

DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT



CURRICULUM

Scheme and Syllabus 1st Year Scheme & Syllabus

Outcome Based Education

(Academic Year 2024-2025)

Department of Electronics & Communication Engineering

1st & 2nd Semester B.E

ABOUT THE INSTITUTE

Dayananda Sagar Academy of Technology and Management- DSATM was established in 2011 with 5 UG Programmes and 1 PG Program, the programmes are approved by All India Council for Technical Education (AICTE) New Delhi, Affiliated to Visvesvaraya Technological University (VTU), Belagavi and DSATM is an autonomous institute from 2023-2024.

The Dayananda Sagar Institutions is one of pioneer institutions in India and abroad with six decades of excellence in Academic and Research. The newer campuses were necessary to accommodate the growing need of the technology and innovation.

DSATM nurtures the students in academic, research, sports, cultural and extracurricular activities.

- Creating an academic environment to nurture and develop competent entrepreneurs, leaders and professionals who are socially sensitive and environmentally conscious.
- Integration of Outcome Based Education and cognitive teaching and learning strategies to enhance learning effectiveness.
- Developing necessary infrastructure to cater to the changing needs of Business and Society.
- Optimum utilization of the infrastructure and resources to achieve excellence in all areas of relevance.
- Adopting learning beyond curriculum through outbound activities and creative assignments.
- Imparting contemporary and emerging techno-managerial skills to keep pace with the changing global trends.
- Facilitating greater Industry-Institute Interaction for skill development and employability enhancement.
- Establishing systems and processes to facilitate research, innovation and entrepreneurship for holistic development of students.
- Implementation of Quality Assurance System in all Institutional processes.

VISION OF THE INSTITUTE

To strive at creating the institution a centre of highest calibre of learning, so as to create an overall intellectual atmosphere with each deriving strength from the other to be the best of engineers, scientists with management & design skills.

MISSION OF THE INSTITUTE

- To serve its region, state, the nation and globally by preparing students to make meaningful contributions in an increasing complex global society challenges.
- To encourage, reflection on and evaluation of emerging needs and priorities with state-of-the-art infrastructure at institution.
- To support research and services establishing enhancements in technical, economic, human and cultural development.
- To establish interdisciplinary centre of excellence, supporting/ promoting student's implementation.
- To increase the number of Doctorate holders to promote research culture on campus.
- To establish IIPC, IPR, EDC, innovation cells with functional MOU's supporting student's quality growth.

QUALITY POLICY

Dayananda Sagar Academy of Technology and Management aims at achieving academic excellence through continuous improvement in all spheres of Technical and Management education. In pursuit of excellence cutting – edge and contemporary skills are imparted to the utmost satisfaction of the students and the concerned stakeholders.

ABOUT THE DEPARTMENT

The Department of Electronics and Communication Engineering (ECE) was established in the year 2011. Now a days we cannot imagine the world without Electronics & Communication Engineering that has become an essential and inevitable part of our daily lives in almost all the fields. The Department focus is to train our students to get strong academic knowledge in the frontier areas of both Electronics & Communication engineering and also to make the students ready to meet real-world challenges. The Department has always been on a high growth path and has a rich blend of young and highly-experienced regular faculty members, most of them holding PhD from reputed universities.

The faculty members display a high level of dedication and enthusiasm towards both teaching and state-of-the-art research with strong commitment to engineering education who work with zeal and enthusiasm to provide a vibrant and optimum learning environment. The Department has been accredited by NBA and NAAC for providing high standards of education. To impart quality education by establishing research and learning environment to meet global needs and industrial standards is our department vision.

VISION OF THE DEPARTMENT

To impart quality education in the field of Electronics and Communication Engineering by establishing research and learning environment to meet global needs and industrial standards.

MISSION OF THE DEPARTMENT

- M1:** To provide quality and contemporary knowledge on latest technologies.
- M2:** To develop innovation and creativity among students enabling leadership and entrepreneurship skills with ethical values.
- M3:** To empower faculty with the knowledge in emerging areas of research.
- M4:** To ensure industry ready professionals with a research outlook.
- M5:** To establish center of excellence with industry and university collaborations.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

PEO1: To ensure graduates with strong foundation in engineering, science and technology for successful career in Electronics and Communication Engineering.

