K. C. E. Society's
Moolji Jaitha College

NAAC Reaccredited Grade - A (CGPA : 3.15 - 3rd Cycle)
UGC honoured "College of Excellence"
Dept. of Biotechnology, Ministry of Science & Technology honoured
'Star College" | DST(FIST) Assisted College

ESTD. 1945

के. सी. ई. सोसायटीचे
मूळजी जेठा महाविद्यालय

नॅक द्वारा पुनर्मानांकित श्रेणी – 'ए' (सी.जी.पी.ए. : ३.१५ – तिसरी फेरी)
विद्यापीठ अनुदान आयोगाद्वारा घोषित 'कॉलेज ऑफ एक्सलन्स'
भारत सरकारच्या विज्ञान, तंत्रज्ञान, जैवतंत्रज्ञान विभागातर्फे
घोषित 'स्टार कॉलेज'। डी.एस.टी. (फीस्ट) अंतर्गत अर्थसहाय्य प्राप्त

Date :- 29/06/2019

NOTIFICATION

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

Ref. :- Decision of the Academic Council at its meeting held on 28/06/2019.

The Syllabi of B. Sc. in Electronics (First and Second Semesters) as per CBCS-UG Regulations, 2016 and approved by the Academic Council as referred above are hereby notified for implementation with effect from the academic year 2019-20.

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

H. O. D.
Chairman
Board of Studies

MOOLJI JAITHA COLLEGE, JALGAON • AUTONOMOUS • NAAC GRADE 'A' CGPA-3.15 (3rd CYCLE) ESTD. 1945

Principal,
M. J. College, Jalgaon

To :

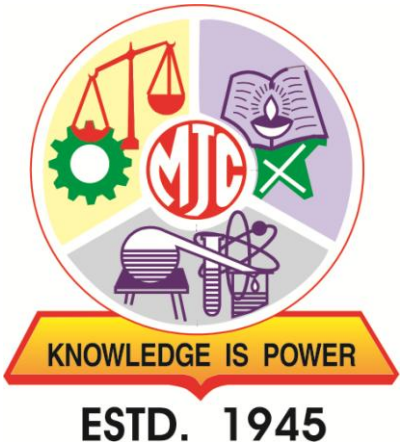
1) The Head of the Dept., M. J. College, Jalgaon.
2) The Director, School of Physical Sciences, M. J. College, Jalgaon.
3) The office of the COE, M. J. College, Jalgaon.
4) The office of the Registrar, M. J. College, Jalgaon.
5) Office File.

Khandesh College Education Society's

Moolji Jaitha College, Jalgaon

An "Autonomous College" Affiliated to

KBC North Maharashtra University, Jalgaon



COURSE STRUCTURE

FOR

B. Sc. Electronics

Under Choice Based Credit System (CBCS)

[w. e. f. Academic Year: 2019-20]

Course format – B.Sc.

Semester	Core Course (DSC) (12)	Ability Enhancement Compulsory Course(AECC) (2)	Skill Enhancement Course (SEC) (4)	Discipline Specific Elective Courses (DES) (6)
I	DSC-1A **(Electronics)**	(English/MIL Communication) /Environmental Science		
	DSC-2A			
	DSC-3A			
	DSC-4A			
II	DSC-1B **(Electronics)**	(English/MIL Communication) /Environmental Science		
	DSC-2B			
	DSC-3B			
	DSC-4B			
III	DSC-1C **(Electronics)**		SEC-1	
	DSC-2C			
	DSC-3C			
IV	DSC-1D **(Electronics)**		SEC-2	
	DSC-2D			
	DSC-3D			
V			SEC-3	DSE-1A **(Electronics)**
				DSE-2A **(Electronics)**
				DSE-3A **(Electronics)**
VI			SEC-4	DSE-1B **(Electronics)**
				DSE-2B **(Electronics)**
				DSE-3B **(Electronics)**

