DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus III to IV Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Electronics & Communication Engineering

3rd & 4th 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.

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

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

PROPOSED UG SCHEME

Sl. No	Course Category	BOS	TD	Teaching Hours/Week					Credits
				Lecture	Tutorial	Practical	Project	Total	
				L	T	P	S	(Hrs/week)	
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

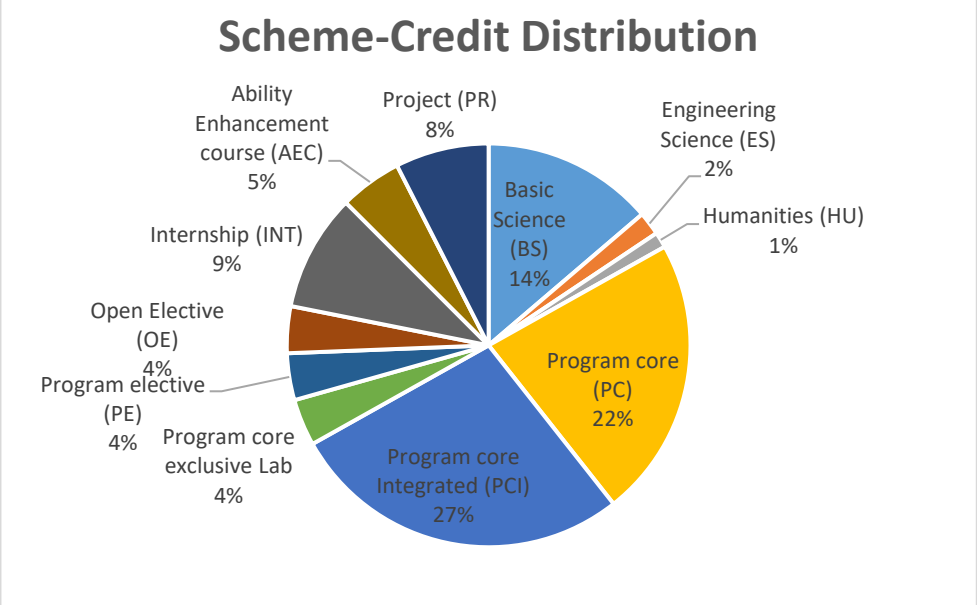
3rd Sem & 4th Sem

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
	1st	2nd	3rd	4th	5th	6th	7th	8th	
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 (NCMC)	-	-	-	-					
Total Credits	20	20	21	21					

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, CIVIL)

Scheme of Teaching and Examinations – 2024
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from 2024-25)

3rd SEMESTER: Electronics & Communication Engineering (ECE)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BMATF301	Z-Transform, Fourier Transform, Probability & Statistics, Linear Algebra	BSC	MAT	MAT						3	3	50	50	100
2	BEC302	Electronic Devices & Circuits	IPCC	ECE	ECE	3	-	2	-		4	3	50	50	100
3	BEC303	Digital Electronics	IPCC	ECE	ECE	3	-	2	-		4	3	50	50	100
4	BEC304	Network Analysis	PCC	ECE	ECE	2	2	-	-		3	3	50	50	100
5	BEC305	Computer Organization & Architecture	PCC	ECE	ECE	3	-	-	-		3	3	50	50	100
6	BEC306	PCB Design	PBL	ECE	ECE	-	-	2	2		2	-	100		100
7	BEC307	Advanced Programming in C	AEC	ECE	ECE	-	-	2	-		1	2	50	50	100
8	BSCK308	Social Connect and Responsibilities	SCR	ECE	ECE	-	-	-	2		1	-	100		100
					Total						**21**				**800**

4th SEMESTER: Electronics & Communication Engineering (ECE)

Sl. No	Course Code	Course Title	Course Category	BOS	TD	Teaching Hours/Week					Credits	Examination			
						Lecture	Tutorial	Practical	Project	Total		SEE Duration (Hrs)	CIE Marks	SEE Marks	Total Marks
						L	T	P	S						
1	BEC401	Analog Electronic Circuits	IPCC	ECE	ECE	3	-	2	-		4	3	50	50	100
2	BEC402	HDL Programming	IPCC	ECE	ECE	3	-	2	-		4	3	50	50	100
3	BEC403	Control Systems	PCC	ECE	ECE	3	-	-	-		3	3	50	50	100
4	BEC404	Signals & Systems	PCC	ECE	ECE	3		-	-		3	3	50	50	100
5	BEC405	Sensors & Instrumentation	PCC	ESE	ECE	2	2	-	-		3	3	50	50	100
6	BEC406	Signal and image processing using MATLAB	PBL	ECE	ECE	-	-	2	2		2	-	100	-	100
7	BEC407	IoT Lab Using Raspberry Pi	AEC	ECE	ECE	-	-	2	-		1	2	50	50	100
8		Universal Human Values				1	-	-	-		1	2	50	50	100
					Total						**21**				**800**

IPCC: Integrated Professional Core Course,

PCC: Professional Core Course

PBL: Project Based Learning

AEC: Ability Enhancement Course,

NCMC: Non-Credit Mandatory Course

L: Lecture,

T: Tutorial,

P: Practical

S= SDA: Skill Development Activity,

CIE: Continuous Internal Evaluation,

SEE: Semester End Evaluation.

Integrated Professional Core Course (IPCC): Refers to Integrated Professional Core Course Theory Integrated with practical's of the same course. Credit for IPCC can be 04 and its Teaching Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper.

Non Credit Mandatory Course (NCMC) - National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

Newly introduced subjects in the syllabus

		3rd Semester	4th Semester
1.	**List of Existing Elective Courses**	**--**	**--**
2.	**List of New Existing Elective Courses**	**--**	**--**
3.	**List of New Industry Aligned Courses**	**PCB Design**	Signal and image processing using MATLAB

Percentage of Change in the Syllabus

3rd Semester						
Sl.No	**Course Code**	**Course Name**	**Topics Added**	**Topics removed**	**Revised in %**	**Justification**
1	23CECE33	Digital Electronic Circuits	Finite State Machine (FSM) and its design	Content based on Verilog (module 4 & 5)	40%	In each module some modifications have been done and Modeling with Verilog is removed as it is included in 4th semester.
2	23CECE32	Electronic Devices and Circuits	Small signal operation and models,Feedback amplifiers and Sinusoidal oscillators.	Field Effect Transistors and Fabrication of PN Junctions	40%	Field Effect transistors and biasing of MOSFETs are covered in 4th semester.
3	23CECE36	PCB Design	New approach as Project based learning	Nil	100%	Project Based Learning PCB design is a theory course for Electronics and Telecommunication Engg., 4th Sem 2022 Scheme The theory topics are different and the SEE is of MCQ type.
4	23CECE38	Social Connect and Responsibilities	Old age home and Orphanage Visit	Nil	20%	To make them understand the importance of parents
5	23CECE35	Computer Organization & Architecture	Memory Operations, Instructions and Instruction Sequencing, Direct Memory Access	NIL	20%	Understanding about Memory Concepts more in detail

6	23CECE34	Network Analysis	Reciprocity Theorem for AC and DC Circuits	Graph Theory	20%	From industry point of view and advanced courses to follow in higher semesters, Learning AC and DC Circuits becomes more vital than Graph Theory.
7	23CECE37	Advanced Programming in C	Introduced with lab component as experiential learning	NIL	100%	This course is added to enhance C programming skills as its fundamentally required by industries and caters to placements

4th Semester						
Sl.No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
1	23CECE42	HDL Programming	Tasks, Functions and User Defined Primitives, Advanced HDL Descriptions,VLSI industry requirement for verification is added.	Digital Part is removed Module 1, 2 and 3 is removed.	40%	The Syllabus is tailored to requirements of the VLSI industry and new topics like tasks, functions and verification are added.
2	23CECE43	Control Systems	Examples of control system :air conditioner, cruise control, and phase-locked loop. Difference and differential equations for	Types of Control Systems, Effect of Feedback Systems, Differential equation of Physical Systems - Mechanical Systems,	40%	Most of Content is standard and mapping with IITs, Indian Private and foreign universities, that content has been retained.

			LTI SISO and MIMO systems,	Electrical Systems, Analogous Systems. Standard test signals		
3	23CESC45	Sensors & Instrumentation	Measuring Instruments Performance Measures of Sensors: Smart and wearable sensors	Principles of Measurement Digital Voltmeter, Digital Multimeter: Digital Frequency Meter and Digital Measurement of Time.	40%	Most of Content is standard and mapping with IITs, Indian Private and foreign universities, that content has been retained.
4	23CECE41	Analog Electronic Circuits	Comparators and Waveform Generators,D-A and A-D Converters.	Thyristor,Gate trigger circuits,555 timer and its applications.	40%	The content is based on mapping with IITs and NITs and hence the content is retained.
5	23CECE46	Signal and image processing using MATLAB	New Subject	New Subject	100%	Project Based Learning
6	23CECE47	IoT (Internet of Things) Lab Using Raspberry Pi	Most of the experiments are retained as per VTU	Few additional Experiments	40%	Additional Experiments have been added
7	23CECE48	Universal Human Values	Retained as per AICTE/VTU	Retained as per AICTE/VTU	0%	Retained as per AICTE
8	23CECE44	Signals and Systems	Fourier series periodic signals and Fourier transform	Vector spaces, Eigen values and Eigen Vectors	40%	Concepts of Fourier Series and Fourier transforms are very much essential in the applications of signal processing and communication system

3rd SEMESTER

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:2:0
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practical Classes
Credits:	04
Theory - Each Module	8 Hrs
Practical's	8-10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the IPCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Integrated Professional Core Course (IPCC) - 4 Credit Course

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Continuous Internal Evaluation (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 CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks for** preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical 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 **5 Marks.**
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce.
  Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.

- 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.**
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

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)/2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

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 to 2.5	50	(50+50) / 2	**15**	6	Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) – II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity based learning	Considering all the Modules	50	(50+50) / 2	**10**	4	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/ Activity based learning		50				
	Total CIE Theory					**25**	10	Scale down Marks of IAT and CCA to 25

CIE	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	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					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	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	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
						Total CIE Practical	**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

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

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**III**				
Course Title	**:**	**Electronic Devices and Circuits**				
Course Code	**:**	**23CECE32**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**EC**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40 Hrs+20 hours of practical classes**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	**Learn** the fundamentals of semiconductor physics and electronic devices.
2	Familiarize in **Applying** mathematical models of BJTs with the constructional details.
3	Provide the **Knowledge** in the construction and working principles of optoelectronic devices
4	Impart the **Design** skills of the BJT amplifier configurations and feedback amplifiers.
5	To **Equip** with the usage of modern tools to simulate various integrated circuits

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in Electronic Devices and Circuits.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three HOTS (Higher-order Thinking Skills) module-wise questions to promote critical thinking.
- Adopt Problem-Based Learning (PBL), which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analysing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve Teaching-Learning Process (TLP).

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Quantum theory of solids:** Bonding forces in solids, Energy bands, Metals, Semiconductors and Insulators, Direct and Indirect semiconductors, Electrons and Holes, Intrinsic and Extrinsic semiconductors. **Semiconductors:** Fermi-Dirac statistics and its Boltzmann approximation. Conductivity and Mobility, Drift and Resistance, Effects of temperature and doping on mobility, Hall Effect, Continuity and Poisson equation. (Text 2: 3.2,3.4,3.5).	8
Pedagogy	**Experiential Learning**	
2	**P-N Junctions:** Forward and Reverse biased junctions, Diode applications-clipping (series and shunt with biasing) and clamping circuits (unbiased and biased). **Rectifier circuits**: Half wave rectifier, full wave rectifier: Centre tapped and bridge rectifier. (Text 1:2.2.1,2.2.2,2.5.1-2.5.3,2.6.1,2.6.2)	8
Pedagogy	**Think Pair Share**	
3	**Bipolar Junction Transistor:** Three regions of operation, BJT as an amplifier and a switch and its operation. (Text 1:3.1,3.3.1) **Transistor Biasing:** Base bias, collector to base bias and voltage divider bias, constant current source (Text 1: 3.5)	8
Pedagogy	**Mobile Studio**	
4	**Small signal operation and models:** Collector current and transconductance, base current, input resistance at the base, emitter current and input resistance at the emitter, voltage gain, separating the signal and the DC quantities, The hybrid-π model, The T-model. (Text 1: 3.6,3.6.1-3.6.7)	8

	Feedback amplifiers: Introduction, Block diagram representation of feedback configurations, Non inverting amplifier with feedback and its derivation. (Text 3: 3.1,3.2,3.3)	
Pedagogy	**Demonstration**	
5	**Optoelectronic Devices Photodiodes:** Current and Voltage in an Illuminated Junction, Solar Cells, Photodetectors. Light Emitting Diode: Light Emitting materials. (Text 5: 8.1.1, 8.1.2, 8.1.3, 8.2, 8.2.1) **Sinusoidal Oscillators:** Introduction, classification of oscillators, Hartley and Colpitts oscillator. Text4: (23.5)	**8**
	Case Studies • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Experiments:

Sl. No.	Experiments/Programs	COs
	Hardware	
1	Conduct experiment to test diode clipping (single/double ended) and clamping circuits (positive/negative)	CO2,CO3,CO4
2	Half wave rectifier and Full wave rectifier with and without filter and measure the ripple factor and efficiency.	CO2, CO3, CO4
3	Characteristics of LDR and Photo diode and turn on an LED using LDR	CO2, CO3, CO4
4	Conduct an experiment to measure temperature in terms of current/voltage using a temperature sensor bridge	CO2, CO3, CO4
5	Input and Output characteristics of BJT Common emitter configuration and evaluation of parameters.	CO2, CO3, CO4
6	Design of Hartley oscillator and Colpitts oscillator	CO2, CO3, CO4
	Simulation	
7	Design a voltage divider bias circuit using BJT.	CO3, CO4, CO5
8	BJT Common Emitter characteristics	CO3, CO4, CO5
9	Characteristics of Zener diode and design a Simple Zener voltage regulator determine line and load regulation.	CO3, CO4, CO5
10	Design and simulation of RC Differentiator and Integrator.	CO3, CO4, CO5
	Open ended Programs	
1	Characteristics of Zener diode and design a Simple Zener voltage regulator determine line and load regulation.	CO3, CO4, CO5
2	Static characteristics of SCR.	CO3, CO4, CO5
3	SCR Controlled HWR and FWR using RC triggering circuit	CO3, CO4, CO5

Text Books

Sl. No.	Title of the Book/Name of the author/Name of the publisher/Edition and Year
1	Adel S. Sedra, Kenneth Smith, "Microelectronic Circuits", 6th edition, Oxford press, 2013.
2	Donald A Neamen, Dhrubes Biswas, "Semiconductor Physics and Devices", 4th Edition, McGraw Hill Education, 2012, ISBN 978-0-07-107010-2.
3	Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits"4th Edition, Pearson 2015.
4	Albert Malvino, David J. Bates "Electronic Principles", 7th Edition, July 2017