PEO2: Graduates shall be technically competent with ability to analyze, design, develop, optimize and implement Electronics and Communication systems to meet global needs.

PEO3: Graduates shall build leadership and entrepreneurship qualities with professional ethics for the development of emerging technologies.

PROGRAM OUTCOMES (PO's)

Engineering Graduates will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSO's)

PSO1: Ability to design analyze and interpret data using modern tools with strong fundamentals of Electronics, Signal Processing and Communication, Embedded system, Computer science, Mathematics and Management.

PSO2: Adapt to emerging technologies with innovative idea and solution for novel problems.

PSO3: Ability to create innovative career path to be an entrepreneur and zest for higher studies.



Dayananda Sagar Academy of Technology & Management
(Autonomous Institute under VTU)

Affiliated to **VTU**
Approved by **AICTE**
Accredited by **NAAC** with **A+** Grade
6 Programs Accredited by **NBA**
(CSE, ISE, ECE, EEE, MECH, CV)

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

Sl.No	Semester	No. of Credits
1	1 st Semester	20
2	2 nd Semester	20
3	3 rd Semester	21
4	4 th Semester	21
5	5 th Semester	22
6	6 th Semester	22
7	7 th Semester	20
8	8 th Semester	14
Total		160

PROPOSED UG SCHEME

Sl. No	Course Category	BOS	TD	Teaching Hours/Week					Credits
				Lecture	Tutorial	Practical	Project	Total (Hrs/week)	
				L	T	P	S		
1	BSC	MAT	MAT	3	0	0	0	3	3
2	IPCC-1	ECE	ECE	3	0	2	0	5	4
3	IPCC-2	ECE	ECE	3	0	2	0	5	4
4	PCC-1	ECE	ECE	3	0	0	0	3	3
5	PCC-2	ECE	ECE	3	0	0	0	3	3
6	PBL	ECE	ECE	0	0	2	2	4	2
7	AEC	ECE	ECE	0	0	2	0	2	1
8	SCR	ECE	ECE	0	0	2	0	2	1
9	NCMC	NSS / YOGA / PED							
10	AICTE Activity Points								
Total									21