F. Y. B. Sc. Electronics Course Structure

Term / Semester	Course Module	Subject code	Title of Paper	Credit	Hours per week
I	DSC	ELE-111	NETWORK ANALYSIS AND SEMICONDUCTOR DIODES	2	2
	DSC	ELE-112	DIGITAL INTEGRATED CIRCUITS	2	2
	DSC	ELE-113	LABORATORY-I	2	4
II	DSC	ELE-121	ANALOG ELECTRONICS	2	2
	DSC	ELE-122	LINEAR INTEGRATED CIRCUITS	2	2
	DSC	ELE-123	LABORATORY-II	2	4

S. Y. B. Sc. Electronics Course Structure

Term / Semester	Course Module	Subject Code	Title of Paper	Credit	Hours per Week
III	DSC	ELE-231	ANALOG COMMUNICATION	2	2
	DSC	ELE-232	MICROPROCESSOR 8085	2	2
	DSC	ELE-233	LABORATORY-I	2	4
	SEC	ELE-230	SENSORS AND CONTROL SYSTEM COMPONENTS	2	2
IV	DSC	ELE-241	DIGITAL COMMUNICATION	2	2
	DSC	ELE-242	MICROCONTROLLER	2	2
	DSC	ELE-243	LABORATORY-II	2	4
	SEC	ELE-240	HYDRAULICS AND PNEUMATICS	2	2

T. Y. B. Sc. Electronics Course Structure

Term / Semester	Course Module	Subject Code	Title of Paper	Credit	Hours per Week
V	DSE	ELE-351	OPERATIONAL AMPLIFIERS AND APPLICATIONS	2	2
	DSE	ELE-352	DESIGN WITH ANALOG ICS	2	2
	DSE	ELE-353	POWER ELECTRONICS	2	2
	DSE	ELE-354	BIOMEDICAL INSTRUMENTATION	2	2
	DSE	ELE-355	SENSOR AND ACTUATORS	2	2
	DSE	ELE-356	INSTRUMENTATION	2	2
	DSE	ELE-357	LABORATORY-I	2	4
	DSE	ELE-358	LABORATORY-II	2	4
	DSE	ELE-359	PROJECT:-I	2	4
	SEC	ELE-350 (A) / ELE-350 (B)	PROGRAMMING WITH LABVIEW PROCESS AUTOMATION AND PROGRAMMABLE LOGIC CONTROL	2	2
VI	DSE	ELE-361	ADVANCE DIGITAL SYSTEM DESIGN	2	2
	DSE	ELE-362	TRANSMISSION LINES, ANTENNA AND WAVE PROPAGATION	2	2
	DSE	ELE-363	OPTOELETRONICS	2	2
	DSE	ELE-364	EMBEDDED SYSTEM	2	2
	DSE	ELE-365	C – PROGRAMMING	2	2
	DSE	ELE-366	NUMERICAL SIMULATION IN ELECTRONICS USING C	2	2
	DSE	ELE-367	LABORATORY-I	2	4
	DSE	ELE-368	LABORATORY-II	2	4
	DSE	ELE-369	PROJECT:-II	2	4
	SEC	ELE-360 (A) / ELE-360 (B)	ROBOTICS MECHATRONICS AND DIGITAL MACHINING	2	2

Examination pattern (40:10)

Nature	Marks
External Marks	40
Internal Marks	10
Total Marks	50

Khandesh College Education Society's

Moolji Jaitha College, Jalgaon

An "Autonomous College" Affiliated to

KBC North Maharashtra University, Jalgaon

KNOWLEDGE IS POWER

ESTD. 1945

SYLLABUS

Electronics

F.Y.B. Sc.

