fundamentals, Pearson Education, Asia. • Tokheim, R. L. (1994). Digital Principles, Schaum's Outline Series, 3rd edition, Tata McGraw- Hill • Taub, H. & Schilling, D. (1985). Digital Integrated Electronics, McGraw Hill.	

F.Y. B.Sc. Electronics (Major)
Semester-II
ELE-DSC-122: Practicals on Digital Electronics

Total Hours: 60 **Credits: 2**

Course Objectives	• To provide hands on the digital system. • To demonstrate working principle of logic gates. • To design combinational and sequential circuits utilized in the different digital circuits. • Applying the concept of digital logic families with circuit implementation.	
Course Outcomes	After successful completion of this course, students are expected to: • Analyze the digital system. • Understand the function of logic gates. • Design the different types of combinational and sequential circuits • Design and apply for real time digital systems.	
Sr. No.	**Topic Particular**	**Hours**
1	Build, test and verify the AND logic Gates.	4
2	Build, test and verify the OR logic Gates.	4
3	Build, test and verify the NOT logic Gates.	4
4	Study the NAND gate as universal gate.	4
5	Study the NOR gate as universal gate.	4
6	Build and test 4 to1 multiplexer.	4
7	Build and test 1 to 4 De-multiplexer.	4
8	Build and test BCD to Decimal convertor.	4
9	Build and test Parity Generator.	4
10	Build and test Parity Checker.	4
11	Build and test seven segment decoder.	4
12	Build and Test Half Adder and Full Adder	4
13	Build and Test Half Subtractor and Full Subtractor.	4
14	Demonstration of Demorgon's Theorems.	4
15	Study of Logic gates using IC's	4
References	• Malvino, A.P., Leach D.P. & Saha. (2011). Digital Principles and Applications. Tata McGraw. • Kumar, A. (2009). Fundamentals of Digital Circuits. PHI Learning Pvt. Ltd. • Venugopal, K. R. (2011). Digital Circuits and systems, Tata McGraw Hill Education. • Thomas, L. F. (1994). Digital Fundamentals, Pearson Education, Asia. • Tokheim, R. L. (1994). Digital Principles, Schaum's Outline Series, 3rd edition, Tata McGraw- Hill. • Taub, H. & Schilling, D. (1985). Digital Integrated Electronics, McGraw Hill.	

F.Y. B.Sc. Electronics (Open Elective)
Semester-II
ELE-OE-121: Electrical Circuits

Total Hours: 30 **Credits: 2**

Course Objectives	• To introduce concept of electrical quantity. • To understand the electrical circuits. • Understanding operation of AD DC motors. • Understand the wiring of Conductors.	
Course outcomes	After successful completion of this course, students are expected to: • Understand the basic electrical quantity and its use in daily life. • Analyze or understand electrical circuits and functioning. • Understand AC and DC machines. • Understand and do electrical wiring.	
Unit	**Topic Particular**	**Hours**
Unit I	**Basic Components** Resistor, Capacitor, Inductor, Transformers and RF coils, Relays, Batteries, Switches, Fuses, Cables, Connectors, Soldering iron and materials. (Only expect construction, working principle, symbols, enlists types, specifications and applications, testing)	8
Unit II	**Basic Electricity Principles** Voltage, Current, Resistance, and Power. Ohm's law. Series, parallel, and series-parallel combinations. AC Electricity and DC Electricity. DC Power sources, Familiarization with multimeter, voltmeter and ammeter.	**8**
Unit III	**Understanding Electrical Circuits** Main electric circuit elements (R,L,C) and their combination. Rules to analyze DC sourced electrical circuits (KCL, KVL) Current and voltage drop across the DC circuit elements, Diode and rectifiers, . Response of inductors and capacitors with DC or AC sources Single-phase and three-phase alternating current sources. Rules to analyze AC sourced electrical circuits. Power factor. Saving energy and money.	**8**
Unit IV	**Electrical wiring and safety** Different types of conductors and cables. Basics of wiring-Star and delta connection. Drawing symbols. Blueprints. Reading Schematics. Ladder diagrams. Electrical Schematics. Power circuits. Control circuits. Reading of circuit schematics. Tracking the connections of elements and identify current flow and voltage drop, Insulation. Solid and stranded cable. Conduit. Cable trays. Splices: wire nuts, crimps, terminal blocks, split bolts, and solder. Preparation of extension board, Circuit breakers. Overload devices. Ground-fault protection. Grounding and isolating. Phase reversal. Surge protection.	**6**
References	• Thereja, B.L., & Thereja, R. (2008). Basic Electrical Engineering. S Chand & Co. • Say, M.G. (2002). Performance and design of AC machines. CBS. • Kothari, D.P., & Nagrath, I.J. (2019). Basic Electrical Technology. McGrawHill. • Alexander, C. K. & Sadiku M.N.O (2022). Fundamental of Electric Circuit, McGrawHill, 7th ed. • Chakrabarti, A. (2018). Circuit Theory, Dhanpat Rai & Co , 7th ed.	

F.Y. B.Sc. Electronics (Major)
Semester-II
ELE-OE-122: Practicals on Electrical Circuits

Total Hours: 60 **Credits: 2**

Course Objectives	• To familiarize with electrical quantity. • To understand the basic of electrical circuits. • Understanding operation of AD and DC motors. • Understand the wiring of Conductors.	
Course Outcomes	After successful completion of this course, students are expected to: • Understand the basic electrical quantity and its use in daily life. • Do measurement of basic electrical quantity and analyze or understand electrical circuits. • Understand AC and DC machines. • Understand and do electrical wiring.	
Sr. No.	**Topic Particular**	**Hours**
1	Identification testing and specification of resistor	4
2	Identification testing and specification of capacitor	4
3	Identification of electronic components, testing and their specification: (Inductor)	4
4	Identification of electronic components, testing and their specification: (Transformer)	4
5	Identification of electronic components, testing and their specification (Switches, Fuse and Relay)	4
6	Study of digital multimeter.	4
7	Study of Series and Parallel circuit of Resistor.	4
8	Study of Series and Parallel circuit of Capacitor.	4
9	Measurement of AC and DC Voltage using Voltmeter.	4
10	Measurement of AC and DC current using Ammeter.	4
11	Study of Ohm's Law.	4
12	Study of KVL Theorem.	4
13	Study of KCL theorem.	4
14	Study of Rectifiers.	4
15	Study of AC and DC sources.	4
References	• Thereja, B.L., & Thereja, R. (2008). Basic Electrical Engineering. S Chand & Co. • Say, M.G. (2002). Performance and design of AC machines. CBS. • Kothari, D.P., & Nagrath, I.J. (2019). Basic Electrical Technology. McGrawHill.	

	• Tiwana, A.B. (1990). Practical Electronic Circuits, BPB • Alexander, C. K. & Sadiku M.N.O (2022). Fundamental of Electric Circuit, McGraw Hill, 7th ed.	