THE NATIONAL INSTITUTE OF ENGINEERING

Manandavadi Road, Mysuru

ESTD : 1946

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum Structure and Syllabus

2025-2026

1st Year UG 2025 Admitted Batch

I Semester

Physics Cycle

Sl.No	Course	Course Code	Course Title	Teaching Department	Teaching Hrs/Week				Credits	Examination			
					L	T	P	SAAE		Duration in Hrs	CIE	SEE	Total
1	ASC	1BMATx101	Applied Mathematics -I	Maths	3	2	0	0	4	3	100	100	100
2	ASC	1BPHYx102	Applied Physics	Physics	2	2	0	0	3	3	100	100	100
3	ESC	1BCEDx103	Computer-Aided Engineering Drawing	Mechanical	2	0	2	0	3	3	100	100	100
4	ESC	1BXXX104x	Engineering Science Course-1	Respective Engg.Dept	3	0	0	0	3	3	100	100	100
5	PSC	1Bxxx105	Programme Specific Course	Respective Engg.Dept	2	2	0	0	3	3	100	100	100
					3	0	0	0	3	3	100	100	100
	OR												
	PLC	1BPLC105x	Programming Language Course	Any Dept.	3	0	0	0	3	3	100	100	100
6	AEC (NCMC)	1Bxxx106	Soft Skills	Humanities	0	0	0	2	0	0	50	0	50
7	PSC	1BxxxL107	Program-Specific Course Lab	Respective Engg Dept	0	0	2	0	1	2	50	50	100
	OR												
	PLC	1BPLC105x	Programming Language Course	Any Dept.	0	0	2	0	1	2	50	50	100
8	ASC	1BPHYxL102	Applied Physics Laboratory		0	0	2	0	1	2	50	50	100
9	AEC/SDC	1BPRJ158	Interdisciplinary Project-Based Learning	Respective Engg Dept	0	0	0	2	1	0	50	0	50
10	HSMS	1BKSK109(BKSK107)/ 1BKBK109(BKBK107)	Samskrutika Kannada/ Balake Kannada	Humanities	0	0	1	0	1	0	50	0	50
Total					24/25				20				

I Semester

Chemistry Cycle

Sl.No	Course	Course Code	Course Title	Teaching Department	Teaching Hrs/Week				Credits	Examination			
					L	T	P	SAAE		Duration in Hrs	CIE	SEE	Total
1	ASC	1BMATx101	Applied Mathematics -I	Maths	3	2	0	0	4	3	100	100	100
2	ASC	1BCHEx102	Applied Chemistry	Chemistry	2	2	0	0	3	3	100	100	100
3	ETC	1BAIA103/ BETC105x	Introduction to AI and Applications	Any Dept.	3	0	0	0	3	3	100	100	100
4	ESC	1BXXX104x	Engineering Science Course-1	Respective Engg.Dept	3	0	0	0	3	3	100	100	100
5	PSC	1Bxxx105	Programme Specific Course	Respective Engg.Dept	2	2	0	0	3	3	100	100	100
					3	0	0	0	3	3	100	100	100
	OR												
	PLC	1BPLC105x	Programming Language Course	Any Dept.	3	0	0	0	3	3	100	100	100
6	AEC	1BENGL106	Communication Skills	Humanities	1	0	0	0	1	0	50	0	50
7	PSC	1BxxxL107	Program-Specific Course Lab	Respective Engg Dept	0	0	2	0	1	2	50	50	100
	OR												
	PLC	1BPLC105x	Programming Language Course	Any Dept.	0	0	2	0	1	2	50	50	100
8	ASC	1BCHExL102	Applied Chemistry Laboratory	Chemistry	0	0	2	0	1	2	50	50	100
9	AEC/SDC	1BIDTL158	Innovation and Design Thinking Lab	Respective Engg Dept	0	0	2	0	1	0	50	0	50
10	AEC (NCMC)	1BKSK109(BKSK107)/ 1BKBK109(BKBK107)	Indian Constitution & Engineering Ethics	Humanities	0	0	0	2	0	0	50	0	50
Total					26/25				20				