(Semester I & II)

Under Choice Based Credit System (CBCS)

[w. e. f. Academic Year: 2019-20]

K.C.E. SOCIETY'S
MOOLJI JAITHA COLLEGE, JALGAON
Class: F. Y. B. Sc.
Subject: Electronics
Choice Base Credit System
(With effect from June 2019)

Semester	Course	Core Course		No. of Credits	Hours per Semester	Marks	
		Course Code	**Course Title**			**Internal**	**External**
I	**DSC 1A:** (Credits: Theory-04, Practicals-02)	**ELE- 111**	Network Analysis and Semiconductor Diodes	02	30	10	40
		ELE -112	Digital Integrated circuits	02	30	10	40
		ELE -113	Lab-I : Network Analysis and Digital Integrated Circuits	02	60	10	40
II	**DSC 1B:** (Credits: Theory-04, Practicals-02)	**ELE -121**	Analog Electronics	02	30	10	40
		ELE-122	Linear Integrated Circuits	02	30	10	40
		ELE-123	Lab-II : Analog Electronics and Linear Integrated Circuits	02	60	10	40

MOOLJI JAITHA COLLEGE, JALGAON

Syllabus of F. Y. B. Sc. Electronics

(Choice Based Credit System)

Semester I

ELECTRONICS - DSC 1 A:
NETWORK ANALYSIS AND DIGITAL INTEGRATED CIRCUITS
Theory: 60 Lectures (Credits: Theory-04, Practicals-02)

Course outcome: Learner will be able to ….

1. Apply knowledge to develop circuits using electronic devices.
2. Apply the concept and knowledge of electronics devices to real life problems.
3. Simulate complex circuits and understand the behavior of the systems.
4. Understand and analyse, linear and digital electronic circuits.

ELE-111: Network Analysis and Semiconductor Diodes

[Credits - 02, Lectures - 30]

Objectives:

1. To get familiar with basic circuit elements and passive components
2. To understand DC circuit theorems and their use in circuit analysis
3. To get familiar with semiconductor basics
4. To study the construction and characteristics of semiconductor devices

Course Contents:

Unit-I: Basic Circuit Concepts

Concept of Ideal D.C Voltage and Current source, Study of basic circuit elements and passive components such as Resistor, Capacitor, Inductor, Transformer, Relays, Batteries, Switches, Fuses, Cables, Connectors. (Their working principle, symbols, enlists types, specifications and applications). **[6 - Lectures]**

Unit-II: Circuit Analysis and Network theorems

Circuit and Network terminology, Ohms law, series and parallel circuits of resistors, capacitors and inductors, voltage and current dividers, Kirchhoff's Laws, (KCL, KVL), Superposition theorem, Concept of black box, Therenin's theorem, Norton's theorem, Maximum power transfer theorem, Node Analysis, Mesh Analysis, Star-Delta Conversion. **[10- Lectures]**

Unit III: Junction Diode

PN junction diode –formation/construction, Formation of Depletion Layer, forward and reverse biasing, Diode Equation and I-V characteristics. Ideal diode, Idea of static and dynamic resistance, Zener diode- I-V characteristics, Zener and avalanche breakdown, Reverse saturation current. Introduction to light emitting diode (L.E.D), photo diode and Photo voltaic or solar cell.

[7 - Lectures]

Unit IV: Applications of Junction diodes

Rectifiers- Half wave rectifier, Full wave rectifiers (center tapped and bridge), circuit diagrams, working and waveforms, PIV, ripple factor and their efficiency (Derivation not expected). Comparison of rectifiers, Filter-Shunt capacitor filter, its role in power supply, output waveform, and working. Zener diode as voltage regulator. **[7 - Lectures]**

Reference Books:

1. Electric Circuits, S. A. Nasar, Schaum's outline series, Tata McGraw Hill (2004)
2. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
3. Electrical Circuits, K.A. Smith and R.E. Alley (2014) Cambridge University Press
4. Network, Lines and Fields, J.D.Ryder, Prentice Hall of India.
5. Electrical Circuit Analysis, Mahadevan and Chitra, PHI Learning.
6. Electronics devices and circuits, B.L. Theraja
7. Principles of Electronics - V. K. Mehta

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ELE: 112 Digital Integrated circuits

[Credits-2, Lectures-30]

Objectives:

1. To get familiar with various numbers systems and Boolean algebra.
2. To study basic building block of digital electronics like logic gates and arithmetic circuits.
3. To learn about latches, Flip flops, shift register and counter.