Percentage of Mapping– Theory & Practical - Scheme & Syllabus- 3rd & 4th Sem

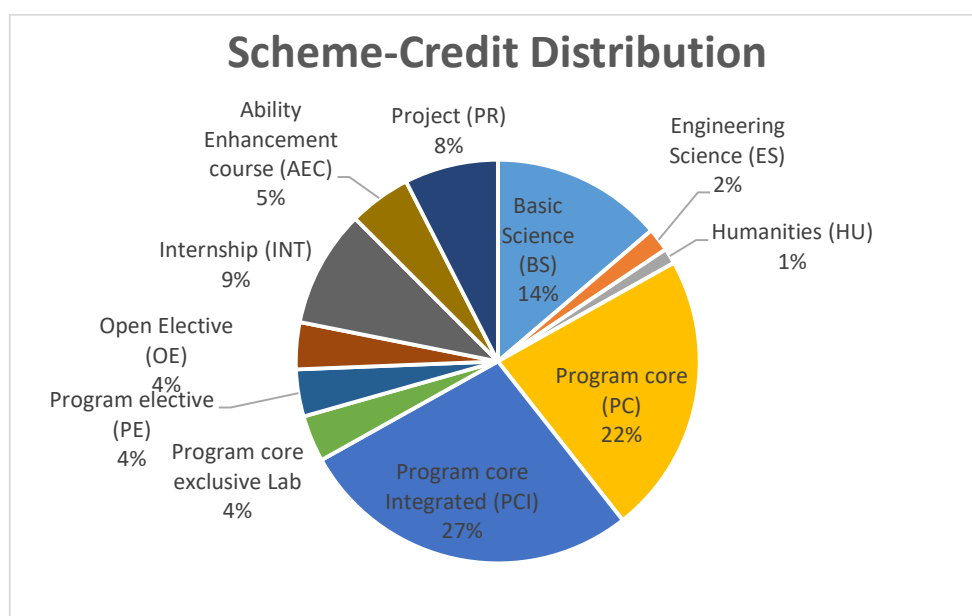
3rd Sem & 4th Sem

Sl. No	Course Category	Component			
		Theory	Practical	Outreach	YOGA/SPORTS
1	BSC	100%	--	--	--
2	IPCC-1	60%	40%	--	--
3	IPCC-2	60%	40%	--	--
4	PCC-1	100%	--	--	--
5	PCC-2	100%	--	--	--
6	PBL	--	100%	--	--
7	AEC	--	100%	--	--
8	SCR	--	--	100%	--
9	NCMC	--	--	--	100%
Total Percentage		53%	47%	13%	13%

Scheme Distribution

Department of Electronics & Communication Engineering

Course Component	Credits	% of Credits
Basic Science (BS)	22	13.75
Engineering Science (ES)	03	1.875
Humanities (HU)	02	1.25
Program core (PC)	36	22.5
Program core Integrated (PCI)	44	27.5
Program core exclusive Lab	06	3.75
Program elective (PE)	06	3.75
Open Elective (OE)	06	3.75
Internship (INT)	15	9.375
Ability Enhancement course (AEC)	08	5
Project (PR)	12	7.5
Total	160	100



SEMESTER WISE CREDIT BREAKDOWN FOR B.E. DEGREE CURRICULUM

BATCH 2023-2027

Course Category	Semester								Total Credits
	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th	
Basic Sciences (BSC)	4	4	3	-					
Engineering Sciences (ESC)	6	6	-	3					
Humanities, Social Sciences and Management (HSMC)	2	2	-	-					
Ability Enhancement Course (AEC)	1	1	1	1					
Universal Human Values (UHV)	-	-	1	1					
Professional Core Courses (PCC)	3	3	6	6					
Integrated Professional core Course (IPCC)	4	4	8	8					
Professional Elective Course (PEC)	-	-	-	-					
Institutional Open Elective Courses (IOE)	-	-	-	-					
Internship (INT)	-	-	-	-					
Mini Project / Project Work (PW)	-	-	2	2					
Non-credit Mandatory Courses (NMC)	-	-	-	-					
Total Credits	20	20	21	21					

1ST YEAR



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	1 st /2 nd				
Course Title	:	Introduction to Electronics Engineering				
Course Code	:	23CECE15/23CECE25				
Course Type (Theory/ Practical/ Integrated)	:	Theory				
Course Category	:	CEC-1/CEC-2				
Stream	:	Other Branches		CIE	:	50 Marks
Teaching hours/ week (L:T:P:S)	:	3:0:0:0		SEE	:	50 Marks
Total Hours	:	40 Hrs T		SEE Duration	:	03 Hours
Credits	:	03				

Course Learning Objectives: Students will be taught

Sl. No	Course Objectives
1	Learn the fundamentals of integrated circuits, communication systems and advanced technologies
2	Familiarise in applying the concepts of electronic circuits and devices for the given application
3	Provide the knowledge in examining various electronic circuits
4	Impart design skills of circuits for real time applications
5	Equip with the usage of modern tools to simulate various integrated circuits

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.