5	Ben. G. Streetman, Sanjay Kumar Banerjee, "Solid State Electronic Devices", 7thEdition, Pearson Education, 2016, ISBN 978-93-325-5508-2.
Reference Books	
1	S. M. Sze, Kwok K. Ng, "Physics of Semiconductor Devices", 3rd Edition, Wiley, 2018.
2	A. Bar-Lev, "Semiconductor and Electronic Devices", 3rd Edition, PHI, 1993.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the principles and characteristics of different types of semiconductor devices	**L2**	**Understand**
CO2	**Apply** and interpret BJT circuits for small signal at low and high frequencies.	**L3**	**Apply**
CO3	**Develop** different transistor circuits and fabrication of MOS transistors with design rules, resistance and capacitance extraction.	**L3**	**Design**
CO4	**Analyze** mathematical models of semiconductor junctions and BJT transistors for circuits and systems.	**L4**	**Analyze**
CO5	**Evaluate** electronics circuits using computer simulation software and verify desired results	**L5**	**Evaluate**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1													**3**	
CO2	**3**												**3**	
CO3		**3**											**3**	
CO4			**3**										**3**	
CO5				**3**	**3**				**2**	**2**			**3**	

Weblinks and Video Lectures (e-Resources)	
1	http://www.springer.com/engineering/electronics/book/978-0-387-25746-4 ,Analog Circuit Design: A Tutorial Guide to Applications and solutions.
2	https://www.tutorialspoint.com/Electronic devices applications/index.htm
3	https://www.scribd.com/book/282535091/ElectronicDevices
4	https://nptel.ac.in/courses/108/106/108106084/
6	https://nptel.ac.in/courses/117/103/117103063/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember/Understand	10	10	-	-	-
Apply	15	15	-	-	-
Design	20	20	-	-	25
Analyze	05	05	30	30	25
Evaluate			20	20	50

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1			Test-2			
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	5	5		5	10	25	25%
CO2	5	10	10	5		30	30%
CO3		10	5	10	10	35	35%
CO4		5	5			10	10%
CO5							

Total	10	30	20	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember/ Understand	25
Apply	30
Design	35
Analyze	10
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	05	05	05	05	05	25	25%
CO2	05	05	10	10		30	30%
CO3		10	10	10	05	35	35%
CO4		05	05			10	10%
CO5							
Total	10	25	30	25	10	100	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**3rd Semester**				
Course Title	**:**	**Digital Electronic Circuits**				
Course Code	**:**	**23CECE33**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**ECE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	40 hours Theory + 20 Hours of Practical Classes		**SEE Duration**	**:**	**3 hrs**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Paraphrase the basic principles of combinational and sequential logic circuits.
2	Impart the concepts of simplifying Boolean expressions using K-map techniques and Quine McCluskey minimization techniques.
3	Comprehend the basic elements of combinational and Sequential Circuits and its applications.
4	Provide the fundamental design concepts and analysis of sequential logic circuits using FSM.
5	Train on EDA tools to simulate, debug and evaluate the design of combinational and sequential circuits for real time examples

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in Digital Electronic Circuits.

- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM		
Module No.	**Topics**	**Hours**
1	**Combinational Logic Circuit:** Introduction to combinational logic, Design procedure, Generation of switching equations from truth tables, Karnaugh maps-3, and 4 variables, incompletely specified functions (Don't Care terms), Simplifying Min term / Max term equations, PI and EPI, Quine-McCluskey minimization technique, Quine-McCluskey using don't care terms.	**8 hrs**
Pedagogy	**Problem Solving**	
2	**Design of Combinational Logic:** Cascading full adders/subtractor, 4-bit Parallel adder/subtractor, Carry Look ahead adder, Decoders, Encoders, Digital multiplexers, Demultiplexer, Design of Boolean function using combinational circuits, Binary comparators.	**8 hrs**
Pedagogy	**Case Study**	
3	**Sequential Circuits:** Basic Bistable Element, Latches and its types, Flip-flops: SR, JK, D and T, The Master-Slave JK Flip-Flop, (Pulse triggered Flip Flop), Characteristic Equations, Shift Registers, Design of 4-bit Universal shift register, Application of shift registers.	**8 hrs**
Pedagogy	**Presentation / Mobile Studio**	
4	**Counters:** Binary Ripple Counters, Synchronous Binary counters, Design of a Synchronous counters, Design of a Synchronous Mod-n Counter using clocked JK, SR, D and T Flip-Flops, Counters based on Shift Registers.	**8 hrs**
Pedagogy	**Demonstration**	
5	**Finite State Machine (FSM):** Mealy and Moore Models, State Machine Notation, Synchronous Sequential Circuit Analysis and Design, Guidelines and Construction of state graph. **FSM Design:** Code Converter, Serial Adder with accumulator, Design of Binary Multiplier and Binary Divider.	**8 hrs**
Pedagogy	**Think Pair and Share**	

	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Design and implement (i) Half Adder & Full Adder using NAND gates. (ii) Half subtractor & Full subtractor using NANAD gates.	**2,3,4**
2	Design and implement 4-bit Parallel Adder/ Subtractor using IC 7483.	**2,3,4**
3	Design and implement BCD to excess-3 code conversion and vice-versa.	**2,3,4**
4	Design and Implementation of (i) 1- bit comparator (ii) 5-bit Magnitude Comparator using IC 7485.	**2,3,4**
5	. Realize (i) Adder & Substractor using IC 74153. (ii) 4-variable function using IC 74151(8:1MUX).	**2,3,4**
6	Realize (i) Adder and Substractors using IC74139. (ii) Binary to Gray code conversion & vice versa (74139)	**2,3,4**
7	Realize the following flip-flops using IC 7476: Master-Slave JK, D & T Flip-Flops.	**2,3,4**
8	Realize the following shift registers using IC 7495 (i) SISO (ii) SIPO (iii) PISO (iv) PIPO (v) Ring and (vi) Johnson counter.	**2,3,4**
9	Realize	**2,3,4**

	(i) Mod-N Asynchronous Counter using IC7490 and (ii) Mod-N Synchronous counter using IC74192	
10	Design Pseudo Random Sequence generator using 7495	**2,3,4**
Open ended Programs		
1	Realize asynchronous and synchronous counter using Multisim tool.	**2,3,4,5**
2	Design Serial Adder with Accumulator and Simulate using Simulation tool.	**2,3,4,5**
3	Design Binary Multiplier and Simulate using Simulation tool.	**2,3,4,5**

Text Books :	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Digital Logic Applications and Design by John M Yarbrough, Thomson Learning, 2001.
2	Digital Principles and Design by Donald. D. Givone, McGraw Hill, 2002.
3	Fundamentals of logic design, by Charles H Roth Jr., Cengage Learning
Reference Books :	
1	Logic Design, by Sudhakar Samuel, Pearson/ Sanguine, 2007
2	SWITCHING THEORY AND LOGIC DESIGN, by Kumar A. Anand, 3rd Edition.
3	Digital Logic & Computer Design by M. Morris Mano, First Edition, ISBN- 978-9332542525

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Describe the different combinational and sequential logic circuits using logic gates.	L2	Understand
CO2	Apply various minimization techniques for simplification of Boolean functions to study different combinational and sequential logic circuits using logic gates and Verilog model of programming.	L3	Apply
CO3	Design the combinational and sequential circuits for given specifications using logic gates.	L3	Apply
CO4	Analyze the required combinational and sequential circuits for the given real time examples.	L4	Analyze
CO5	Implement and examine real-time examples using combinational and sequential circuit with suitable EDA tool.	L5	Evaluate

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	2	2	-	-	-	2	2	-	-	2	-	-

Weblinks and Video Lectures (e-Resources)	
1	VTU e-Shikshana : https://www.youtube.com/watch?v=df2Toz3VWwc video number 1 to 15
2	https://www.coursera.org/courses/digital-circuits
3	https://nptel.ac.in/courses/digital-electronic-circuits

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember	-	-	-	-	
Understand	10	10	-	-	
Apply	20	20			30
Analyse	20	20	25	25	20
Evaluate			25	25	
Create					

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5			5	5	20	20%
CO2	10	10		10	10		40	40%
CO3		10	10		10	10	40	40%
CO4								
CO5								
Total	15	25	10	10	25	15	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	33
Apply	35
Analyse	32
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	7		6	10	10	33	33%
CO2	8	10	7	10		35	35%
CO3	5	10	7		10	32	32%
CO4							
CO5							
Total	20	20	20	20	20	100	100

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

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

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 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 **25 Marks** after and review 2 of **25 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				**50**	----	----	**20**	
	Theory	Internal Assessment Test (IAT) - I	Module – 1 to 2.5	50	(50+50) / 2	**25**	10	Average of Two Internal test each of 50 Marks scale down the marks to 25
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	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 / Activity Based learning		50				
	Total CIE Theory					**50**	20	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

Dayananda Sagar Academy of Technology & Management

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Semester	:	**3**				
Course Title	:	**NETWORK ANALYSIS**				
Course Code	:	**23CECE34**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**ECE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3Hrs**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To Study the basics of network circuit and transformations.
2	To Impart the knowledge of Network theorems and complex solutions.
3	To Solve problems on Mesh / Nodal and two port networks.
4	To Know the transient behaviors of circuits and Laplace Transforms.
5	To Equip with skills of different circuits using Modern Tools.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- *Adopt different teaching methods to attain the course outcomes.*
- *Include videos to demonstrate various concepts in Network Analysis.*
- *Encourage collaborative (Group) Learning to encourage team building.*
- *Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.*
- *Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.*
- *Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.*
- *Discuss various case studies to map with real-world scenarios and improve the understanding.*
- *Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.*

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

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COURSE CURRICULUM

Module No.	Topics	Hours
1	**BASIC CONCEPTS:** Circuits Terminology ,Ideal and Practical sources, Source transformations, Network reduction using Star–Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks, Concepts of super node and super mesh.	8
Pedagogy	**Inquiry-Based Learning**	
2	**NETWORK THEOREMS:** Superposition, Thevenin's and Norton's theorems with linearly dependent and independent sources for DC and AC networks, Maximum Power transfer theorem , Reciprocity and Millman's theorems with linearly dependent and independent sources for DC and AC networks,	8
Pedagogy	**Flipped Classroom**	
3	**RESONANT CIRCUITS:** **Series resonance circuits**: Introduction, frequency- response, Quality Factor, Bandwidth (Relevant expressions and numerical) **Parallel resonance circuits**: Introduction, frequency- response , Quality Factor, Bandwidth (Relevant expressions and numerical)	8
Pedagogy	**Blended Learning**	
4	**TWO PORT NETWORK PARAMETERS:** Open circuit (Z) Parameters, Short circuit (Y) parameters: Modelling with two port parameters, relationship between parameters sets. Hybrid (h) Parameters, ABCD (T) parameters: Modelling with two port parameters, relationship between parameters sets.	8
Pedagogy	**Problem Solving**	

5	**TRANSIENT BEHAVIOR AND INITIAL CONDITIONS:** Behaviour of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations.	**8**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	M.E.Van Valkenburg (2000), Network Analysis, Prentice Hall of India, 3rdedition, 2000, ISBN:9780136110958.
Reference Books	
1	Hayt, Kemmerly and Durbin-Engineering Circuit Analysis, **TMH**7th Edition, 2010.
2	**J.**David Irwin/ R.Mark Nelms- Basic Engineering Circuit Analysis JohnWiley,8thed,2006.
3	Charles K Alexander and Mathew NO Sadiku-Fundamentals of Electric Circuits, Tata McGraw-Hill,3rc1 Ed,2009.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the basic concepts of networks and study the performance of various types of networks with concepts of source transformation, shifting and network transformations.	L2	Understand
CO2	**Apply** the concepts of different network theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions for complex network.	L3	Apply
CO3	**Analyze** and Obtain the solutions for different types of networks using mesh analysis, node analysis and its applications and two port networks and their interrelations.	L4	Analyze
CO4	**Evaluate** network concepts of series and parallel resonance, resolve circuits on its steady state and transient conditions.	L5	Evaluate
CO5	**Design** different circuits to meet Quality Factor (Selectivity) and Bandwidth using **Modern Tool**.	L6	Design

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	3												3		
CO3		3											2		
CO4			3	2									2		
CO5				1	2								1		

Weblinks and Video Lectures (e-Resources)	
1	https://E-learning.vtu.ac.in
2	https://www.coursera.org/courses/network-analysis
3	https://nptel.ac.in/courses/network-analysis
4	http://en.wikipedia.org/wiki/network-analysis

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember				
Understand	05	05		
Apply	20	25	25	20
Analyse	25	20	25	25
Evaluate				05
Create				

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5			5	5	20	20%
CO2	10	10		10	10		40	40%
CO3		10	10		10	10	40	40%
CO4								
CO5								
Total	15	25	10	10	25	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	20
Apply	40
Analyse	40
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5			5	5	20	20%
CO2	10	10		10	10		40	40%
CO3		10	10		10	10	40	40%
CO4								
CO5								
Total	15	25	10	10	25	15	100	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	3rd				
Course Title	:	Computer organization and architecture				
Course Code	:	23CECE35				
Course Type (Theory/ Practical/ Integrated)	:	Theory				
Category	:	PCC				
Stream	:	ECE		CIE	:	50
Teaching hours/ week (L:T:P:S)	:	3		SEE	:	50
Total Hours	:	40		SEE Duration	:	3
Credits	:	3				

Course Learning Objectives: Students will be able :

Sl. No	Course Objectives
1	To Impart the knowledge of the organization and architecture of computer systems with machine instructions and programs
2	To equip students to demonstrate different data types on simple arithmetic and logical unit and the functions of different types of memory devices and Communicating I/O devices.
3	To impart students to Discover and utilize the operation of the input/output devices communicating with computer system and perform software languages to functions of basic processing unit, Parallel processing, and pipelining
4	To provide practical exposure to the software languages to meet Real time applications using suitable methodologies.
5	To develop the solution for the real time applications with respect to current Technology.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in Computer organization and architecture.
- Encourage collaborative (Group) Learning to encourage team building.

- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Basic Structure of Computers**: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance -Processor Clock. **Machine Instructions and Programs**: Numbers, Arithmetic Operations and Characters, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing Text Book-1: Chapter 1 & Chapter 2	8
Pedagogy	**Quiz**	
2	Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions Accessing I/O Devices. Accessing I/O Devices. Text Book-1: Chapter 3	8
Pedagogy	**Develop Programming**	
3	**Input/ Output Organization :** Interrupts -Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Direct Memory Access Text Book-1: Chapter 4	8
Pedagogy	**Inquiry-Based Learning**	
4	**Memory System:** Basic Concepts, Semiconductor RAM Memories-Internal organization of memory chips, Static memories, Asynchronous DRAMS, Read Only Memories, Cash Memories, Virtual Memories, Secondary Storage Magnetic Hard Disks. Text Book-1: Chapter 5 & Chapter 6	8
Pedagogy	**Blended Learning**	
5	**Basic Processing Unit:** Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control, Micro-programmed Control. Text Book-1: Chapter 7 & Chapter 8	8
Pedagogy	**Blended Learning**	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5thEdition,Tata McGrawHill,2002.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the organization and architecture of computer systems with machine instructions and programs	L2	Understand
CO2	Apply different data types on simple arithmetic and logical unit and the functions of different types of memory devices and Communicating I/O devices.	L3	Apply
CO3	Analyse the operation of the input/output devices communicating with computer system and perform software languages to functions of basic processing unit, Parallel processing, and pipelining	L4	Analyze
CO4	Develop the software languages to meet Real time applications using suitable methodologies.	L4	Evaluate
CO5	Investigate the real time applications with respect to current Technology.	L5	Create

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	**3**												**3**		
CO3		**3**											**3**		
CO4			**3**	**2**									**3**		
CO5				**3**	**3**								**3**		

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember				
Understand	05	05		
Apply	20	25		
Analyse	25	20		20
Evaluate			25	20
Create			25	10

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5			5	5	20	20%
CO2	10	10		10	10		40	40%
CO3		10	10		10	10	40	40%
CO4								
CO5								
Total	15	25	10	10	25	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	20
Apply	40
Analyse	40
Evaluate	
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	7		6	10	10	33	33%
CO2	8	10	7	10		35	35%
CO3	5	10	7		10	32	32%
CO4							
CO5							
Total	20	20	20	20	20	100	100

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:0:2:2
Total Hours of Pedagogy	25 hours – Theory + Project
Credits:	02
Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project Evaluation

	CIE		**SEE**	
	Project Weekly Assessment		**Final Project Evaluation**	
Project	**Project Understanding**	05 Marks	**Write up**	10 Marks
	Technical Competence	10 Marks	**Presentation & Demonstration**	50 Marks
	Innovation	10 Marks	**Project report**	25 Marks
	Problem Solving	15 Marks	**Viva-Voce**	15 Marks
	Project Demonstration	10 Marks	**Total**	**100 Marks**
Total		**50 Marks**	**100 Marks Reduced to 50 Marks**	

1. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, and student-centered.

A systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Project learning, also known as project-based learning, is a dynamic approach to teaching, in which students explore real-world problems and challenges, simultaneously developing cross-curriculum skills while working in small collaborative groups.

2. Characteristics of Project-Based Learning:

- Students making decisions within a framework
- A problem or challenge to be solved;
- Students designing the process for reaching a solution
- Students gathering and managing information
- Continuous Evaluation
- Students regularly reflecting on the process
- A final product to be evaluated for quality
- An atmosphere that tolerates error and change

3. Purpose

- Introducing project-based learning on the curriculum.
- To help students to gain in-depth knowledge of the subject via project.
- During this process, students will be able to learn and understand the various stages of project development.

4. Objectives

- Introducing mini project based on the curriculum.
- Develop in depth knowledge of the topic and technology.
- Use critical thinking skills and make real world connections
- Demonstrate and understand through products.
- Industry and concept-oriented learning.

5. Why Incorporate PBL?

- Promotes collaboration and interaction
- Learners communicate meaningfully and for authentic purposes
- Allows students with a variety of learning styles to demonstrate their acquired knowledge
- Students learn language, content, and skills simultaneously
- Increases learner autonomy
- Provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems.
- Improves education for all students Facilitates student integration of the content of different subjects
- Teaches children to use their own minds well and applies what they learn in school to life-long endeavors.
- Helps students to become technologically literate
- Establishes connections to life outside the classroom, addressing real-world concerns, and developing real-world skills
- Skills learned through PBL are those desired by today's employers.

6. Benefits of PBL

- Offers multiple ways for students to participate and to demonstrate their knowledge.
- Accommodates different kinds of intelligences.
- Shifts students away from doing only what they typically do in a classroom Environment.
- Encourages the mastery of technological tools, thus preparing them for the workforce.

- Serves as a medium for students who don't usually participate.
- Prompts students to collaborate while at the same time support self-directed learning.
- Offers a learning experience that draws on the thinking and shared efforts of several individuals.
- Helps students develop a variety of social skills relating to group work and negotiation.
- Promotes the internalization of concepts, values, and modes of thought, especially those related to cooperation and conflict resolution.
- Establishes a supportive and non-competitive climate for students.
- Provides a means for transferring the responsibility for learning from teachers to students.
- Calls upon students to explain or defend their position to others in their project groups, so that learning is more apt to be personalized and valued.

7. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.

  Level 1- 2nd Year – 3rd Semester & 4th Semester

  Level 2- 3rd year – 5th Semester & 6th Semester

  Level 3 – Final Year Project
- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.
- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks

2. During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

Phase 2:

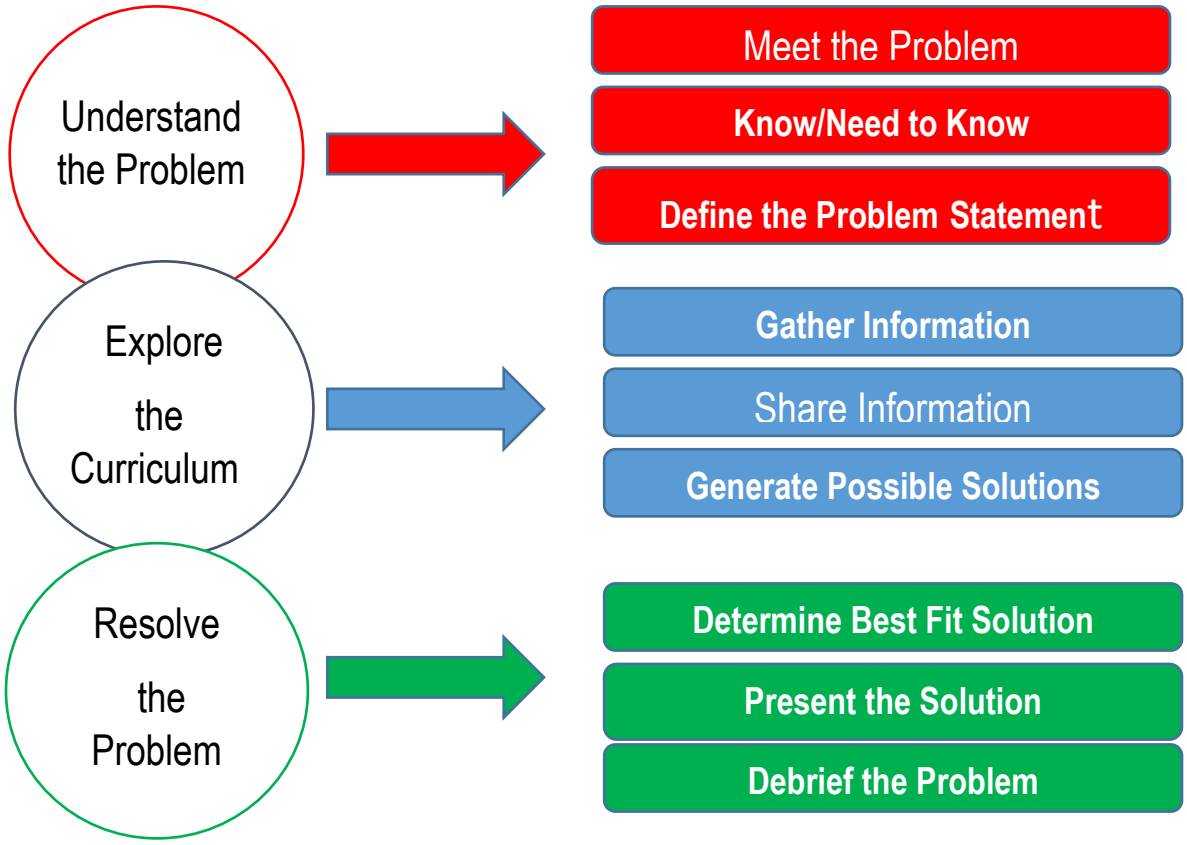
1. Phase 2 is for 11 Weeks

2. During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

1. Phase 1 – 25 Marks
2. Phase 2 – 25 Marks

8. PBL Teaching and Learning Template



9. Practice

- Every week 3 hour is exclusively dedicated to Project Based Learning.
- Assess their progress until they resolve the problem and summarise their learning.
- Provide opportunities for in-depth investigations of worthy topics.
- Allow learners to become more autonomous as they construct personally-meaningful artefacts that are representations of their learning.
- Motivate students by engaging them in their own learning. PBL affords students opportunities for development.
- Building communication, technical and management skills.

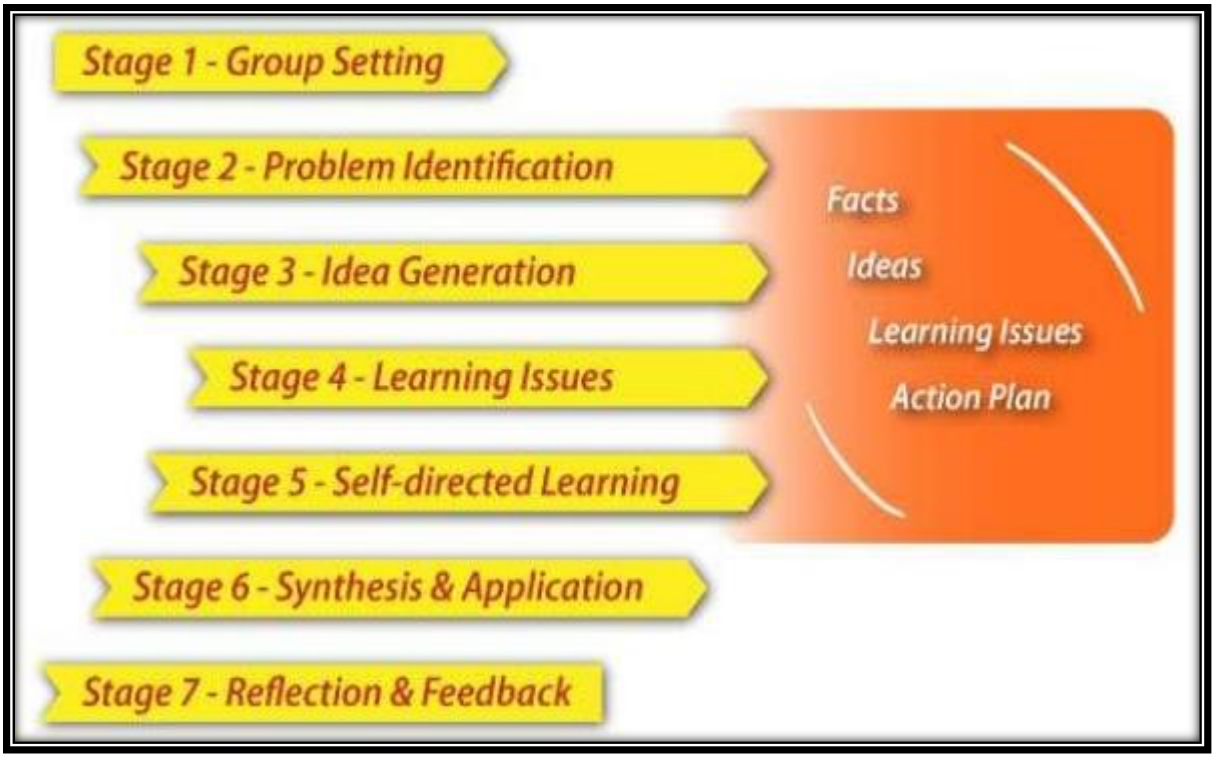
10. Obstacles/Gaps

- Lack of student's interest
- Lack of assessment
- Lack of Basic knowledge
- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management

11. How to Overcome?

- Periodic process – stage wise assessment has to be done.
- Basic Knowledge- A complete guidelines and videos will be provided by the faculty who is handling the respective subject and allotted guide.
- Regular evaluation and periodic monitoring is done by 2 stages.
- For Successful execution and demonstration of end-to-end system, exclusive 3hr/week project time is allotted.

12. Block diagram of PBL



13. Impact Analysis

- It encourages students to draw on their own creativity on problem solving and they learn the bridge gap between theory and practice.
- Final products resulting from project-based learning can be shared with the department at large, thus fostering ownership and technically strong with the subject scenario.

14. PBL – Guidelines

The guidelines are for successful completion of the project and to facilitate effective and uniform conduction of projects by the students. It is expected that these guidelines will help in overall improvement in the quality of the project.

14.1 Main phases of the project

Sl.No	Topics	Duration
Phase-1		
1.	Understanding of the project and preparing a project plan	**3 Weeks**
2.	Literature review	**1 Week**
3.	Planning	**1 Week**
Phase-2		
4.	Analysis and Design	**3 Weeks**
5.	Implementation	**6 Weeks**
6.	Testing	**1 Week**
7.	Writing the project report	**1 Week**
	Total	**16 Weeks**

14.2 Final Presentation Structure

1. Title of the project & Batch Information
2. Agenda / Topics
3. Problem Statement / Project Definition
4. Background / Literature Review
5. Methodology
6. Analysis and Design
7. Implementation
8. Testing
9. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

1. Cover Page
2. Certificate
3. Declaration
4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. Introduction
9. Background / Literature Review
10. Methodology / Solution
11. Analysis and Design
12. Implementation
13. Results
14. Conclusion and Future Works
15. Bibliography / References
16. Appendices

15. Guidelines to prepare the Project report

- Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm).
- The margins should be: Left – 1.25", Right – 1", Top and Bottom – 0.75".
- The total number of reports to be prepared are
    - One copy to the department.
    - One copy to the concerned guide
    - One copy to the candidate.
- Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated in the Final Report.
- For making copies dry tone Xerox is suggested.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

16. Outcome of the project

- Students will gain the knowledge and understand
- To think creatively, work collaboratively.
- Solve complex problems using digital technology.
- Students learn and desire to engage continuous gain about knowledge such as design, analysis, development, implementation and testing.
- Strong written communication skills and the ability to write technical documents that include specification, design, and implementation of a mini project.

Project - Based Learning Rubric

Score Levels	Content	Conventions	Organization	Presentation
5	▪ Is well thought out and supports the solution to the challenge or question ▪ Reflects application of critical thinking ▪ Has clear goal that is related to the topic ▪ Is pulled from a variety of sources ▪ Is accurate	▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice	▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution.	▪ Multimedia is used to clarify and illustrate the main points. ▪ Format enhances the content. ▪ Presentation captures audience attention. ▪ Presentation is organized and well laid out.
4	▪ Is well thought out and supports the solution ▪ Has application of critical thinking that is apparent ▪ Has clear goal that is related to the topic ▪ Is pulled from several sources ▪ Is accurate	▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice	▪ Information supports the solution to the challenge or question.	▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized.
3	▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources	▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice	▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently	▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention.

2	▪ Provides inconsistent information for solution ▪ Has no apparent application of critical thinking ▪ Has no clear goal ▪ Is pulled from few sources ▪ Has significant factual errors, misconceptions, or misinterpretations	▪ More than 5 spelling, grammatical, or punctuation errors ▪ Poor use of vocabulary and word choice	▪ Content is unfocused and haphazard. ▪ Information does not support the solution to the challenge or question. ▪ Information has no apparent pattern.	▪ Presentation appears sloppy and/or unfinished. ▪ Multimedia is overused or underused. ▪ Format does not enhance content. ▪ Presentation has no clear organization.