II Semester

Physics Cycle

Sl.No	Course	Course Code	Course Title	Teaching Department	Teaching Hrs/Week				Credits	Examination			
					L	T	P	SAAE		Duration in Hrs	CIE	SEE	Total
1	ASC	1BMATx201	Applied Mathematics -II	Maths	3	2	0	0	4	3	100	100	100
2	ASC	1BPHYx202	Applied Physics	Physics	2	2	0	0	3	3	100	100	100
3	ESC	1BCEDx203	Computer-Aided Engineering Drawing	Mechanical	2	0	2	0	3	3	100	100	100
4	ESC	1BXXX204x	Engineering Science Course-2	Respective Engg.Dept	3	0	0	0	3	3	100	100	100
5	PSC	1Bxxx205	Programme Specific Course	Respective Engg.Dept	2	2	0	0	3	3	100	100	100
					3	0	0	0	3	3	100	100	100
	OR												
	PLC	1BPLC205x	Programming Language Course	Any Dept.	3	0	0	0	3	3	100	100	100
6	AEC (NCMC)	1Bxxx206	Soft Skills	Humanities	0	0	0	2	0	0	50	0	50
7	PSC	1BxxxL207	Program-Specific Course Lab	Respective Engg Dept	0	0	2	0	1	2	50	50	100
	OR												
	PLC	1BPLC205x	Programming Language Course	Any Dept.	0	0	2	0	1	2	50	50	100
8	ASC	1BPHYxL202	Applied Physics Laboratory		0	0	2	0	1	2	50	50	100
9	AEC/SDC	1BPRJ258	Interdisciplinary Project-Based Learning	Respective Engg Dept	0	0	0	2	1	0	50	0	50
10	HSMS	1BKSK209(BKSK207)/ 1BKBK209(BKBK207)	Samskrutika Kannada/ Balake Kannada	Humanities	0	0	1	0	1	0	50	0	50
Total					26/27				20				

II Semester

Chemistry Cycle

Sl.No	Course	Course Code	Course Title	Teaching Department	Teaching Hrs/Week				Credits	Examination			
					L	T	P	SAAE		Duration in Hrs	CIE	SEE	Total
1	ASC	1BMATx201	Applied Mathematics -II	Maths	3	2	0	0	4	3	100	100	100
2	ASC	1BCHEx202	Applied Chemistry	Chemistry	2	2	0	0	3	3	100	100	100
3	ETC	1BAIA203/ BETC205x	Introduction to AI and Applications	Any Dept.	3	0	0	0	3	3	100	100	100
4	ESC	1BXXX204x	Engineering Science Course-1	Respective Engg.Dept	3	0	0	0	3	3	100	100	100
5	PSC	1Bxxx205	Programme Specific Course	Respective Engg.Dept	2	2	0	0	3	3	100	100	100
					3	0	0	0	3	3	100	100	100
	OR												
	PLC	1BPLC205x	Programming Language Course	Any Dept.	3	0	0	0	3	3	100	100	100
6	AEC	1BENGL206	Communication Skills	Humanities	1	0	0	0	1	0	50	0	50
7	PSC	1BxxxL207	Program-Specific Course Lab	Respective Engg Dept	0	0	2	0	1	2	50	50	100
	OR												
	PLC	1BPLC205x	Programming Language Course	Any Dept.	0	0	2	0	1	2	50	50	100
8	ASC	1BCHExL202	Applied Chemistry Laboratory	Chemistry	0	0	2	0	1	2	50	50	100
9	AEC/SDC	1BIDTL258	Innovation and Design Thinking Lab	Respective Engg Dept	0	0	2	0	1	0	50	0	50
10	AEC (NCMC)	1BKSK209(BKSK207)/ 1BKBK209(BKBK207)	Indian Constitution & Engineering Ethics	Humanities	0	0	0	2	0	0	50	0	50
Total					26/25				20				

Code: 1BECE105/205 **Course: Fundamentals of Electronics and Communication Engineering**
Credits: 3 **L:T:P: 2:2:0**
CIE: 50% **SEE: 50%**
SEE Hours: 3 Hrs **Total Marks:100**

Prerequisites if any	Semiconductor physics
Learning objectives	1. Explain the physical principles underlying the operation of semiconductor devices such as diodes and transistors. 2. Understand and apply Boolean algebra to simplify and analyze digital logic expressions. 3. Define the basic components of a communication system: transmitter, channel, receiver.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the working principles, fundamental characteristics of various semiconductor devices including diodes and transistors.	L2
CO2	Analyse basic combinational circuits using the fundamental principles of digital systems.	L3
CO3	Describe the fundamental concepts of communication systems.	L2

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	3	2	2	-	1	-	-	-	-	2	1		3	2	2
CO2	3	2	2	-	1	-	-	-	-	2	1		3	2	2
CO3	3	2	2	-	1	-	-	-	-	2	1		3	2	2