Unit 1: Number System and Codes:

Decimal, Binary, Octal and Hexadecimal number systems, base conversions. Concept of positive and negative logic. Representation of signed and unsigned numbers, BCD code (8421), Gray code, Binary addition, Subtraction by 1's and2's complement method. Octal and hexadecimal addition and subtraction. **[7 – Lectures]**

Unit 2: Logic Gates and Boolean algebra:

Logic symbol, logic equation and Truth Tables of OR, AND, NOT, NOR, NAND, XOR and their IC pin configuration. NAND and NOR as universal Gates, Demorgan's theorem, Basic postulates and fundamental theorems of Boolean algebra. **[7 – Lectures]**

Unit 3: Combinational Logic Analysis and Design: Standard representation of logic functions (SOP & POS), Min and max terms, Minimization Techniques (Karnaugh map minimization up to 4 variables for SOP). Arithmetic Circuits: Binary Addition. Half and Full Adder

Data processing circuits: Multiplexers (2:1 and 4:1), De-multiplexers (1:2 and 1:4), Decoders (BCD to Decimal Decoder), Encoders (Decimal to BCD Encoder). **[8 – Lectures]**

Unit 4: Sequential Circuits: S-R, D, J-K and T Flip flop, Clocked (Level and Edge Triggered) Flip-Flops. Preset and Clear operations. Race-around conditions in J-K Flip-Flop. Master-slave J-K Flip-Flop. Shift registers: Serial-in-Serial-out, Serial-in-Parallel-out, Parallel-in-Serial-out and Parallel-in-Parallel-out Shift Registers (only 4 bits). Counters (4 bits): Asynchronous counters, Decade Counter. Synchronous Counter. **[8 – Lectures]**

Reference Books:

1. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., (2011), Tata McGraw
2. Fundamentals of Digital Circuits, Anand Kumar, 2nd Edn, (2009) PHI Learning Pvt. Ltd.
3. Digital Circuits and systems, Venugopal, (2011) Tata McGraw Hill.
4. Thomas L. Flyod, Digital Fundamentals, Pearson Education Asia (1994)
5. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (

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ELE-113 -ELECTRONICS LAB

Network Analysis and Digital Integrated Circuits : Lab-I
[Credits – 02, Lectures – 60]

ELECTRONICS LAB-I :

At least **05 experiments each** from **section A and B**

Section A: Network Analysis and Semiconductor diode

1. Identification of electronic components and their specification (R, C, L, diodes, transistors),
2. Measurement of Amplitude, Frequency and Phase difference using Oscilloscope.
3. Erification of (a) Thevenin's theorem and (b) Norton's theorem.
4. Verification of (a) Superposition Theorem and (b) Reciprocity Theorem.
5. Verification of the Maximum Power Transfer Theorem.
6. Study of the I-V Characteristics of (a) P-N junction Diode, and (b) Zener diode.
7. Study of (a) Half wave rectifier and (b) Full wave rectifier (FWR).
8. Study the effect of capacitor input filter in Full wave rectifier.
9. Study of Zener diode as a voltage regulator.

Section B: Digital Integrated Circuits

1. Verification of truth table of logic gates OR, AND, NOT, NOR, NAND, XOR using ICS
2. To design a combinational logic system for a specified Truth Table. (b) To convert Boolean expression into logic circuit and design it using logic gate ICs. (c) To minimize a given logic circuit.
3. Study of Half Adder and Full Adder.
4. Study of Half Subtractor and Full Subtractor.
5. Study of BCD to seven-segment decoder.
6. To build and test Flip-Flop (Clocked RS, D-type) circuits using NAND gates.
7. To build and test JK Master-slave flip-flop using Flip-Flop ICs
8. To build and test Counter using D-type/JK Flip-Flop ICs and study timing diagram.

9. To build and test Shift Register (serial-in and serial-out) using D-type/JK Flip-Flop ICs.
10. To study decade counter using IC 7490.
11. Study of 4-1 line multiplexer.