Subject Identified for Project Based Learning

Semester	3rd
Subject Identified for PBL	PCB Design
Prerequisite	Basic of Electronics circuit and their design
Justification for the selected subject	To learn basic of PCB design that caters in developing the PCBs for projects to be implemented in higher semesters and helpful for placements at electronic hardware industries
List of possible projects	Simple LED Driver Circuit, 555 timer circuits
	Basic Power Supply Module, power switching relay circuit
	Rectifier Circuits,Mobile Charging circuit using Solar Power
	Temperature Sensor, light sensor, touch sensor
	Audio Amplifier Circuits,

Signature of the Guide **Signature of HOD**

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**3**				
Course Title	:	**PCB Design**				
Course Code	:	**23CECE36**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PBL**				
Stream	:	**ECE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:2:2**		**SEE**	:	**50**
Total Hours	:	**30**		**SEE Duration**	:	**2Hrs**
Credits	:	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Introduce the fundamental concepts and principles of PCB design, including the types of PCBs, materials used, and the importance of PCB design in electronics.
2	Develop skills in using PCB design software tools for creating schematic diagrams and PCB layouts.
3	Educate students on the various fabrication processes and techniques used in the manufacturing of PCBs.
4	Teach students the methods for testing and troubleshooting PCBs to ensure they meet design specifications and function correctly.
5	Provide hands-on experience in designing, fabricating, and assembling PCBs for real-world electronic applications.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Introduce printed circuit board designing and fabrication where participants will get exposure to Design Spark PCB designing industrial tool (open source) and different aspects of printed circuit board designing. Installation of Design Spark PCB Software, activating it. Introducing library enabling, new components download from Internet, importing it in design.	7
Pedagogy	**collaborative Learning**	
2	Project creation, labelling with application name. Schematic design using Design spark PCB Tool for different application circuit. Own Library creation, components creation. Basic Schematic Capture - Create a schematic for a simple circuit (e.g., LED with a resistor and power source). Place components from the library. Connect components using wires. Annotate the schematic (add labels, values, and reference designators)	7
Pedagogy	**Think Pair and Share (Blended Learning)**	
3	Component Library Management - Create a custom component library. Add new components to the library, including symbols and footprints. Modify existing components. Assign electrical properties and designators.	7
Pedagogy	**Problem Solving**	
4	PCB Layout Design for single sided PCB Board fabrication. Gerber file generation from Design spark PCB Tool for fabrication. Simple PCB Layout - Import the schematic into the PCB layout tool. Place components on the PCB layout area. Route traces between components. Design Rule Check (DRC) and Electrical Rule Check (ERC)	7
Pedagogy	**Demonstration**	
5	Gerber File Generation and Verification Fabrication of board using plane copper clad. Toner transfer, chemical etching to get etched Board. Drilling, components placement and soldering for board fabrication. Testing and troubleshooting methods.	7
Pedagogy	**Project Implementation**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving	

	• **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Getting Started with MATLAB: A Quick Introduction for Scientists & Engineers, Rudra Prathap, Oxford University Press, 2010.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Apply fundamental concepts of PCB design, including the types of PCBs and materials used, and their applications in various electronic devices.	**L3**	**Apply**
CO2	Design PCB to develop accurate schematic diagrams and PCB layouts.	**L3**	**Apply**
CO3	Analyse and perform testing and troubleshooting on PCBs, identifying, and resolving issues to ensure proper functionality.	**L4**	**Analyze**
CO4	Investigate the design, for fabrication electronic applications, showcasing their ability to apply knowledge in practical scenarios.	**L5**	**Evaluate**
CO5	Use of industry standard PCB software to design, analyse and fabricate simple circuits individually or in a team	**L3**	**Apply**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**
CO2	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**
CO3	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**
CO4	**--**	**--**	**--**	**3**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**3**	**--**	**--**
CO5	**--**	**--**	**--**	**--**	**3**	**--**	**--**	**--**	**2**	**2**	**--**	**--**	**3**	**--**	**--**

Weblinks and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=ESnDQl7ZM5o
2	https://www.youtube.com/watch?v=KpgRl28C018
3	https://www.youtube.com/watch?v=KpgRl28C018&list=PLDclr_SCaTAxEpaE0uf9RDQUNtW5YSoxW
4	https://www.cirexx.com/pcb-design-steps/
5	https://www.altium.com/altium-designer

Project Based Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding PBL Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on……

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide

Name of the Guide Designation

Department of ……. Engineering

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)

Project Based Learning – Student(s) – Guide – Interaction

Date		
PBL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

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

Project Based Learning – Continuous Evaluation

Batch No.	Name	USN	Marks assigned	Remarks by the guide on the progress of the project

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

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Project Based Learning – Review

CONTINIOUS INTERNAL ASSESSMNET							
Batch No.	Name of the Student	USN	Phase I (25 Marks)		Phase II (25 Marks)		Final CIE Marks (Phase I & Phase II) (50 Marks)
			Abstract / Understanding of the Project (5 Marks)	Analysis & Design (20 Marks)	Implementation (20 Marks)	Demonstration (5 Marks)	

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning Outcomes

Sl.No	Batch No.	Name of Students	USN	Domain	Outcomes

ABILITY ENHANCEMENT COURSE (AEC)

AEC Course – Ability Enhancement Course

Teaching Hours/Week (L: T:P: S)	0:0:2:0
Total Hours of Pedagogy	24 hours Practical
Credits:	01
Programs / Experiments	12
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Practical (Internal Examiners only)

Dayananda Sagar Academy of Technology & Management

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Semester	**:**	**03**				
Course Title	**:**	**Advanced Programming in C**				
Course Code	**:**	**23CECE37**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Practical**				
Category	**:**	**AEC**				
Stream	**:**			**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**0:0:2:0**		**SEE**	**:**	**50**
Total Hours	**:**			**SEE Duration**	**:**	**03**
Credits	**:**	**01**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Provide students with a thorough understanding of advanced C programming topics such as structures, unions, pointers, and file handling.
2	Impart knowledge of advanced C programming to apply in real world examples
3	Enhance students' ability to solve complex programming problems using dynamic data structures like linked lists and by effectively managing memory in C
4	Prepare students for more complex challenges in computing by building a solid foundation in advanced C programming, which is essential for system-level programming and software development.
5	Equip students with the practical skills required to implement real-world applications using advanced C programming techniques, including file handling and dynamic memory management.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in PCB Design..
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.

- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.

Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.**Scheme of Teaching and**

1 Credit Course – Practical

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.

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are 50 Marks. The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to 20 marks (40% of the maximum marks). The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

SEE marks for the practical course are 50 Marks.

- SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University. All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered by the examiners or based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.
- General rubrics suggested for SEE are mentioned here,
    - Writeup-20%,
    - Conduction procedure and result in -60%,
    - Viva-voce 20% of maximum marks.

  SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)
- Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.
- The minimum duration of SEE is 02 hours.

DSATM

Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Write a program to create a text file, write data to it, and then read and display the content from the file.	CO1 to CO5
2	Write a program to merge the contents of two files and write into third file	CO1 to CO5
3	Write a program to copy the contents of one file to another, demonstrating reading and writing file operations	CO1 to CO5
4	Create a structure to store information about a student (name, age, and grade) and implement functions to input and display student data. Implement an array of structures to manage a list of students, including operations to sort the list based on grades.	CO1 to CO5
5	Implement a structure containing a union that can store different types of employee data (full-time, part-time) based on employee type.	CO1 to CO5
6	Develop a program to sort an array using pointer notation instead of array indexing.	CO1 to CO5
7	Write a program to manage a dynamic list of students using pointers to structures and perform operations like adding, deleting, and modifying student records	CO1 to CO5
8	Implement a singly linked list with operations to insert, delete, and traverse nodes	CO1 to CO5
9	Create a circular linked list where the last node points to the first node, and implement traversal to display the list in a circular fashion.	CO1 to CO5
10	Write C program to implement stack and queue using linked list	
	Open ended Programs	
1	Develop a student management system for a university. The system needs to handle the dynamic addition, modification, and deletion of student records. Each student record contains personal details (e.g., name, age, ID) and academic information (e.g., courses enrolled, grades).	CO1 to CO5
2	Develop a banking system where customers can open accounts, deposit and withdraw funds, and view transaction histories. The system should support multiple types of accounts (e.g., savings, checking) and handle transactions in real-time	CO1 to CO5

CIE for Principles of Programming Using C (Integrated Professional Core Course (IPCC)):

This Course refers to professional theory core course integrated with practical. Credit for this course can be 03 and its Teaching Learning hours (L : T : P: S) can be considered as (2 : 0 : 2 : 0).

15 marks for the conduction of practical experiment and preparation of the Laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.

On completion of every program in the laboratory, the student shall be evaluated including viva-voce and marks shall be awarded on the same day.

Each program report can be evaluated for **15 marks** (Write-up – 3 marks, Execution – 8 marks .and Viva – 4 marks)
The Laboratory test (duration 2 hours / 3 hours) after completion of all the programs shall be conducted for 50 marks and scaled down to **10 marks.**
The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. This course is common to all branches of first year B.E/B.Tech. 2023-24 regulation.

Note: L- Theory Lecture, T- Tutorial, P-Practical, S-Project, IPCC: Integrated Professional Core Course, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	A structured programming Approach using C, Behrouz A. Forouzan Richard F. Gilberg, 3rd Edition, Cengage Learning India Pvt. Ltd., 2007
Reference Books	
1	C Programming: A Modern Approach, K.N. King, W. W. Norton & Company, 2008
2	The C programming Language, Kernighan B W and Dennis M Ritchie, 2nd edition, Pearson Education India, 2015
3	Programming in C, Reema Thareja, 2nd Edition, Oxford University, Press 2015

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Effectively apply advanced C programming constructs like structures, unions, and pointers to develop efficient and robust applications.	**L3**	**Apply**
CO2	Analyze and implement dynamic data structures such as linked lists, stacks, and queues using pointers.	**L4**	**Analyze**
CO3	Design software solutions, integrating multiple advanced concepts from the course to meet specific requirements	**L3**	**Develop**
CO4	Interpret and manage file operations and memory usage in C, ensuring efficient data processing and memory allocation.	**L4**	**Interpret**
CO5	Use Integrated Development Environments (IDEs), debuggers, and other programming tools to efficiently develop and troubleshoot C programs.	**L5**	**Evaluate**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	-	-	-	-	-	2	2	-	-	3	-	-
CO2	-	3	-	-	-	-	-	-	2	2	-	-	3	-	-
CO3	-	-	3	-	-	-	-	-	2	2	-	-	3	-	-
CO4	-	-	-	3	-	-	-	-	2	2	-	-	3	-	-
CO5	-	-	-	3	-	-	-	-	2	2	-	-	3	-	-

Weblinks and Video Lectures (e-Resources)	
1	https://ggsestc.digimat.in/nptel/courses/video/106104128/L47.html Lecture no 47
2	https://www.youtube.com/watch?v=HHJpXRyNh-k
3	https://www.youtube.com/watch?v=KL65a0TyeYo
4	https://www.youtube.com/watch?v=PmedoKU7Rhs
5	https://www.youtube.com/watch?v=7-EppTJK7WQ lecture series from IIT, Madras

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Practical		
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)
	IAT1 Programs 1-6	IAT2 Programs 7-10	Open ended
	50 Marks	50 Marks	50 Marks
Remember			
Understand			
Apply	25	25	**20**
Analyse	15	15	20
Evaluate	10	10	10
Create			

CIE Course Assessment Plan

CO's	Marks Distribution		Total Marks	Weightage
	IAT1 Programs 1-6	IAT2 Programs 7-10		
CO1	10	--	10	10%
CO2	15	20	35	35%
CO3	10	20	30	30%
CO4	10	10	20	20%
CO5	05	05	10	20%
Total	50	50	100	100

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	
Apply	25
Analyse	15
Evaluate	10
Create	

SEE Course Plan

CO's	Marks Distribution	Total Marks	Weightage
	Programs 1 to12		
CO1	10	10	20%
CO2	15	15	30%
CO3	10	10	20%
CO4	10	10	20%
CO5	05	05	10%
Total	50	50	100

SOCIAL CONNECT
&
RESPONSIBILITY (SCR)

SCR- Social Connect & Responsibility

Teaching Hours/Week (L: T: P: S)	0:0:0:2
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning
Credits:	01
Programs / Experiments	12
CIE Marks	100
SEE Marks	------
Total Marks	100
Exam Hours	3
Examination nature (SEE)	No SEE only CIE For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept / Any Dept.

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Semester	:	**3**				
Course Title	:	**Social Connect & Responsibilities**				
Course Code	:	**23CECE38**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**SCR**				
Stream	:	**ECE**		**CIE**	:	**100**
Teaching hours/ week (L:T:P:S)	:	**0:0:3:1**		**SEE**	:	**-**
Total Hours	:	**40 hour Practical Session +15 hour Planning**		**SEE Duration**	:	**NA**
Credits	:	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Provide a formal platform for students to communicate and connect to the society responsibly.
2	Understand the community in general in which they work.
3	Identify the needs and problems of the community and involve them in problem –solving.
4	Develop among them a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
5	Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

Teaching-Learning Process
Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in Social Connect & Responsibilities.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Plantation and adoption of a tree:** Plantation of a tree that will be adopted for four years by a group of BE / B.Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature – Objectives, Visit, case study, report, outcomes.	8
Pedagogy		
2	**Heritage walk and crafts corner:** Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms – Objectives, Visit, case study, report, outcomes.	8
Pedagogy		
3	**Organic farming and waste management:** Usefulness of organic farming, wet waste management in neighbouring villages, and implementation in the campus – Objectives, Visit, case study, report, outcomes.	8
Pedagogy		
4	**Water conservation:** Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices – Objectives, Visit, case study, report, outcomes. **Food walk:** City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes.	8
Pedagogy		
5	**Orphanage & Old age home Visit:** Knowing the importance of parents for the younger children and understanding why parents need their children during their old age. – Objectives, Visit, case study, report, outcomes.	8
	Pedagogy : These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes. 1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied social and cultural skills. 2. State the need for activities and its present relevance in the society and Provide real-life examples.	

	3. Support and guide the students for self-planned activities. 4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field. • 5. Encourage the students for group work to improve their creative and analytical skills.

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

CO	Course Outcomes
CO1	Communicate and connect to the surrounding.
CO2	Create a responsible connection with the society.
CO3	Involve in the community in general in which they work.
CO4	Notice the needs and problems of the community and involve them in problem –solving.
CO5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1						**3**		**2**	**2**	**2**		**2**			
CO2						**3**		**2**	**2**	**2**		**2**			
CO3						**3**		**2**	**2**	**2**		**2**			
CO4						**3**		**2**	**2**	**2**		**2**			
CO5						**3**		**2**	**2**	**2**		**2**			

Activities: Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.
PEDAGOGY: The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersionwith NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?
COURSE TOPICS:

The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversional will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.
Duration : A total of 40 - 50 hrs engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic ,and poetry) Faculty mentors has to design the evaluation system as per guidelines of scheme & syllabus.

Continuous Internal Evaluation (CIE):

- After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period.
- The report should be signed by the mentor.
- The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50.
- Planning and scheduling the social connect Information/Data collected during the social connect Analysis of the information/data and report writing
- Considering all above points allotting the marks as mentioned below

Excellent : 80 to 100

Good : 60 to 79

Satisfactory : 40 to 59

Unsatisfactory and fail: <39

Pedagogy – Guidelines:

It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl.No	Topic	Group size	Location	Activity execution	Reporting	Evaluation Of the Topic
1.	Plantation and adoption of a tree:	May be individual or team	Farmers land/ parks / Villages / roadside/ community area / College campus etc.…	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
2.	Heritage walk and crafts corner:	May be individual or team	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	Site selection /proper consultation/Contin uous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
3.	Organic farming and waste management:	May be individual or team	Farmers land / parks / Villages visits / roadside/ community area / College campus etc.…	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
4.	Water conservation: & conservation techniques	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers / campus etc…..	Site selection / proper consultation/Contin uous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
5.	Food walk: Practices in societ	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Governme nt Schemes officers/ campus etc…	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty

1 Credit Course – Practical + Planning

Assessment Details (both CIE and SEE)

NO SEE – Semester End Exam – Completely Practical and activities based evaluation

Plan of Action (Execution of Activities)	
Sl.No	**Practice Session Description**
1.	Lecture session in field to start activities
2.	Students Presentation on Ideas
3.	Commencement of activity and its progress
4.	Execution of Activity
5.	Execution of Activity
6.	Execution of Activity
7.	Execution of Activity
8.	Case study-based Assessment, Individual performance
9.	Sector/ Team wise study and its consolidation
10.	Video based seminar for 10 minutes by each student At the end of semester with Report.