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1: Semiconductor Devices			
1.1	Working principles of the following devices: PN Junction Diode, Zener Diode and Its Use in Voltage Regulation, Light Emitting Diode (LED), Photodiode.	2	0	0
1.2	Basic principles and characteristics of the following power devices: Silicon Controlled Rectifier (SCR).	1	2	0
1.3	TRIAC, DIAC and IGBT.	2	1	0
	Module – 2: Diodes and its Application			
2.1	Introduction, Characteristics and Parameters	1	0	0
2.2	Diode Approximation, DC Load Line Analysis	1	0	0
2.3	Power supply block diagram	0	1	0
2.4	Half Wave Rectifier with and without Capacitor Filter Circuit (With derivation).	1	1	0
2.5	Full Wave Bridge Rectifier with and without Capacitor Filter Circuit (With derivation)	1	1	0
2.6	Clipper and clamper circuit.	1	0	0
	Module – 3: Bipolar Junction Transistors and Field Effect Transistor			
3.1	Introduction, BJT Voltages & Currents, BJT Amplification, BJT Switching	1	0	0
3.2	Common Base Characteristics, Common Emitter Characteristics, BJT Biasing	1	0	0
3.3	Fixed Biasing and Voltage Divider, DC Load Line and Bias Point.	0	1	0
3.4	Junction Field Effect Transistor (N-Channel), JFET Characteristics	1	0	0
3.5	MOSFETS: Enhancement and Depletion mode MOSFETs	0	1	0
3.6	MOSFET characteristics	1	0	0
3.7	MOSFET as a Switch and Amplifier.	1	1	0

Module – 4: Digital Systems and Binary Numbers				
4.1	Digital Systems and Binary Numbers: Digital Systems, Numbering System (Binary, Octal, Decimal and Hexadecimal)	1	0	0
4.2	Number Base Conversion, 1's and 2's Complement Operation.	0	1	0
4.3	Signed Binary Numbers- Arithmetic Addition and Subtraction.	0	1	0
4.4	Boolean Algebra: Basic definition, Properties of Boolean Algebra, Boolean Functions	1	0	0
4.5	K-map, Canonical and Standard Forms	0	1	0
4.6	Digital Logic Gates, Adders- Half adder, Full adder	1	0	0
4.7	Multiplexer, demultiplexer	1	0	0
4.8	Encoder, decoder.	1	0	0
Module – 5: Fundamentals of Communication				
5.1	Communication systems block diagram, Communication Channels and their Characteristics: Wireline, Fiber Optic.	2	0	0
5.2	Wireless Electromagnetic Channels, Need for modulation.	1	1	0
5.3	Types modulation: AM, FM, PM, ASK, FSK, PSK (Qualitative)	2	0	0
5.4	Sampling Theorem, Nyquist criteria and Converting Analog Signal to Digital Signal Using PCM.	1	1	0
	Total No. of Lecture Hours	**26**		
	Total No. of Tutorial Hours		**14**	
	Total No. of Practical Hours			**00**

Textbooks:

1. D.P Kothari and I J Nagrath, Basic electronics, Second Edition, McGraw Hill Education Pvt ltd, 2018.
2. Power Electronics, P S Bimbra, Khanna Publishers.
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN- 978-81-203-0417-8

Reference Books:

1. Fundamentals of Microelectronics, Behazad Razavi, John Wiley & Sons, 2021
2. Microelectronics Circuits Theory and applications, Adel S Sedra, Kenneth C Smith, 7th edition Oxford University Press.
3. Microelectronics Circuit Analysis and Design, Donald A. Neaman, 4th edition, McGraw-Hill, 2010
4. John G. Proakis, Masoud Saleh, Fundamentals of Communication Systems, Second Edition, Pearson Educations, Inc., 2014.
5. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016

Online Resources:

1. https://archive.nptel.ac.in/courses/108/105/108105158/
2. https://archive.nptel.ac.in/courses/108/106/108106105/

Course Code: 1BBEEL107/207 **Course Name: Fundamentals of Electronics and Communication Engineering Lab**
Credits: 1 **L:T:P - 0:0:2**
CIE: 50% **SET: 50%**
SET Hours: 2 Hrs **SET Max. Marks: 50**

Prerequisites if any	Semiconductor physics
Learning objectives	1. To demonstrate the simulation and implementation of the hardware and analyse different electronic circuits.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs		Bloom's level
CO1	Study, implement and analyse different electronic circuits.	L3

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11		PSO1	PSO2	PSO3
CO1	3	3	3	-	2	-	-	-	-	-	1		3	2	1

Mapping Strength: Strong– 3 Medium – 2 Low – 1 List of

experiments:

**** Familiarization of equipment's and components to be conducted before start of lab experiments.***

Sl. No.	Experiment	Hands on/ Virtual
1.	Characterisation of PN junction diode, Zener Diode, SCR.	Hands on
2.	Design and Testing of Half-Wave Rectifiers with and Without Filter for Determining Ripple Factor, Voltage Regulation, and Efficiency.	Hands on
3.	Design and Testing of Full-Wave Bridge Rectifiers with and Without Filter for Determining Ripple Factor, Voltage Regulation, and Efficiency.	Hands on
4.	Design and Testing of Clipping and Clamping Circuits to obtain desired Transfer Characteristics.	Hands on
5.	Analysis of Input and Output Characteristics of a Bipolar Junction Transistor in Common Emitter Configuration.	Hands on
6.	Study of Truth Tables for OR, AND, NOT, NAND, and NOR Gates Using Basic and Universal Gates.	Hands on
7.	Realization of canonical forms using logic gates.	Hands on
8.	Realization of Half/ Full Adder using Logic Gates.	Hands on
9.	Realization of Half/ Full Subtractor using Logic Gates.	Hands on
10.	Realization of Mux/Demux.	Hands on