DSATM

Scheme of Teaching and Examinations for BE Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Digital Electronics: Binary, Decimal, Octal and hexadecimal Number systems, Number base Conversion, Complements, Basic theorems and properties of Boolean algebra, Boolean functions, Canonical and Standard forms, Digital Logic gates. Combinational Logic: Introduction, Adders: Half adder and Full adders. Text-1	8
Pedagogy	Mobile Studio	
2	Operational Amplifiers: Introduction, Block diagram of OPAMP, OPAMP parameters, Ideal and Practical Characteristics of OPAMP. OPAMP applications: Inverting and Non-Inverting Amplifiers, Voltage Follower, Summer, Differentiator, Integrator Text-2	8
Pedagogy	Think Pair Share	
3	Embedded Systems – Definition, Embedded systems vs General Computing Systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC. Text – 3 Sensors, types and its Applications Text – 5	8
Pedagogy	Case Studies	
4	Analog Communication – Communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, FM. Digital Communication: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission, Multiple Access Techniques. Text - 4	8
Pedagogy	Demonstration	
5	Cellular wireless networks: Cellular Telephone system, Cellular concepts, Network topology, wireless LAN, Bluetooth. Text - 4 Fundamentals of VLSI: Evolution of Microelectronics, Basics structures NMOS, PMOS and CMOS, Moore's Law, Depletion Mode and Enhancement mode Transistors, VLSI Design flow. Text - 5	8
Pedagogy	Flipped Class Room	

Reference Books	
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)	
1	Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203- 0417-84
2	Op-amps and Linear Integrated Circuits, Ramakanth A Gayakwad, Pearson Education, 4 th Edition
3	K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016
4	S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017
5	Raj Kamal , 'Internet of Things – Architecture and Design Principles', Mc Graw Hill Education

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Understand the concepts of integrated circuits, communication systems and advanced technologies.	L2	Understand
CO2	Apply the fundamentals of integrated circuits to provide solution for analog and digital circuits.	L3	Apply
CO3	Analyse the operation of electronic circuits for a given problem scenario.	L4	Analyse
CO4	Design Linear Integrated and logic circuits for real time applications.	L3	Apply
CO5	Examine the performance of various electronic circuits using modern tools.	L4	Analyse

Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3		2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	3	2	-	-	-	-	2	2	-	-	2	-	-
CO5	-	-	-	-	2	-	-	-	2	2	-	2	2	-	-

Weblinks and Video Lectures (e-Resources)

1	https://nptel.ac.in/courses/122106025
2	https://nptel.ac.in/courses/108105132
3	https://nptel.ac.in/courses/117104072
4	https://E-learning.vtu.ac.in

Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)

3 credits - Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory				50			20	
CIE	Theory	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	(50+50+50) / 3	25	10	Average of Three Internal test each of 50 Marks scale down the marks to 25 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	(50+50) / 2	25	10	Two CCA methods as per VTU Clause 22OB4.2 of regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
	Total CIE Theory					50	20	Scale down Marks of IAT and CCA to 50

SEE		Theory exam	Entire theory Syllabus	100	----	50	18	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
CIE + SEE				100	----	----	40	

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Possible continuous and comprehensive assessment:

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Group Problem Solving, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty may adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Continuous Internal Evaluation (CIE):

The CIE Marks for the internal assessment test shall be **25 Marks** and for the continuous and comprehensive assessment (CCA) shall be **25 Marks**.

Internal Assessment test:

The IA test questions are to be framed to map the course outcomes, program outcomes and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Three Tests each of 50 Marks

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **25 Marks**.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **25 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
 - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
 - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **25 Marks**

Total Marks scored for theory component of CIE (IAT + CCA) is **50 Marks**

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English.

The duration of SEE is 03 hours.

- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student must answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks.**

There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	--	--	--	--	--	NA
Understand	10	20	20	--	--	NA
Apply	25	20	20	20	20	NA
Analyse	15	10	10	20	20	NA
Evaluate	--	--	--	10	10	NA
Create	--	--	--	--	--	NA

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage (%)
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	04	06	10	10	20	50	33
CO2	10	05	10	10	20	55	37
CO3	10	05	05	05	10	35	23
CO4	05	05	--	--	--	10	07
CO5	--	--	--	--	--	--	--
Total	29	21	25	25	50	150	100

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100% Theory)
Remember	--

Understand	33%
Apply	50%
Analyse	17%
Evaluate	--
Create	--

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage (%)
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	05	06	08	06	08	33	33
CO2	05	07	06	08	07	33	33
CO3	--	-	06	06	05	17	17
CO4	10	07	--	--	--	17	17
CO5	--	--	--	--	--	--	--
Total	20	20	20	20	20	100	100%

Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Digital Electronics: Binary, Decimal, Octal and hexadecimal Number systems,	1
	Number base Conversion,	1
	Complements,.	1
	Basic theorems and properties of Boolean algebra,	1
	Boolean functions,	1
	Canonical and Standard forms, Digital Logic gates.	1
	Combinational Logic: Introduction, Adders: Half adder and	1
	Full adders	1
2	Operational Amplifiers: Introduction, Block diagram representation of OPAMP, .	1
	OPAMP parameters,	1
	Ideal Characteristics of OPAMP.	1
	Practical Characteristics of OPAMP.	1
	OPAMP applications: Inverting and Non-Inverting amplifiers,	1
	Voltage Follower, summer,	1
	Differentiator,	1
	Integrator	1
3	Embedded Systems – Definition, Embedded systems vs General Computing Systems,	1
	Classification of Embedded Systems, Major application areas of Embedded Systems,	1
	Elements of an Embedded System, Core of the Embedded System,	1
	Microprocessor vs Microcontroller, RISC vs CISC.	1

	Introduction to sensors	1
	Sensor types	1
	Sensor types Contd	1
	Applications of Sensors	1
4	Analog Communication – Modern communication system scheme, Information source, and input transducer,	1
	Transmitter, Channel or Medium – Hardwired and Soft wired,	1
	Noise, Receiver, Multiplexing,	1
	Types of communication systems. Types of modulation (only concepts) – AM, FM.	1
	Digital Communication : Advantages of digital communication over analog communication,	1
	ASK, FSK, PSK,	1
	Radio signal transmission,	1
	Multiple Access Techniques.	1
5	Cellular wireless networks: Cellular Telephone system,	1
	Cellular concepts, Network topology,	1
	wireless LAN,	1
	Bluetooth.	1
	Fundamentals of VLSI: Evolution of Microelectronics,	1
	Basics structures NMOS, PMOS and CMOS,	1
	Moore's Law, Depletion Mode and Enhancement mode Transistors,	1
	VLSI Design flow,	1
Total		40 Hrs



Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	2 ND				
Course Title	:	Basic Electronics				
Course Code	:	23CECE26				
Course Type (Theory/ Practical/ Integrated)	:	Integrated				
Course Category	:	CEC - 2				
Stream	:	EC		CIE	:	50 Marks
Teaching hr/week (L:T:P:S)	:	2:0:2:0		SEE	:	50 Marks
Total Hours	:	40 Hrs		SEE Duration	:	3 Hours
Credits	:	3				

Course Learning Objectives: Students will be taught

Sl. No	Course Objectives
1	Learn the fundamentals of transistor, integrated circuits, communication systems and IoT in electronics and communication engineering
2	Familiarise in applying the concepts of electronic circuits and devices for the given applications
3	Provide the knowledge in examining analog and digital circuits
4	Impart design skills of circuits for real time applications
5	To equip with the usage of modern tools to simulate various integrated circuits

Teaching-Learning Process Pedagogy (General Instructions):

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning.



Scheme of Teaching and Examinations for BE Programme -2023-24
Outcome Based Education and Choice Based Credit System (CBCS)
(Effective from the Academic Year 2023-24)