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

Assessment Details for CIE (both CIE and SEE)

Weightage	**CIE – 100%**	• Implementation strategies of the project (NSS work). • The last report should be signed by NSS Officer, the HOD and principal. • At last report should be evaluated by the NSS officer of the institute.
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study-based Assessment Individual performance with report	20 Marks	
Sector wise study & its consolidation 5*5 = 25	25 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report. Activities 1 to 5, 5*5 = 25	25 Marks	
Total marks for the course in each semester	100 Marks	
For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.		
Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.		

Course - Skills Mapping Table

3rd Semester					
Sl.No	**Name of the Course**	**Course Code**	**Course Type**	**Course Category**	**Skills attained by the students**
1	Electronic Devices & Circuits	23CECE32	Theory & Practical	**IPCC**	**Skill-1(Basic Electronic Circuits Design)**
2	Digital Electronics	23CECE33	Theory & Practical	**IPCC**	**Skill-2(Digital Circuits Design)**
3	Arduino Programming	23CECE36	Project	**PBL**	**Skill-3(Arduino Programming)**
4	PCB Design	23CECE37	Practical	**AEC**	**Skill-4(PCB Design)**

4th SEMESTER

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:2:0
Total Hours of Pedagogy	40 hours Theory + 20 Hours of Practical Classes
Credits:	04
Theory - Each Module	8 Hrs
Practical's	8-10 Programs / Experiments
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

- The theory part of the IPCC shall be evaluated both by CIE and SEE.
- The practical part shall be evaluated by only CIE (no SEE).
- However, questions from the practical part of IPCC shall be included in the SEE question paper.

Integrated Professional Core Course (IPCC) - 4 Credit Course

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation (CIE) for the Theory component of the IPCC (Maximum marks 50)

Internal Assessment Test (IAT):

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are 25 marks and that for the practical component is 25 marks.
- 25 marks for the theory component are split into 15 marks for two Internal Assessment Tests
  (Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 15 marks) and 10 marks for Two Continuous Comprehensive Assessment(CCA) methods.

- The first Internal test at the end of 40-50% coverage of the syllabus
- The second Internal test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for 25 marks).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

The IA test questions are to be framed to map the Course Outcomes (COs), Program Outcomes (POs) and the Revised Blooms Taxonomy (RBT) Levels. Emphasis to be given for Higher order Thinking Skills(HOTS).

Continuous Internal Evaluation (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 CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report, **05 Marks** are for conducting the experiment, **05 Marks for** preparation of the laboratory record, **5 Marks** for conducting Open Ended Experiments Each experiment. Marks of all experiments' write-ups are added to 15 marks.
- The Practical 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 **5 Marks.**
- The open-ended experiment after completion of all the experiments shall be conducted for 20 marks with a split-up for 5 Marks for writeup, 10 Marks for Execution, and 5 Marks for Viva-Voce.
  Marks for writeup, Execution and Viva-Voce is added and scaled down to 05 marks.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 25 marks.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

Semester End Examination (SEE) for IPCC Theory

SEE will be conducted as per the scheduled timetable, with common question papers for the course (duration 03 hours)

- The question paper will have ten questions. Each question is set for 20 marks.

- 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.**
- 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.
- The students have to answer 5 full questions, selecting one full question from each module.
- Marks scored by the student shall be proportionally scaled down to 50 Marks.
- The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only.
- Questions mentioned in the SEE paper may include questions from the practical component.

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)/2 and scaled down to **10 Marks**.

- CCA1 after 4th week and CCA2 after 9th week. The Assessment will be through 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

4 Credits Courses – Integrated Professional Core Course (IPCC)

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 to 2.5	50	(50+50) / 2	**15**	6	Average of Two Internal test each of 50 Marks scale down the marks to 15 Marks
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity based learning	Considering all the Modules	50	(50+50) / 2	**10**	4	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/ Activity based learning		50				
	Total CIE Theory					**25**	10	Scale down Marks of IAT and CCA to 25

CIE	**Practical**	Conduction of Experiments	Performance-Continuous Evaluation of each experiment	05	15	Average of all Experiments	15	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					
			Observation book	05					
		Practical Test	Write up	15	50	----	05	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	----	05	2	One experiment for 20 marks. 20 marks reduced to 05 marks
			Execution	10					
			Viva-voce	05					
						Total CIE Practical	**25**	**10**	Scale down Marks of Experiments, Record, Observation, Practical Test and Open-Ended Experiment

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

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

Note: If few of the 3 Credit Courses are Integrated course type, for such courses the method suggested for 4 Credit IPCC Course shall be followed

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**IV**				
Course Title	**:**	**Analog Electronic Circuits**				
Course Code	**:**	**23CECE41**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**EC**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**3:0:2:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40 Hrs+12 Session**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl.N	Course Objectives
1	**Learn** the fundamentals of transistor, working of FET, characteristics and biasing of FET
2	Familiarise in **Applying** the concepts of electronic devices and circuits for FET small signal model and various biasing circuits.
3	Provide K**nowledge** in examining the different Amplifier circuits.
4	Impart D**esign** the circuits for Filters and Data Converters.
5	To E**quip** with the usage of Modern tools to simulate various integrated circuits

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in Analog Electronic Circuits.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Field Effect Transistors:** Introduction, Construction and Characteristics - of JFETs, Transfer Characteristics, Enhancement and Depletion type MOSFET and CMOS inverter, Channel length modulation, Threshold voltage and its effects. **FET Biasing:** Fixed bias configuration, Self-bias configuration Voltage-Divider biasing. **(Text-1: 5.2, 5.3, 5.7, 5.8, 6.2, 6.3, 6.4, 6.5, 6.6) (Text-3: 2.4 , 2.5)**	8
Pedagogy	**Experiential Learning**	
2	**FET Small signal operation and Modelling:** The DC bias point, signal current in drain, voltage gain, small signal equivalent circuit models, transconductance, T equivalent model. **MOSFET Amplifier configuration**: Basic configurations, characterizing amplifiers, CS amplifier with and without source resistance, Source follower. **(Text-4: 4.6.1 to 4.6.7, 4.7. 1 to 4.7.4)**	8
Pedagogy	**Think Pair Share**	
3	**Power Amplifiers**: Amplifier types, Class A amplifier: Series fed, Transformer coupled, Class B amplifier: Transformer coupled push-pull circuit and Complementary-symmetry circuit, Amplifier distortion, Class C and Class D amplifiers. **(Text-1: 16.1, 16.2, 16.3, 16.4, 16.5, 16.6 & 16.8)**	8
Pedagogy	**Mobile Studio**	
4	**OP-AMP Applications:** Precision Small signal Half wave and Full wave rectifiers, Absolute value output circuit, Peak detector, Difference Amplifier, Differential Input/output Amplifier, Instrumentation Amplifier. **Comparators and Waveform Generators**: Comparator- Non-inverting and inverting, Zero Crossing detector, Schmitt Trigger, RC phase shift oscillator and Wien Bridge Oscillator. (**Text -2: 6-6-1, 8-12-2, 8-13, 8-2, 8-3, 8-4, 7-12, 7-13)** **(Text-5: 3.7,3.8)**	8
Pedagogy	**Demonstration**	
5	**Active Filters:** Introduction, First order and Second order low pass and High pass Filter, Band-pass Filter: Wide Band pass filter, Band Rejection Filter: Wide Band reject filter **D-A and A-D Converters**: DAC Circuits - Binary weighted, R-2R, A/D Converter: Successive Approximation Register.	8

	(Text -2: 7-2, 7.3 7-4 , 7-5, 7-6 , 7-8-1, 7-9-1) **(Text -2: 8-11(a), 8-11(b), 8.11-2(a))**	
Pedagogy	**Poster Presentation**	
	Case Studies ● **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another ● **Problem Solving**: encourages cognitive thinking and enables creative problem solving ● **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. ● **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
	Hardware	
1	Conduct an experiment to draw the Drain and Transfer characteristics of MOSFET	CO2, CO3, CO4
2	Design and simulate First and Second order active Low-Pass Filter (LPF) and High-Pass Filter (HPF) for a given cut-off frequencies	CO2, CO3, CO4
3	Design and set up the circuits using opamp: i) Adder, ii) Comparator	CO2, CO3, CO4
4	Design and Conduct Half wave and Full wave Precision Rectifier	CO2, CO3, CO4
5	Design and set-up BJT/FET i) Colpitts Oscillator, ii) Crystal Oscillator	CO2, CO3, CO4
6	Design and Conduct Schmitt Trigger for given UTP and LTP	CO2, CO3, CO4
	Simulation	
7	Plot the transfer and drain characteristics of a JFET and calculate its drain resistance, mutual conductance and amplification factor	CO2, CO3, CO4, CO5
8	Design and plot the frequency response of Common Source JFET/MOSFET amplifier	CO2, CO3, CO4, CO5
9	Test the Opamp Comparator with zero and non-zero reference and obtain the Hysteresis curve	CO2, CO3, CO4, CO5
10	Design and test RC phase shift oscillator	CO2, CO3, CO4, CO5
12		
	Open ended Programs	
1	Design and test the following using 555 timers i)Monostable Multivibraator ii) Astable Multivibrator	CO2, CO3, CO4, CO5
2	Design and Test a Phase lead and lag OpAmp circuit	CO2, CO3, CO4, CO5
3	Design and test an audio amplifier by connecting a microphone input and observe the output using a loudspeaker	CO2, CO3, CO4, CO5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Robert L. Boylestad and Louis Nashelsky, Electronics devices and Circuit theory, 7th Edition, Pearson.
2	Ramakant A. Gayakwad, Op-Amps and Linear Integrated Circuits Fourth Edition | By PHI learning , 2012
3	Neil H.E. Weste, David Harris ,CMOS VLSI Design : A circuits and systems perspective Pearson Education India, 2015 , 4th Edition
4	Adel S Sedra, Kenneth C Smith, Microelectronic Circuits, Theory and Applications,, 6 th Edition, Oxford, 2015. ISBN:978-0-19-808913-1
5	David A. Bell "Operational Amplifiers & Linear ICs" 3rd Edition, 2011.
Reference Books	
1	J. Millman and C. C. Halkias, Integrated Electronics, 2nd Edition, Tata Mc-Graw Hill Publishing Company Limited,2017
2	Behzad Razavi, Fundamentals of Microelectronics, John Weily, 2013

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the concepts of operation and performance parameters of FET and MOSFET.	**L2**	**Understand**
CO2	**Apply** the fundamentals of concepts of FET amplifiers for small signal analysis.	**L3**	**Apply**
CO3	**Develop** the operation of various electronic circuits and performance of Power Amplifiers	**L3**	**Design**
CO4	**Analyze** Linear Integrated circuits for various applications of Operational Amplifiers (Filters, Data converters)	**L4**	**Analyze**
CO5	**Evaluate** various electronic circuits using modern tools	**L5**	**Evaluate**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1													3		
CO2	3												3		
CO3		3											3		
CO4			3						2	2			3		
CO5				3	3				2	2			3		

Weblinks and Video Lectures (e-Resources)	
1	http://www.springer.com/engineering/electronics/book/978-0-387-25746-4,Analog Circuit Design: A Tutorial Guide to Applications and solutions.
2	https://www.tutorialspoint.com/linear integrated circuits applications/index.htm
3	https://www.scribd.com/book/282535091/Linear-Integrated-Circuits
4	https://nptel.ac.in/courses/108/106/108106084/
5	https://nptel.ac.in/courses/108/102/108102095/
6	https://nptel.ac.in/courses/117/103/117103063/

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember/Understand	10	10	-	-	-
Apply	15	15	-	-	-
Design	20	20	-	-	25
Analyze	05	05	30	30	25
Evaluate			20	20	50

CIE Course Assessment Plan

CO's	Marks Distribution					Total Marks	Weightage
	Test-1			Test-2			
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	5	5		5	10	25	25%
CO2	5	10	10	5		30	30%
CO3		10	5	10	10	35	35%
CO4		5	5			10	10%
CO5							
Total	10	30	20	20	20	100	

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember/ Understand	25
Apply	30
Design	35
Analyze	10
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	05	05	05	05	05	25	25%
CO2	05	05	10	10		30	30%
CO3		10	10	10	05	35	35%
CO4		05	05			10	10%
CO5							
Total	10	25	30	25	10	100	100%

Dayananda Sagar Academy of Technology & Management

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Semester	:	**IV**				
Course Title	:	**HDL Programming**				
Course Code	:	**23CECE42**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC**				
Stream	:	**EC**		**CIE**	:	**50 Marks**
Teaching hours/ week (L:T:P:S)	:	**3:0:2:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 Theory +20 Practical**		**SEE Duration**	:	**03 hours**
Credits	:	**04**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Comprehend the Syntax, Semantics and programming styles of Verilog HDL
2	Provide knowledge of simple and complex combinational and sequential digital circuits to write Verilog programs in all the levels of programming
3	Enhance the Verilog HDL programming skills for writing programs for simple and complex digital circuits
4	Familiarize to analyse the design with required test bench and test cases
5	Use EDA tools to simulate and debug the Verilog programs either as an individual or a team

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in HDL Programming
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

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COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction:** A Brief History of HDL, Structure of HDL Module, Operators, and Data types, Types of Descriptions, Brief comparison of VHDL and Verilog. Verilog programming Models: Structural, Behavioral and Dataflow Modeling. Write and simulate simple Verilog programs (e.g., AND, OR gates) 1.1 to 1.5 (Only Verilog) **Synthesis Basic:** Synthesis flow chart, Synthesis information from Module, mapping to the hardware. 10.1, 10.2, & 10.3(Only Verilog) of **Text Book - 1**	8
Pedagogy	**Flipped Classroom**	
2	**Data –Flow Descriptions:** Structure of Data-Flow Description, Signal declaration and Assignment Statements, Constant Declaration, Delay time declaration, Data Type – Vectors and programing examples (Only Verilog) 2.1 to 2.3 **Structural Descriptions:** Organization of the structural Descriptions, Binding, State Machines with programing examples, Generate, Generic, and Parameter statements. (Only Verilog) 4.1 to 4.5 of **Text Book – 1**	8
Pedagogy	**Mobile Studio**	
3	**Behavioral Descriptions:** Structure of Behavioral Description. Examples of combinational (Mux, decoder, encoder etc) and sequential circuits (Latches and Flip flops). 3.1 and 3.2. of **Text Book – 1** **Control Statements**: if statement with examples, case, casex, and casez statement with examples, Case study with Booth algorithm, for loop, while loop, repeat and forever statements 3.4 of **Text Book – 1**	8
Pedagogy	**Think – Pair – Share**	
4	**Tasks, Functions and User Defined Primitives:** Tasks, Task declaration and Invocation with programing examples, Functions, Function Declaration and Invocation with programing examples and difference between Task and Functions, Parts of UDP definition, UDP Rules, Combinational UDP and Sequential UDP 8.1, 8.2, 8.3 and 8.4, 12.1 ,12.2 and 12.3 of **Text Book – 2** **Advanced HDL Descriptions:** File Processing, Examples of File Processing 8.1 and 8.2 of **Text Book – 1**	8
Pedagogy	**Problem Based Learning**	