Code: 1BESC104C/204C **Course: Introduction to Electronics and Communication Engineering**
Credits: 3 **L:T:P- 3:0:0**
CIE: 50% **SEE: 50%**
SEE Hours: 3 Hrs **Total Marks:100**

Prerequisites if any	None
Learning objectives	1. Explain the physical principles underlying the operation of semiconductor devices such as diodes and transistors. 2. Understand and apply Boolean algebra to simplify and analyze digital logic expressions. 3. Define the basic components of a communication system: transmitter, channel, receiver.

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the working principles, fundamental characteristics of various semiconductor devices including diodes and transistors.	L2
CO2	Analyse basic combinational circuits using the fundamental principles of digital systems.	L3
CO3	Describe the fundamental concepts of embedded and communication systems.	L2

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	-	1	-	-	-	-	-	1	To be mapped by Respective Department		
CO2	3	2	2	-	1	-	-	-	-	-	1			
CO3	3	2	2	-	1	-	-	-	-	-	1			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1: Semiconductor Devices				
1.1	Working principles of the following devices: PN Junction Diode	1	0	0
1.2	Zener Diode and Its Use in Voltage Regulation	1	0	0
1.3	Light Emitting Diode (LED)	1	0	0
1.4	Photodiode	1	0	0
1.5	Basic principles and characteristics of power devices: Silicon Controlled Rectifier (SCR), TRIAC	2	0	0
1.6	DIAC and IGBT	2	0	0
Module – 2: Rectifiers and BJT				
2.1	Power supply block diagram	1	0	0
2.2	Working principle with waveform of: Half Wave Rectifier with and without Capacitor Filter Circuit.	1	0	0
2.3	Working principle with waveform of: Full Wave Bridge Rectifier with and without Capacitor Filter Circuit.	2	0	0
2.4	Bipolar Junction Transistors – Basics of BJT	2	0	0
2.5	BJT as an amplifier	1	0	0
2.6	BJT as a switch.	1	0	0
Module – 3: Boolean Algebra and Logic Circuits				
3.1	Introduction to number systems and number conversion methods	1	0	0
3.2	1's and 2's Complement Operation	2	0	0
3.3	Properties of Boolean Algebra, Boolean Functions	1	0	0
3.4	Canonical and Standard Forms	1	0	0
3.5	Digital Logic Gates	1	0	0
3.6	Adders- Half adder, Full adder	2	0	0

Module – 4: Embedded Systems				
4.1	Definition	1	0	0
4.2	Embedded systems vs general computing systems	1	0	0
4.3	Classification of Embedded Systems	1	0	0
4.4	Major application areas of Embedded Systems	1	0	0
4.5	Elements of an Embedded System	1	0	0
4.6	Core of the Embedded System	1	0	0
4.7	Differences between Microprocessor vs Microcontroller and RISC vs CISC	1	0	0
4.8	Definition of sensors and actuators with examples	1	0	0
Module – 5: Introduction to communication systems				
5.1	Introduction, Communication systems block diagram	2	0	0
5.2	Communication System Scheme: Information Source and Input Transducer, Transmitter, Channel or Medium, Noise, Receiver	1	0	0
5.3	Definition of Modulation and Need for modulation	1	0	0
5.4	Concept of Radio Wave Propagation (Ground, Space, Sky)	2	0	0
5.5	Types of modulation: AM, FM, PM, ASK, FSK, PSK (Only Definition and waveforms)	2	0	0
	Total No. of Lecture Hours	**40**		
	Total No. of Tutorial Hours		**00**	
	Total No. of Practical Hours			**00**

Textbooks:

1. D.P Kothari and I J Nagrath, Basic electronics, Second Edition, McGraw Hill Education Pvt ltd, 2018.

Reference Books:

2. Ramakanth A Gayakwad, Op-amps and Linear Integrated Circuits, 4th Edition, Pearson Education, 2015.
3. John G. Proakis, Masoud Saleh, Fundamentals of Communication Systems, Second Edition, Pearson Educations, Inc., 2014.
4. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016
5. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN- 978-81-203-0417-8

Online Resources:

1. https://archive.nptel.ac.in/courses/108/105/108105158/
2. https://archive.nptel.ac.in/courses/108/106/108106105/