DSATM

COURSE SYLLABUS

Module No.	Contents of the Module	Hours
1	Bipolar Junction Transistors: Introduction, BJT Voltages & Currents, BJT Amplification, Common Base Characteristics, Common Emitter Characteristics, Common Collector Characteristics, BJT Biasing: Introduction, DC Load line and Bias point. Field Effect Transistor: Junction Field Effect Transistor, JFET Characteristics, MOSFETs: Enhancement MOSFETs, Depletion MOSFETs. Text Book - 1 Introduction to FinFET, its structure and VI Characteristics.	8
Pedagogy	Experiential Learning	
2	Linear Integrated Circuits: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Op-Amp parameters Op-Amp Characteristics, The ideal Op-Amp Op-Amp Applications: Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator. Text Book - 2	8
Pedagogy	Think Pair Share	
3	Digital Electronics: Binary, Decimal, Octal and hexadecimal Number systems, Number base Conversion, Complements, Basic theorems and properties of Boolean algebra, Boolean functions, Canonical and Standard forms, Digital Logic gates. Logic circuits: Introduction, Adders: Half adder and Full adders, Overview of sequential circuits. Text Book - 3	8
Pedagogy	Mobile Studio	
4	Analog Communication System – Communication system scheme, Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM, FM, PM Digital Communication System: Advantages of digital communication over analog communication, ASK, FSK, PSK. (Concepts & waveforms only), Multiple Access Techniques Text Book – 4	8
Pedagogy	Demonstration	
5	Internet of Things: Introduction, IoT terms and basic definition, Characteristics of IoT, IoT Ecosystem: Enabling technologies in IoT, Application of IoT, Market place of IoT, Vision of IoT. Transducers: Introduction to transducers, Sensors, Actuators, and its workflow. Text Book – 5	8
Pedagogy	Case Studies	

--	--

List of Experiments or Programs

Sl. No	Experiments/Programs Design/implement/analyse the following	COs
1	Basic gate and Universal Gate, Special Gate	CO3, CO4, CO5
2	Realization of Demorgan's Theorem for 2 and 3 variable.	CO3, CO4, CO5
3	Design of Boolean Expression for 3 variable using basic gates	CO3, CO4, CO5
4	Half Adder and Full Adder	CO3, CO4, CO5
5	BJT characteristics for CE configuration	CO3, CO4, CO5
6	FET characteristics	CO3, CO4, CO5
7	OpAmp inverting and non-inverting	CO3, CO4, CO5
8	Transistor as Switch	CO3, CO4, CO5
9	Demonstration of AM(Simulation)	CO1, CO2
10	Demonstration of ASK(Simulation)	CO1, CO2

Reference Books

Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1	"Electronic Devices and Circuits", David A Bell, 5th Edition, Oxford, 2016
2	"Op-amps and Linear Integrated Circuits", Ramakanth A Gayakwad, Pearson Education, 4th Edition
3	"Digital Logic and Computer Design", M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8
4	"Communication Systems", S L Kakani and Priyanka Punglia, New Age International Publisher, 2017
5	"Internet of Things", Srinivas K G., Siddesh G. M. and Hanumantha Raju R. Cengage Publisher
6	"FinFET and Other Multi-Gate Transistors", Colinge, JP, Springer 2008, pp 1-13

Course Outcomes: At the end of the course, the student will be able to:

CO	Course Outcomes	RBT Level	Level Indicator
CO1	Explain the concepts of transistor, integrated circuits, IoT and communication systems	L2	Understand
CO2	Apply the fundamentals of concepts of electronics to provide solution for analog and digital circuits	L3	Apply
CO3	Analyse the operation of various electronic circuits for real time applications	L4	Analyse
CO4	Design Linear Integrated and logic circuits for a given application	L3	Apply
CO5	Simulate various electronic circuits using modern tools	L4	Analyse

Mapping of Course Outcomes to Program Outcomes:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3		2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	2	2	-	-	-	-	2	2	-	-	2	-	-
CO5	-	-	-	-	2	-	-	-	2	2	-	2	2	-	-

Weblinks and Video Lectures (e-Resources)

1	https://nptel.ac.in/courses/122106025
2	https://nptel.ac.in/courses/108105132
3	https://nptel.ac.in/courses/117104072
4	https://E-learning.vtu.ac.in
5	https://www.coursera.org/courses/digital-circuits
6	https://nptel.ac.in/courses/digital-electronic-circuits

Assessment Pattern (both CIE and SEE)

Engineering Science Course (ESC) / Emerging Technology Course (ETC) / Programming Language Course (PLC)