5	**Advanced Verification Techniques:** Traditional Verification flow**,** Architectural Modelling, Functional Verification Environment, Simulation Analysis, coverage, Formal Verification 15.1, 15.2 and 15.3 of **Text Book – 2** **Implementation Fabrics:** ICs, PLDs, Packaging and Circuit Boards, 6.1, 6.2, and 6.3 of **Text Book – 3**	**8**
Pedagogy	**Case Studies**	

	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

List of Programs:

Sl. No.	Experiments/Programs	COs
Instruction: Simulate the program with the testbench code, debug and evaluate the performance metrics using VIVADO tool and FPGA Board		
1	Simplify the given Boolean expressions and realize using Verilog program	**CO3, CO4, CO5**
2	Develop a Verilog code and verify its functionality using simulator (a) 2 to 4 decoder (b) 8 to 3 (encoder without priority & with priority) (c) Multiplexer (4:1 mux and 8:1 mux) (d) 4 bit binary to gray converter (e) Comparator	**CO3, CO4, CO5**
3	Develop a Verilog code to describe the functions of a Full Adder Using three modeling styles.	**CO3, CO4, CO5**
4	Realize 4-bit ALU using Verilog program	**CO3, CO4, CO5**
5	Develop the Verilog code for the following flip-flops D, JK, T JK	**CO3, CO4, CO5**
6	Design 4 bit binary, BCD counters (Synchronous reset and Asynchronous reset) and "any sequence" counters	**CO3, CO4, CO5**
7	Verilog Program to interface a Stepper motor to the FPGA/CPLD and rotate the motor in the specified direction (by N steps).	**CO3, CO4, CO5**
8	Write Verilog code to generate different waveforms (Sine, Square, Triangle, Ramp etc.,) using DAC.	**CO3, CO4, CO5**
Open ended Programs		
1	Implement a FIFO memory buffer that can be used for data buffering and transfer between different clock domains.	**CO2,CO3, CO4, CO5**
2	Create a UART module for serial communication with configurable baud rate, data bits, and parity	**CO2,CO3, CO4, CO5**
3	Design a digital thermometer that reads temperature from a sensor and displays the value on a seven-segment display.	**CO2,CO3, CO4, CO5**
4	Design an interrupt controller that can handle external and internal interrupts for a RISC-V processor.	**CO2,CO3, CO4, CO5**
5	Design one of the pipeline stages (e.g., Fetch, Decode, Execute, Memory, Write-back) for a pipelined RISC-V processor.	**CO2,CO3, CO4, CO5**

CIE for Principles of Programming Using C (Integrated Professional Core Course (IPCC)):
This Course refers to professional theory core course integrated with practical. Credit for this course can be 03 and its Teaching Learning hours (L : T : P: S) can be considered as (2 : 0 : 2 : 0).
15 marks for the conduction of practical experiment and preparation of the Laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
On completion of every program in the laboratory, the student shall be evaluated including viva-voce and marks shall be awarded on the same day.

Each program report can be evaluated for **15 marks** (Write-up – 3 marks, Execution – 8 marks .and Viva – 4 marks)
The Laboratory test (duration 2 hours / 3 hours) after completion of all the programs shall be conducted for 50 marks and scaled down to **10 marks.**
The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. This course is common to all branches of first year B.E/B.Tech. 2023-24 regulation.
Note: L- Theory Lecture, T- Tutorial, P-Practical, S-Project, IPCC: Integrated Professional Core Course, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	HDL Programming VHDL and Verilog by Nazeih M Botros, Dreamtech press, 2009 reprint.
2	"Verilog HDL: A Guide to Digital Design and Synthesis", Samir Palnitkar, Pearson education, Second edition.
3	"Digital Design: An Embedded Systems Approach Using VERILOG", Peter J. Ashenden, Elesvier, 2010.
Reference Books	
1	"Digital Systems Design Using Verilog" by Carles Roth, Mindtap
2	"Verilog by Example: A Concise Introduction for FPGA Design" by Blaine Readler, Full Arc Press, 2011.

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

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Understand the syntax, operators and programing styles of Verilog HDL programing	**L2**	**Understand**
CO2	Apply programing knowledge to write Verilog code for simple and complex digital circuits	**L3**	**Apply**
CO3	Develop Verilog HDL program for simple and complex digital circuits	**L3**	**Design**
CO4	Analyze and optimize the program for various performance metrics	**L4**	**Analyze**
CO5	Evaluate the functionality and performance of designs using industry standard tools individually or in a team.	**L5**	**Evaluate**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1													3		
CO2	3												3		
CO3		3											3		
CO4			3										3		
CO5				3	3				2	2			3		

Weblinks and Video Lectures (e-Resources)	
1	https://vlsiverify.com/
2	https://www.chipverify.com/
3	https://verificationguide.com/systemverilog/systemverilog-tutorial/
4	https://archive.nptel.ac.in/courses/106/105/106105165/
5	https://onlinecourses.nptel.ac.in/noc24_cs61/preview

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory				Practical
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)		Practical Test
	IAT-1	IAT-2	CCA-1	CCA-2	
	50 Marks	50 Marks	50 Marks	50 Marks	
Remember/ Understand	10	15			
Apply	15	15			15
Design	20	15			20
Analyze	05	05	30	30	15
Evaluate			20	20	

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	05	05		05	05	05	25	25
CO2	05	10		05	10		30	30
CO3		10	10		10	05	35	35
CO4		05		05			10	10
CO5								
Total	10	30	10	15	25	10	100	100

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember/ Understand	25
Apply	30
Design	35
Analyze	10
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module -3	Module-4	Module-5		
CO1	05	05	05	05	05	25	25
CO2	05	10	05	10		30	30
CO3		10	10	10	05	35	35
CO4		05	05			10	10
CO5							
Total	10	30	25	25	10	100	100

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0
Total Hours of Pedagogy	40 hours
Credits:	03
Each Module	8 Hrs
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Theory

3 Credit Course – Professional Core Course (PCC)

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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
  - The first test will be administered after 40-50% of the syllabus has been covered, and
  - The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

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

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 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 **25 Marks** after and review 2 of **25 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,
- The assessment of these techniques shall be in rubrics.
- The faculty can adopt any other CCA method of implementation and its assessment with prior approval of Program Assessment Committee (PAC).

Professional Core Course (PCC) – 3 Credit course – Theory

Assessment Method	Component	Type of Assessments	Syllabus Coverage	Maximum Marks	Average	Reduced Marks	Minimum Passing Marks	Evaluation Details
Total CIE Theory + Practical				**50**	----	----	**20**	
	Theory	Internal Assessment Test (IAT) - II	Module – 1 to 2.5	50	(50+50) / 2	**25**	10	Average of Two Internal test each of 50 Marks scale down the marks to 25
		Internal Assessment Test (IAT) - II	Module – 2.5 to 5	50				
	Continuous Comprehensive Assessment (CCA)	CCA-1- Pedagogical Initiatives / Activity Based learning	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 / Activity Based learning		50				
	Total CIE Theory					**50**	20	Total Marks of IAT and CCA is 50

SEE		Theory exam	Entire theory syllabus including questions from lab Component in respective Modules	100	----	50	20	SEE Exam is theory Exam conducted for 100 Marks, scored Marks are scaled down to 50 Marks
			CIE + SEE	100	----	----	40	

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**4th Semester**				
Course Title	:	**Control Systems**				
Course Code	:	**23CECE43**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**ECE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**(3:0:0:0)**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 hours**
Credits	:	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Impart the knowledge of fundamentals of control systems, transfer function, time-domain response, state variables and the stability of a system.
2	Familiarize in applying the concepts to determine the transfer function, time-domain response and the stability of a system using Routh-Hurwitz criterion, root locus, Nyquist, and Bode plots.
3	Provide the knowledge in analyzing the system, time-domain response and the stability of a system using Routh-Hurwitz criterion, root locus, Nyquist, and Bode plots.
4	Impart the design to find the effect of gain ,magnitude , Phase of the system behavior using various methods
5	Equip with the usage of modern tools to simulate and verify the behaviour of control systems.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in Control Systems.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.

- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction :** Basic components, Applications, Classification of Control System , Open-loop and closed-loop control system, Examples of control system :air conditioner, cruise control, and phase-locked loop. **Mathematical Modelling of Physical Systems:** Difference and differential equations for LTI SISO and MIMO systems, Mathematical modelling of electrical and mechanical systems, Equivalence between the elements of different types of systems, Transfer function of linear systems. Text: 1 – 1.1, 1.3, 1.4, 1.5, 2.1, 2.2, 2.4	**8 Hours**
Pedagogy	**Presentation**	
2	**Block diagram reduction :** Overall response Open-loop transfer function and closed-loop transfer function(Derivation), Block diagram representation, Rules and Problems in Block diagram reduction techniques . **Signal flow graph :** Terminology, Mason's gain formula and Problems on Signal Flow graph Text: 1 – 2.5, 2.6, 2.7	**8 Hours**
Pedagogy	**Problem Solving**	
3	**Time Domain Response Analysis :** Transient response and steady state responses, Time domain specifications, Types of test inputs, Response of first order and second order systems with derivation, Steady state error, Static error coefficients, Generalized error coefficients. Introduction to PI, PD and PID Controllers (excluding design) Text: 1 – 5.1, 5.2, 5.3, 5.4, 5.5, 5.7	**8 Hours**
Pedagogy	**Simulation**	
4	**Stability analysis:** Concepts of stability, Necessary conditions for Stability, Routh stability criterion, Relative stability analysis, R H criterion. ROOT-LOCUS: introduction, Techniques, concepts, and Construction. Text: 1 – 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 7.1, 7.2, 7.3	**8 Hours**
Pedagogy	**Case studies**	

5	**Frequency domain analysis and stability:** Correlation between time and frequency response, Bode Plots, Experimental determination of transfer function Mathematical preliminaries, Nyquist Stability criterion, (Stability criteria related to polar plots are excluded) **State Variable Analysis:** Introduction to state variable analysis: Concepts of state, state variable and state models. State model for Linear continuous –Time systems, solution of state equations. Text: 1 – 8.1, 8.2, 8.4, 8.6, 9.1, 9.2, 9.3, 12.1, 12.2, 12.3, 12.6	**8 Hours**
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

CIE for Control Systems (Professional Core Course (PCC)):
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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).
- A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

Internal Assessment Test (IAT):

- For the Internal Assessment Test component of CIE, there are 25 marks and for Assignment component of the CIE, there are 25 marks. Two Tests, each of 50 Marks with 01-hour 30 minutes' duration, are to be conducted and average of two tests to be reduced to 25 marks
- The first test will be administered after 40-50% of the syllabus has been covered, and
- The second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.

- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.
- Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

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

Semester-End Examination:

Theory SEE will be conducted as per the scheduled timetable (duration 03 hours).

- The question paper will have ten questions. Each question is set for 20 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 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 **25 Marks** after and review 2 of **25 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**

Possible Continuous and Comprehensive Assessment (CCA):

- 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,

- The assessment of these techniques shall be in rubrics.

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

Note: L- Theory Lecture, T- Tutorial, P-Practical, S-Project, IPCC: Integrated Professional Core Course, CIE: Continuous Internal Evaluation, SEE: Semester End Examination.

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	J.Nagarath and M.Gopal, ― Control Systems Engineering‖, New Age International (P) Limited, Publishers, Fifth edition-2005, ISBN: 81-224-2008-7.
2	Modern Control Engineering,‖ K.Ogata, Pearson Education Asia/PHI, 4th Edition, 2002. ISBN 978-81-203-4010-7
Reference Books	
1	Modern Control Theory By William L. Brogan , ISBN:9788131761670, 8131761673, Publisher: Prentice Hall
2	Automatic Control Systems‖, Benjamin C. Kuo, John Wiley India Pvt. Ltd., 8th Edition, 2008.
3	Feedback and Control System,‖ Joseph J Distefano III et al., Schaum‘s Outlines, TMH, 2nd Edition 2007.

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

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Understand the concepts of control systems, transfer function, time-domain response, state variables and the stability of a system	L2	Understand
CO2	Apply the concepts to determine the transfer function, time-domain response and the stability of a system using Routh-Hurwitz criterion, root locus, Nyquist, and	L3	Apply
CO3	Analyze the systems, time-domain response and the stability of a system using Routh-Hurwitz criterion, root locus, Nyquist, and Bode plots.	L4	Analyze
CO4	Evaluate system to find the effect of gain, magnitude, Phase of the system	L4	Design
CO5	Simulate and verify the behavior of control systems using modern tools.	L5	Simulate

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-		3	-	-
CO5	-	-	-		3	-	-	-	-	-	-	-	3	-	-

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/108106098

CIE- Continuous Internal Evaluation (50 Marks)

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

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	10	10		10			30	30%
CO2	10		10		10	10	40	40%
CO3		10			10	10	30	30%
CO4								
CO5								
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	30
Apply	40
Analyse	30
Evaluate	-
Create	-

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	10	10	10			30	30%
CO2	10		10	10	10	40	40%
CO3		10		10	10	30	30%
CO4							
CO5							
Total	20	20	20	20	20	100	100%

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Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

Semester	:	**IV**				
Course Title	:	**Signals and System**				
Course Code	:	**23CECE44**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**ECE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 Hrs.**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To study the description and representation of continuous and discrete time signals.
2	To Impart the knowledge of the Fourier Series and Fourier transform for periodic and non-periodic signals.
3	To study the Characteristics of LTI systems for continuous and discrete time signals.
4	To know the basics of Z-Transforms and its properties for discrete time signals
5	To equip with Modern Tools to analyze various signals and LTI Characteristics.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
    - Include videos to demonstrate various concepts in Signals and Systems.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction and Classification of Signals**: Definition and classification of signals and systems. Basic Operations on signals: Amplitude scaling, addition, multiplication, time scaling, time shift, and time reversal. Elementary signals/Functions: Exponential, sinusoidal, step, impulse, and ramp functions. Importance of sinc function, Basic system properties.	8
Pedagogy	**Problem Solving**	
2	**LTI System:** Discrete-time LTI systems: The convolution sum, Graphical method, Continuous-time LTI systems: The convolution integral, Graphical method, Properties of LTI systems, Causal LTI systems by difference equations (Natural, Forced, and Complete Response)	8
Pedagogy	**Problem Solving**	
3	**Fourier Series Periodic Signals:** The response of LTI systems to complex exponentials, Fourier series representation of continuous-time periodic signals, Properties of continuous-time Fourier series (CTFS), Fourier series representation of discrete-time periodic signals, Properties of Discrete-time Fourier series (DTFS).	8
Pedagogy	**Problem Solving**	
4	**Fourier Transform:** Aperiodic signals: Continuous-time Fourier transform (CTFT), The Fourier transform for periodic signals, Properties of continuous-time Fourier transform, Inverse Fourier Transform. The discrete-time Fourier transform: Introduction to sampling, Sampling theorem, Nyquist frequency, Aperiodic signals: discrete-time Fourier transform (DTFT), Properties of discrete-time Fourier transform, Inverse Discrete time Fourier transform.	8
Pedagogy	**Problem Solving**	

5	**Z-Transforms:** Introduction to Z transforms region of convergence, properties of Z-transform, Inverse Z-transform and its methods, Causality, stability, Transform analysis of LTI systems, and unilateral Z-transform (Basic Problems only).	**8**
Pedagogy	**Problem Solving**	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, 2008, Wiley India. ISBN 9971-51-239-4.
Reference Books	
1	Michael Roberts, "Fundamentals of Signals & Systems", 2nd edition, Tata McGraw-Hill, 2010, ISBN 978-0-07-070221-9.
2	Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, "Signals and Systems" Pearson Education Asia / PHI, 2nd edition, 1997. Indian Reprint 2002.
3	H.P Hsu, R. Ranjan, "Signals and Systems", Scham's outlines, TMH, 2006.
4	B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2005.
5	Signal and Systems, S. K Mitra, Oxford University Press; 4 th edition ,21 June 2016.