Reference Books:

1. Electrical Circuits, M. Nahvi and J. Edminister, Schaum's Outline Series, Tata McGraw-Hill (2005)
2. Networks, Lines and Fields, J.D.Ryder, Prentice Hall of India.
3. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
4. Allen Mottershead, Electronic Devices and Circuits, Goodyear Publishing Corporation.
5. Digital Principles and Applications, A.P. Malvino, D.P.Leach and Saha, 7th Ed., (2011) Tata McGraw
6. R. L. Tokheim, Digital Principles, Schaum's Outline Series, Tata McGraw- Hill (1994)
7. Digital Electronics, S.K. Mandal (2010) 1st edition, McGraw Hill

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MOOLJI JAITHA COLLEGE, JALGAON

Syllabus of F. Y. B. Sc. Electronics

(Choice Based Credit System)

Semester- II

ELECTRONICS-DSC 1 B:
ANALOG ELECTRONICS AND LINEAR INTEGRATED CIRCUITS
Theory: 60 Lectures (Credits: Theory-04, Practicals-02)

Course outcome:

Learner will be able to ….

1. Apply the concept and knowledge of integrated circuit chips to develop new systems.
2. Apply practical knowledge to solve real life problems of the society.
3. Understand of the course and create scientific temperament and give exposure to the students for independent use of integrated circuit chips for innovative applications.
4. Model complex circuits and simulate them.
5. Handle simulation software to analyse electronics circuits.

ELE-121: Analog Electronics
[Credits-2, Lectures -30]

Objectives:

1. To get familiar with BJT circuits and amplifier
2. To understand feedback Circuits and oscillator
3. To learn Unipolar semiconductor devices and applications

Course Contents:

Unit 1: Bipolar Junction Transistor

Construction and operation of BJT (NPN and PNP Transistor), Transistor circuits configuration CB, CE and CC configuration (circuits diagram and comparison), I-V characteristics of transistor in CE configuration (Input and output characteristics). h parameter of an Ideal CE transistor, Regions

of operation (active, cut off and saturation), Current gains α and β. Relations between α and β. dc load line and Q point. **[8 – Lectures]**

Unit 2: Amplifiers

Transistor as an amplifier, Need of transistor biasing, Inherent variation of Transistor parameter, Stabilization, Method of transistor biasing - Fixed Bias and Voltage Divider Bias. Thermal runaway and stability factor (Derivation not expected). Classification of amplifiers (Class A, Class B, Class C) Single and two stage RC Coupled Amplifier (circuit diagram and working) and its Frequency Response. **[8 – Lectures]**

Unit 3: Feedback and oscillators

Concept of feedback, Types of feedback, Advantages of negative feedback in amplifier (Qualitative only). Oscillator- Classification of oscillator, Tank circuit, Barkhausen criterion for sustained oscillations. Phase shift and Colpitt's oscillator-circuit diagram and working.

[7 – Lectures]

Unit 4: Unipolar Devices

Symbol, types, construction, working principle, I-V characteristics, Specifications parameters of: Uni-Junction Transistor (UJT), Junction Field Effect Transitor (JFET), Metal Oxide Semiconductor FET (MOSFET), comparison of JFET, MOSFET and BJT **[7 – Lectures]**

Reference Books:

1. Electronic Devices and Circuits, David A. Bell, 5th Edition (2015), Oxford University Press.
2. Electronic Circuits: Discrete and Integrated, D.L. Schilling and C. Belove, Tata McGraw Hill
3. Microelectronic circuits, A.S. Sedra, K.C. Smith, A.N. Chandorkar, (2014), 6th Edn., Oxford University Press.
4 J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill (2001)
5. J. J. Cathey, 2000 Solved Problems in Electronics, Schaum's outline Series, Tata McGraw Hill (1991)
6. Basic Electronics, Bernod Grob, McGra-Hill, India.
7. Applied Electronics, R. S. Sedha; S. Chand and Company, New Delhi.
8. Principles of Electronics - V. K. Mehta

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ELE-122: Linear Integrated Circuits

[Credits-2, Lectures-30]

Objectives:

1. To understand various op-amp parameters and their importance in design.
2. To learn about basic op-amp configurations.
3. To introduce various op-amp application circuits.
4. To introduce various timing circuits.