3 Credits & 2 Credits Courses – Theory (if Integrated)

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				50	----	----	20	
CIE	Theory	Internal Assessment Test (IAT) - I	Module - 1 & 2	50	(50+50+50) / 3	15	6	Average of Three Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module - 3 & 4	50				
		Internal Assessment Test (IAT) - III	Module - 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives	Considering all the Modules	50	(50+50) / 2	10	4	Two CCA methods as per VTU Clause 22OB4.2 or regulations to be adopted. If CCA chosen is Project Based Learning, then one assessment method may be adopted
		CCA-2- Pedagogical Initiatives		50				
	Total CIE Theory						25	10

CIE	Practical	Conduction of Experiments	Continuous Evaluation of each experiment			Average of all Experiments	10	4	Performance of the Experiment (On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. 20 marks are for conducting the experiment and calculations/observations/output)
			Record	05	10				
			Observation book	05					
		Practical Test	Write up	15	50	----	10	4	One Internal Practical Test after conduction of all Experiments for 50 Marks
			Execution	25					
			Viva-voce	10					
		Open Ended Experiment	Write up	05	20	----	5	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
		Total CIE Practical						25	10

The Minimum Marks to be secured in CIE to appear for SEE shall be 10marks (40% of Maximum Marks – 25) in the Theory Component and 10 (40% of Maximum Marks -25) in the Practical Component. The Laboratory Component of the IPCC shall be for CIE only. However, in SEE the questions from the Laboratory Component shall be included in the respective Modules only.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 40% of the maximum Marks (20 Marks out of 50).

The minimum passing mark for the SEE is 35% of the maximum Marks (18 Marks out of 50).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 Marks out of 100) in the total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Possible continuous and comprehensive assessment:

Project based, Problem Based, Building Models, Lab-to-Land, Mobile Studio, Design and Programming Contest, Certification, Concept Map (Collage presentation/poster presentation), Case studies, Think-Pair-Share, Flipped classroom, storytelling. The assessment of these techniques can be either based on Quiz or rubrics.

The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Continuous Internal Evaluation (CIE):

The CIE Marks for the theory component of the IPCC shall be **25 Marks** and for the laboratory component **25 Marks**.

CIE for the theory component of the IPCC

Internal Assessment test:

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes(POs) and the Blooms RBT Levels. Emphasis to be given for higher order RBT levels

Three Tests each of **50 Marks**

- First test after 6th week of the semester (syllabus completion of 35 – 40%)
- Second test after 10th week of semester (syllabus completion of 65 – 70%)
- Third test after 14th week of semester (syllabus completion of 90 – 100%)

The average score of three test is taken and scaled down to **15 Marks**.

Continuous and Comprehensive Assessment (CCA):

Two of continuous and comprehensive assessment (CCA) to be conducted to attain COs and POs, evaluated each for **50 Marks**. Total Marks scored will be CCA1+CCA2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The evaluation includes either through quiz or rubrics
- CCA as project-based learning,
 - CCA is evaluated for **50 Marks** with review 1 of **20 Marks** after and review 2 of **30 Marks** includes project demonstration/competition and report submission.
 - The evaluation of review 1 after 6th weeks of semester and review 2 after 12th week of semester with project demonstration and submission of the report

Total score for CCA is **10 Marks**

Total Marks scored for theory component of CIE (IAT+ CCA) is **25 Marks**

CIE for the practical component of the IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and Marks shall be awarded on the same day. The **15 Marks** are for conducting the experiment and preparation of the laboratory record, the other **10 Marks shall be for the test** conducted at the end of the semester.
- The CIE Marks awarded in the case of the practical component shall be based on the continuous evaluation of the laboratory report and the conduction. Each experiment report can be evaluated for 05 Marks and conduction for 10Marks. Marks of all experiments' write-ups and conduction are added and averaged to 15 Marks.
- The laboratory test (**duration 03 hours**) at the end of the 15th week of the semester/after completion of all the experiments (whichever is early) shall be conducted for 50 Marks and scaled down to **05 Marks**.
- Scaled-down Marks of write-up, evaluations and tests, will be added as CIE Marks for the laboratory component of IC/IPCC for **25 Marks**.
- The minimum Marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum Marks) in the theory component and 10 (40% of maximum Marks) in the practical component.
- The laboratory component of the IC/IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 05 questions is to be set from the practical component of IC/IPCC, the total Marks of all questions should not be more than 25 Marks.