Weblinks and Video Lectures (e-Resources)

1	https://archive.nptel.ac.in/courses/108/104/108104100/
2	https://nptel.ac.in/courses/117/101/117101055/IITB
3	https://www.youtube.com/watch?v=6emTPPaDvmE&list=PLgwJf8NK-2e4EDpzaBCAO6Q2HikObVpTf
4	https://www.youtube.com/watch?v=rCw-FVegWJA&list=PLBlnK6fEyqRhkN2yGQpH40Pk-paIJzzvv

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the basic concepts of signals and systems and its classification.	L2	Understand
CO2	**Apply** the mathematical description and representation of continuous and discrete time in signals and systems.	L3	Apply
CO3	**Analysis** of the Fourier Series and Fourier transform for periodic and non-periodic signals.	L4	Analyze
CO4	**Evaluate** input-output relationship for linear time-invariant system for continuous and discrete time signals and Z-Transforms properties for discrete-time signals	L5	Evaluate
CO5	**Design** and verify various signals, convolution techniques and LTI properties.	L6	Design

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	1	2	-	1
CO3	-	3	-	-	-	-	-	-	-	-	-	1	2	-	1
CO4	-	-	3	-	-	-	-	-	-	-	-	1	2	-	1
CO5	-	-	-	2	2	-	-	-	-	-	-	1	2	1	1

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember				
Understand	10		05	
Apply	15	10	20	15
Analyse	15	20	15	20
Evaluate	10	20	10	15
Create				

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5			5	5	20	20%
CO2	10	5		10	10		35	35%
CO3		10	5		10	5	30	30%
CO4		5	5			5	15	15%
CO5								
Total	15	25	10	10	25	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	-
Understand	20
Apply	35
Analyse	30
Evaluate	15
Create	-

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	5	5			5	5	20	20%
CO2	10	5		10	10		35	35%
CO3		10	5		10	5	30	30%
CO4		5	5			5	15	15%
CO5								
Total	15	25	10	10	25	15	100	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**4**				
Course Title	:	**Sensors and Instrumentation**				
Course Code	:	**23CESC45**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**ESC**				
Stream	:	**ECE**		**CIE**	:	**50 Marks**
Teaching hours/ week (L: T:P:S)	:	**3:0:0:0**		**SEE**	:	**50 Marks**
Total Hours	:	**40 hours**		**SEE Duration**	:	**3 hours**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamentals and classifications of various sensors used in mechanical, electrical, optical, and chemical sensor
2	Learn to calibrate and maintain electrical measurement device and understanding their working principles and accuracy considerations
3	Analyze sensor performance measures such as sensitivity, accuracy, noise characteristics, and errors, and effectively use bridge circuits for precise measurements
4	create the ability to work with various transducers, understanding their principles and applications in modern technology, including MEMS, nano sensors, and LASER sensors
5	Evaluate and apply smart and wearable sensors in modern applications

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
    - Include videos to demonstrate various concepts in Sensors and Instrumentation.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

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Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Sensor and its Types:** Fundamentals of Data Acquisition System, Classification of Sensors, **Mechanical Sensors**: Strain gauges, pressure sensors, **Electrical Sensors**: Thermocouples, photovoltaic Cells. **Optical Sensors**: Photodiodes, CCDs. **Chemical Sensors**: Gas sensors, pH meters. Textbook 1: Chapter 25	8
Pedagogy	**Presentation**	
2	**Measuring Instruments: Potentiometers, Voltmeters, and Ammeters:** Working principles, Calibration and Measurement accuracy. Oscilloscopes: Working principles, Calibration, Types of oscilloscopes, Digital Storage Oscilloscope, Sampling Oscilloscope. Textbook 1: Chapter 8,17,18	8
Pedagogy	**Collaborative Learning**	
3	**Performance Measures of Sensors**: Sensitivity and range, Accuracy vs. precision, Noise characteristics: Sources of noise and noise reduction techniques, Errors & its Classification. **Bridge circuits**: DC bridges: Wheatstone, Kelvin double, and Maxwell bridges, AC bridges: Wien and Schering bridges Textbook 1: Chapter 3,8	8
Pedagogy	**Think, Share and Pair**	
4	**Transducers:** Strain Gauges, Thermistors, Thermocouples, Linear Variable Differential Transformer (LVDT), Capacitive Transducers, Piezo-Electric transducers, Optical Transducer, Hall Effect transducer **Applications:** MEMS , Nano Sensors & LASER sensors Textbook 1: Chapter 25	8
Pedagogy	**Flipped Classroom**	
5	**Smart and wearable sensors:** Smart and wearable sensors, Overview with modern applications and their significance, Recent advancements in smart and wearable sensors, **Case Studies:**Smart transport systems, Smart sensors for green Technology ,Health care and Medical Applications, Smart cities. Textbook 1: Chapter 27	8
Pedagogy	**Case Studies**	

	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Electrical and Electronic Measurements and Instrumentation – A. K. Sawhney, 17th Edition (Reprint 2004), Dhanpat Rai& Co. Pvt. Ltd., 2004
2	Patranabis, D., "Sensors and Transducers", Prentice Hall of India, 1999.
Reference Books	
1	**"Handbook of Modern Sensors: Physics, Designs, and Applications," 4th Edition** by Jacob Fraden
2	**Measurement, Instrumentation, and Sensors Handbook:** Spatial, Mechanical, Thermal and Radiation Measurement,**2nd Edition** by John G. Webster, Halit Eren
3	Carr, Joseph J., "Elements of Electronic Instrumentation and Measurement", Pearson, 3rd Edition 1995.
4	Advances in Modern Sensors, Physics, design, simulation and applications, Preview, Editor G R Sinha Published November 2020 (Module 5)
5	Doeblin, E.A., "Measurement Systems – Applications and Design", Tata McGraw Hill, New York, 1990.
6	Kalsi, H.S., "Electronic Instrumentation", Tata McGraw Hill, 2004.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the fundamentals and classifications of various sensors used in mechanical, electrical, optical, and chemical domains	**L1**	Understand
CO2	Apply knowledge and skills in operating, calibrating, and measuring with instruments like potentiometers, voltmeters, ammeters, and oscilloscopes, understanding their working principles and accuracy considerations	**L2**	Apply
CO3	Analyze and evaluate sensor performance measures such as sensitivity, accuracy, noise characteristics, and errors, and effectively use bridge circuits for precise measurements.	**L3**	Analyze
CO4	Create various applications using transducers with help of its principles and applications using modern technology, including MEMS, nano sensors, and LASER sensors	**L4**	Create
CO5	Critically evaluate wearable sensor technologies in contemporary applications, recognizing their significance in areas like smart transport systems and green IoT, supported by case studies and real-world examples	**L5**	Evaluate

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	3	2	-	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-

Weblinks and Video Lectures (e-Resources)	
1	https://www.allaboutcircuits.com/
2	https://ieeexplore.ieee.org/Xplore/home.jsp
3	https://archive.nptel.ac.in/courses/108/105/108105153/
4	https://www.youtube.com/watch?v=LIhmzVL5bm8
5	https://www.youtube.com/watch?v=-0LzMfhoSts

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Theory			
	Continuous Assessment Tests (IAT)		Continuous Comprehensive Assessment (CCA)	
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10		
Understand	15	15		
Apply	20	20		
Analyse	05	05		
Evaluate			30	30
Create			20	20

CIE Course Assessment Plan

CO's	Marks Distribution						Total Marks	Weightage
	Test-1			Test-2				
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	05	05		05	05	05	25	25
CO2	05	10		05	10		30	30
CO3		10	10		10	05	35	35
CO4		05		05			10	10
CO5								
Total	10	30	10	15	25	10	100	100

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	25
Understand	30
Apply	35
Analyse	10
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution						Total Marks	Weightage
	Module-1	Module-2	Module 2 to 2.5	Module-2.5 to 3	Module-4	Module-5		
CO1	05	05		05	05	05	25	25
CO2	05	10		05	10		30	30
CO3		10	10		10	05	35	35
CO4		05		05			10	10
CO5								
Total	10	30	10	15	25	10	100	100

PROJECT BASED LEARNING (PBL)

PBL- Project Based Learning

Teaching Hours/Week (L: T:P: S)	0:0:2:2
Total Hours of Pedagogy	25 hours – Theory + Project
Credits:	02
Modules	5
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Project Evaluation

	CIE		**SEE**	
	Project Weekly Assessment			
Project	**Project Understanding**	05 Marks	**Write up**	10 Marks
	Technical Competence	10 Marks	**Presentation & Demonstration**	50 Marks
	Innovation	10 Marks	**Project report**	25 Marks
	Problem Solving	15 Marks	**Viva-Voce**	15 Marks
	Project Demonstration	10 Marks	**Total**	**100 Marks**
Total		**50 Marks**	**100 Marks Reduced to 50 Marks**	

1. Introduction

Project Based Learning is a model for classroom activity that shifts away from the classroom practices of short, isolated, teacher-centered lessons and instead emphasizes learning activities that are long-term, interdisciplinary, and student-centered.

A systematic teaching method that engages students in learning essential knowledge and life-enhancing skills through an extended, student-influenced inquiry process structured around complex, authentic questions and carefully designed products and tasks.

Project learning, also known as project-based learning, is a dynamic approach to teaching, in which students explore real-world problems and challenges, simultaneously developing cross-curriculum skills while working in small collaborative groups.

2. Characteristics of Project-Based Learning:

- Students making decisions within a framework
- A problem or challenge to be solved;
- Students designing the process for reaching a solution
- Students gathering and managing information
- Continuous Evaluation
- Students regularly reflecting on the process
- A final product to be evaluated for quality
- An atmosphere that tolerates error and change

3. Purpose

- Introducing project-based learning on the curriculum.
- To help students to gain in-depth knowledge of the subject via project.
- During this process, students will be able to learn and understand the various stages of project development.

4. Objectives

- Introducing mini project based on the curriculum.
- Develop in depth knowledge of the topic and technology.
- Use critical thinking skills and make real world connections
- Demonstrate and understand through products.
- Industry and concept-oriented learning.

5. Why Incorporate PBL?

- Promotes collaboration and interaction
- Learners communicate meaningfully and for authentic purposes
- Allows students with a variety of learning styles to demonstrate their acquired knowledge
- Students learn language, content, and skills simultaneously
- Increases learner autonomy
- Provides opportunities for students to pursue their own interests and questions and make decisions about how they will find answers and solve problems.
- Improves education for all students Facilitates student integration of the content of different subjects
- Teaches children to use their own minds well and applies what they learn in school to life-long endeavors.
- Helps students to become technologically literate
- Establishes connections to life outside the classroom, addressing real-world concerns, and developing real-world skills
- Skills learned through PBL are those desired by today's employers.

6. Benefits of PBL

- Offers multiple ways for students to participate and to demonstrate their knowledge.
- Accommodates different kinds of intelligences.
- Shifts students away from doing only what they typically do in a classroom Environment.
- Encourages the mastery of technological tools, thus preparing them for the workforce.
- Serves as a medium for students who don't usually participate.
- Prompts students to collaborate while at the same time support self-directed learning.
- Offers a learning experience that draws on the thinking and shared efforts of several individuals.
- Helps students develop a variety of social skills relating to group work and negotiation.
- Promotes the internalization of concepts, values, and modes of thought, especially those related to cooperation and conflict resolution.
- Establishes a supportive and non-competitive climate for students.
- Provides a means for transferring the responsibility for learning from teachers to students.
- Calls upon students to explain or defend their position to others in their project groups, so that learning is more apt to be personalized and valued.

7. Process

- Project batches will be formed after the commencement of 3rd semester.
- The Students Batch Comprising of 4 members in a batch should be formed by the Project Based Learning co-ordinator.
- Each Semester consists of 16 Weeks of Project based Learning.
- The Level of the Projects to be identified.

  Level 1- 2nd Year – 3rd Semester & 4th Semester

  Level 2- 3rd year – 5th Semester & 6th Semester

  Level 3 – Final Year Project
- The Faculty handling the respective Theory Subject will be the PBL Coordinator and all the three Batches to be handled by the PBL Coordinator with additional faculty.
- The List of Project Batches to be identified by the faculty assigned in consultation with HOD.
- The batch can select any topic from the list circulated by the PBL Coordinator
- The details of students Interaction with the guide shall be maintained by the guide in the prescribed format.

- The Students Project should be continuously evaluated and PBL Coordinator should submit weekly report to the HOD.
- The Rubrics for the PBL should be followed.
- The Students batches shall give the presentation on understanding of the topic and plan for implementation.
- The Evaluation of the Projects is done in Two Phases

7.1 Two phases for Assessment

Phase 1:

1. Phase 1 is for 4 weeks

2**.** During this phase, the students shall discuss about the Objectives, Literature Survey and plan for project execution.