Course Contents:

Unit 1: Operational Amplifiers

Block diagram of operational amplifier, symbol, Ideal and Practical Characteristics Operational Amplifier (IC 741), Open and closed loop configuration, Frequency Response. CMRR. Slew Rate.

[8 – Lectures]

Unit 2: Applications of Op-Amps:

Inverting and non-inverting amplifiers, concept of Virtual Ground, Summing and Difference Amplifier, Differentiator, Integrator, Wein bridge oscillator, Comparator and Zero-crossing detector, and Active low pass and high pass Butterworth filter (1st order only), Problems based on applications. **[8 – Lectures]**

Unit 3: Clock and Timer (IC 555)

Multivibrator, Types of mutivibrator, Block diagram of IC 555, Astable, Monostable and Bistable multivibrator circuits using IC-555, Period and frequency of multivibrators, Problems

. **[7 – Lectures]**

Unit 4: D-A and A-D Conversion

DAC and ADC conversion,Types of DAC, 4-bit binary weighted and R-2R D-A converters, circuit and working. Accuracy and Resolution. A-D conversion ,characteristics. Types of ADC (list only), Successive approximation ADC. Problems on DAC

[7 – Lectures]

Reference Books:

1. OP-Amps and Linear Integrated Circuit, R. A. Gaikwad, 4th edition (2000), Prentice Hall
2. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition, (2011), Oxford University Press.
3. Digital Systems: Principles and Applications, R.J.Tocci, N.S.Widmer, (2001) PHI

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ELE-123 -ELECTRONICS LAB

Analog Electronics and Linear Integrated Circuits:Lab-II
[Credits-2, Lectures-60]

At least **04 experiments each** from **section A and B ,02 experiments** from **section C**

Section-A: Analog Electronics (Circuits)

1. Study of the I-V Characteristics of BJT in CE configuration.
2. Study of the I-V Characteristics of UJT and design relaxation oscillator.
3. Study of the output and transfer I-V characteristics of common source JFET.
4. Design and study of Fixed register biasing method.
5. Study of a Single Stage CE amplifier.
6. Study of the RC Phase Shift Oscillator.
7. Study the Colpitts's oscillator.
8. Study of two stage RC coupled CE amplifier.
9. Design and study Voltage divider biasing method.

Section-B: Op-Amp. Circuits

1. To design an inverting amplifier using Op-amp (741/351) for dc voltage of given gain
2. To design inverting amplifier using Op-amp (741/351) and study its frequency response
3. To add two dc voltages using Op-amp in inverting and non-inverting mode
4. To design an non inverting amplifier using Op-amp (741/351) for dc voltage of given gain
5. To investigate the use of an op-amp as an Integrator.
6. To investigate the use of an op-amp as a Differentiator.
7. To design a Wien bridge oscillator for given frequency using an op-amp.
8. To design a circuit to simulate the solution of simultaneous equation and $1^{st}/2^{nd}$order differential equation.
9. Design a Butterworth Low Pass active Filter (1st order) and study Frequency Response

10. Design a Butterworth High Pass active Filter (1st order) and study Frequency Response

11. Design a digital to analog converter (DAC) of given specifications.

12. To design an Astable Multivibrator of given specification using IC 555 Timer.

13. To design a Monostable Multivibrator of given specification using IC 555 Timer

Section-C:

SPICE/MULTISIM : Simulation for electronics circuits and devices

1. Characteristics of junction diode.
2. Characteristics of BJT
3. Characteristics of JFET/ MOSFET. Characteristics of junction diode
4. To verify Thevenin and Norton Theorems.
5. Design and analysis the series and parallel circuits.

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