The theory component of the IPCC shall be for both CIE and SEE.

Semester End Examination (SEE):

- Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject
- The question paper shall be set for 100 Marks. The medium of the question paper shall be English. **The duration of SEE is 03 hours.**
- The question paper will have 10 questions. Two questions per module. Each question is set for 20 Marks. The student has to answer 5 full questions, selecting one full question from each module summing up to maximum score of 100 Marks. Marks **scored out of 100 shall proportionally be reduced to 50 Marks**.
- There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module. The two questions shall be of same course outcome, program outcome and Blooms RBT level. Emphasis to be given for higher order RBT levels

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory					Practical
	Continuous Assessment Tests			Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	IAT-3	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	-	-	-	-	-	-
Understand	15	10	24	-	-	

Apply	20	20	16	20	20	30
Analyse	15	20	10	20	20	20
Evaluate	-	-	-	10	10	-
Create	-	-	-	-	-	-

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage (%)
	Test-1		Test-2		Test-3		
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	10	05	05	05	24	49	33
CO2	15	05	10	10	16	56	37
CO3	05	05	08	07	10	35	23
CO4	-	05	05	-	-	10	07
CO5	-	-	-	-	-	-	-
Total	30	20	28	22	50	150	100

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	30%
Apply	44%
Analyse	26%
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage (%)
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	08	06	-	08	08	30	30
CO2	07	-	05	07	07	26	26
CO3	05	06	05	05	05	26	26
CO4		08	10			18	18
CO5							
Total	20	20	20	20	20	100	100%

Course Contents and Lecture Schedule

Module No.	Topics	No. of Lectures
1	Bipolar Junction Transistors: Introduction, BJT Voltages & Currents,	1
	BJT Amplification, Common Base Characteristics, Common Emitter Characteristics,	1
	Common Collector Characteristics,	1
	BJT Biasing: Introduction, DC Load line and Bias point.	1
	Field Effect Transistor: Junction Field Effect Transistor, JFET Characteristics	1
	MOSFETs: Enhancement and Depletion mode	1
	Introduction to FinFET and its Structure	1
	VI Characteristics of FinFET	1
2	Linear Integrated Circuits: Introduction, The Operational Amplifier,	1
	Block Diagram Representation of Typical Op-Amp,	1
	Op-Amp parameters Op-Amp Characteristics,	1
	The ideal Op-Amp	1
	Op-Amp Applications: Inverting Configuration, Non-Inverting Configuration,	1
	Differential Configuration,	1
	Voltage Follower, Integrator,	1
	Differentiator.	1
3	Digital Electronics: Binary, Decimal, Octal and hexadecimal Number systems,	1
	Number base Conversion, Complements,	1
	Basic theorems and properties of Boolean algebra,	1
	Boolean functions, Canonical and Standard forms,	1
	Digital Logic gates.	1
	Logic circuits: Introduction, Adders:	1
	Half adder and Full adders,	1
	Overview of sequential circuits.	1
4	Analog Communication System – Modern communication system scheme,	1
	Information source, and input transducer,	1
	Transmitter, Channel or Medium – Hardwired and Soft wired,	1
	Noise, Receiver, Multiplexing, Types of communication systems.	1
	Types of modulation (only concepts) – AM , FM, PM	1
	Digital Communication System: Advantages of digital communication over analog communication	1
	ASK, FSK, PSK. (Concepts & waveforms only)	1
	Multiple Access Techniques	1
5	Internet of Things: Introduction, IoT terms and basic definition,	1
	Characteristics of IoT, IoT Ecosystem:	1
	Enabling technologies in IoT, Application of IoT,	1
	Market place of IoT,.	1
	Vision of IoT.	1
	Transducers: Introduction to transducers,	1

	Sensors,	1
	Actuators, and its workflow	1
Total		40 Hrs