Phase 2:

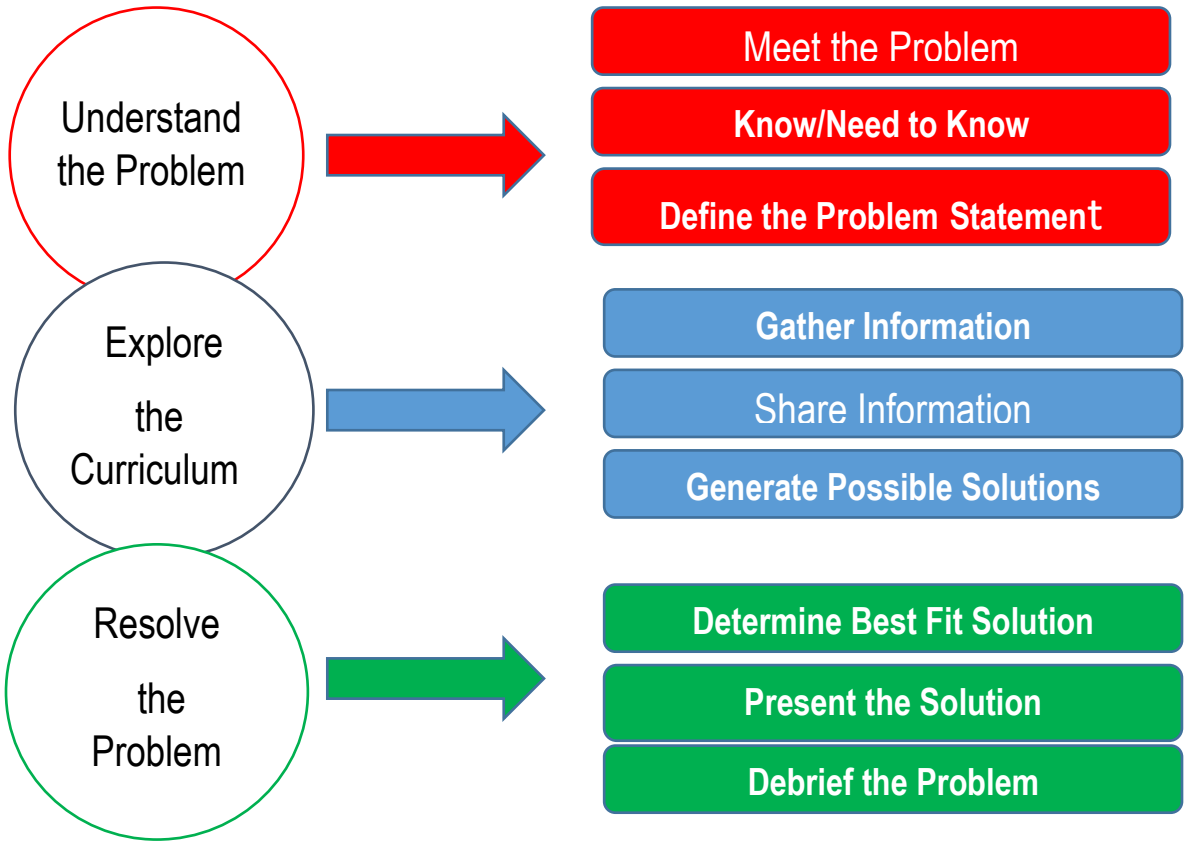
1. Phase 2 is for 11 Weeks

2**.** During this phase, the students shall carry out the project under regular supervision of the guide/subject expert, Implementation and give final presentation/demonstration with project documents.

The marks distribution for PBL Work:

4. Phase 1 – 25 Marks
5. Phase 2 – 25 Marks

8. PBL Teaching and Learning Template



9. Practice

- Every week 3 hour is exclusively dedicated to Project Based Learning.
- Assess their progress until they resolve the problem and summarise their learning.
- Provide opportunities for in-depth investigations of worthy topics.
- Allow learners to become more autonomous as they construct personally-meaningful artefacts that are representations of their learning.
- Motivate students by engaging them in their own learning. PBL affords students opportunities for development.
- Building communication, technical and management skills.

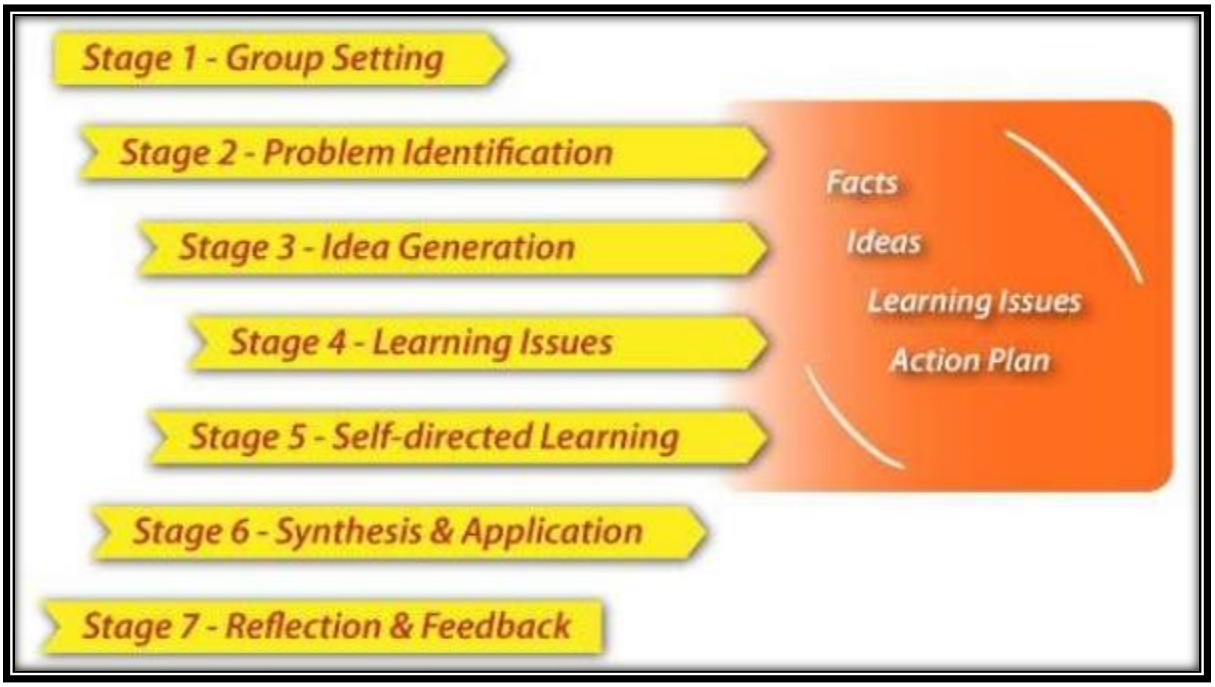
10. Obstacles/Gaps

- Lack of student's interest
- Lack of assessment
- Lack of Basic knowledge
- Lack of consistence attendance and monitoring.
- Lack of abundant time allotment and time management

11. How to Overcome?

- Periodic process – stage wise assessment has to be done.
- Basic Knowledge- A complete guidelines and videos will be provided by the faculty who is handling the respective subject and allotted guide.
- Regular evaluation and periodic monitoring is done by 2 stages.
- For Successful execution and demonstration of end-to-end system, exclusive 3hr/week project time is allotted.

12. Block diagram of PBL



13. Impact Analysis

- It encourages students to draw on their own creativity on problem solving and they learn the bridge gap between theory and practice.
- Final products resulting from project-based learning can be shared with the department at large, thus fostering ownership and technically strong with the subject scenario.

14. PBL – Guidelines

The guidelines are for successful completion of the project and to facilitate effective and uniform conduction of projects by the students. It is expected that these guidelines will help in overall improvement in the quality of the project.

14.1 Main phases of the project

Sl.No	Topics	Duration
Phase-1		
1.	Understanding of the project and preparing a project plan	**3 Weeks**
2.	Literature review	**1 Week**
6.	Planning	**1 Week**
Phase-2		
4.	Analysis and Design	**3 Weeks**
5.	Implementation	**6 Weeks**
6.	Testing	**1 Week**
7.	Writing the project report	**1 Week**
	Total	**16 Weeks**

14.2 Final Presentation Structure

1. Title of the project & Batch Information
2. Agenda / Topics
3. Problem Statement / Project Definition
4. Background / Literature Review
5. Methodology
6. Analysis and Design
7. Implementation
8. Testing
9. Conclusion and Scope for Future Works

14.3 Project Based Learning Report Structure

1. Cover Page
2. Certificate
3. Declaration
4. Acknowledgement
5. Table of Contents
6. List of Tables
7. List of Figures
8. Introduction
9. Background / Literature Review
10. Methodology / Solution
11. Analysis and Design
12. Implementation
13. Results
14. Conclusion and Future Works
15. Bibliography / References
16. Appendices

15. Guidelines to prepare the Project report

- Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on a A4 size bond paper (210 x 297 mm).
- The margins should be: Left – 1.25", Right – 1", Top and Bottom – 0.75".
- The total number of reports to be prepared are
    - One copy to the department.
    - One copy to the concerned guide
    - One copy to the candidate.
- Before taking the final printout, the approval of the concerned guide is mandatory and suggested corrections, if any, must be incorporated in the Final Report.
- For making copies dry tone Xerox is suggested.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

16. Outcome of the project

- Students will gain the knowledge and understand
- To think creatively, work collaboratively.
- Solve complex problems using digital technology.
- Students learn and desire to engage continuous gain about knowledge such as design, analysis, development, implementation and testing.
- Strong written communication skills and the ability to write technical documents that include specification, design, and implementation of a mini project.

Project - Based Learning Rubric

Score Levels	Content	Conventions	Organization	Presentation
5	▪ Is well thought out and supports the solution to the challenge or question ▪ Reflects application of critical thinking ▪ Has clear goal that is related to the topic ▪ Is pulled from a variety of sources ▪ Is accurate	▪ No spelling, grammatical, or punctuation errors ▪ High-level use of vocabulary and word choice	▪ Information is clearly focused in an organized and thoughtful manner. ▪ Information is constructed in a logical pattern to support the solution.	▪ Multimedia is used to clarify and illustrate the main points. ▪ Format enhances the content. ▪ Presentation captures audience attention. ▪ Presentation is organized and well laid out.
4	▪ Is well thought out and supports the solution ▪ Has application of critical thinking that is apparent ▪ Has clear goal that is related to the topic ▪ Is pulled from several sources ▪ Is accurate	▪ Few (1 to 3) spelling, grammatical, or punctuation errors ▪ Good use of vocabulary and word choice	▪ Information supports the solution to the challenge or question.	▪ Multimedia is used to illustrate the main points. ▪ Format is appropriate for the content. ▪ Presentation captures audience attention. ▪ Presentation is well organized.
3	▪ Supports the solution ▪ Has application of critical thinking that is apparent ▪ Has no clear goal ▪ Is pulled from a limited number of sources	▪ Minimal (3 to 5) spelling, grammatical, or punctuation errors ▪ Low-level use of vocabulary and word choice	▪ Project has a focus but might stray from it at times. ▪ Information appears to have a pattern, but the pattern is not consistently	▪ Multimedia loosely illustrates the main points. ▪ Format does not suit the content. ▪ Presentation does not capture audience attention.

2	▪ Provides inconsistent information for solution ▪ Has no apparent application of critical thinking ▪ Has no clear goal ▪ Is pulled from few sources ▪ Has significant factual errors, misconceptions, or misinterpretations	▪ More than 5 spelling, grammatical, or punctuation errors ▪ Poor use of vocabulary and word choice	▪ Content is unfocused and haphazard. ▪ Information does not support the solution to the challenge or question. ▪ Information has no apparent pattern.	▪ Presentation appears sloppy and/or unfinished. ▪ Multimedia is overused or underused. ▪ Format does not enhance content. ▪ Presentation has no clear organization.

Subject Identified for Project Based Learning

Semester	4th
Subject Identified for PBL	Signal and Image Processing Applications using MATLAB and Simulink
Prerequisite	Basics of engineering mathematics and computer literacy required
Justification for the selected subject	To learn varies tool boxes available in the MATLAB Tool which helps to get into the core industry & research field.
List of possible projects	Medical Image Processing, Robotics, Automation etc…

Signature of the Guide **Signature of HOD**

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

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

Semester	**:**	**4**				
Course Title	**:**	**Signal and Image Processing Applications using MATLAB and Simulink**				
Course Code	**:**	**23CECE46**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Practical**				
Category	**:**	**PBL**				
Stream	**:**	**ECE**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**0:0:2:2**		**SEE**	**:**	**50**
Total Hours	**:**	**30**		**SEE Duration**	**:**	**2Hrs**
Credits	**:**	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn the MATLAB Basics. – Commands, Arrays, Matrices, Built-in functions etc..
2	Study MATLAB tool boxes in analyzing different image datasets.
3	Implement Simulink for different signal processing applications.
4	Improve industry skill gap and employability skills.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	Working with the MATLAB User Interface, Analysis and Visualization with Vectors, Matrices and Tables, Conditional Data Selection, Organizing and Analyzing Data Increasing Automation with Programming Constructs and Functions	7
Pedagogy	**collaborative Learning**	
2	Basic Signal Processing Concepts, Signal Generation, Acquisition and Visualization, Time Domain and Frequency Domain signal analysis, Design Filters Using Simulink, Common Signal Processing Applications using MATLAB and Simulink.	7
Pedagogy	Think Pair and Share (Blended Learning)	
3	Image Processing Overview, Image Enhancement, Image Thresholding, Edge Detection and Image Morphology, Common Image Processing Applications	7
Pedagogy	Problem Solving	
4	Introduction to Artificial Intelligence, Data Processing and Handling, Machine Learning Workflows, Deep Learning Workflows, Artificial Intelligence Applications using Signal and Image Data	7
Pedagogy	Poster Presentation	
	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

Project Based Learning - Batch

From, **Date:**

Name: & USN:

Name: & USN:

Name: & USN:

Name: & USN:

Semester:

Respected Sir/Madam,

Sub: Regarding PBL Batch

With respect to the above subject, we are the students mentioned above would like to form the batch for carrying out the mini project on……

Thanking you, Yours faithfully

Sl. No.	Name of the student	Signature
1.		
2.		
3.		
4.		

Signature of the Guide

Name of the Guide Designation

Department of ……. Engineering

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

Project Based Learning – Student(s) – Guide – Interaction

Date		
PBL Batch No.		
Title of the project		
Week No.		
Content of the Discussion		
Suggestion by the guide		
Name of Signature of students		

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

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Project Based Learning – Continuous Evaluation

Batch No.	Name	USN	Marks assigned	Remarks by the guide on the progress of the project

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

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Accredited by NAAC with A+ Grade
6 Programs Accredited by NBA
(CSE, ISE, ECE, EEE, MECH, CV)

Project Based Learning – Review

CONTINIOUS INTERNAL ASSESSMNET							
Batch No.	Name of the Student	USN	Phase I (25 Marks)		Phase II (25 Marks)		Final CIE Marks (Phase I & Phase II) (50 Marks)
			Abstract / Understanding of the Project (5 Marks)	Analysis & Design (20 Marks)	Implementation (20 Marks)	Demonstration (5 Marks)	

Signature of the Guide **Signature of PBL Coordinator** **Signature of HOD**

Project Based Learning Outcomes

Sl.No	Batch No.	Name of Students	USN	Domain	Outcomes

ABILITY ENHANCEMENT COURSE (AEC)

AEC Course – Ability Enhancement Course

Teaching Hours/Week (L: T:P: S)	0:0:2:0
Total Hours of Pedagogy	24 hours Practical
Credits:	01
Programs / Experiments	12
CIE Marks	50
SEE Marks	50
Total Marks	100
Exam Hours	3
Examination nature (SEE)	Practical (Internal Examiners only)

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

Semester	**:**	**4th Semester**				
Course Title	**:**	**IoT (Internet of Things) Lab Using Raspberry Pi**				
Course Code	**:**	**23CECE48**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Practical**				
Category	**:**	**Ability Enhancement Course**				
Stream	**:**	**ECE**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**(0:0:2:0)**		**SEE**	**:**	**50**
Total Hours	**:**	**24**		**SEE Duration**	**:**	**3 hours**
Credits	**:**	**01**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To impart basic understanding knowledge of IOT using Arduino and Raspberry Boards.
2	To equip students to demonstrate the various sensors and actuators interfacing with Arduino & Raspberry Boards for different IOT Applications.
3	To impart students to Discover the concepts behind the interfacing and how exactly it is working.
4	To provide practical exposure to see the desired output while interfacing various sensors and actuators in IOT applications.
5	To develop the solution for the given problem and prepare the report for the particular real-time IOT applications.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts in C.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

List of Programs:

Sl. No.	Experiments/Programs
1	To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to 'turn ON' LED for 1 sec after every 2 seconds.
2	To interface Push button/LDR with Arduino/Raspberry Pi and write a program to 'turn ON' LED when push button is pressed or at sensor detection.
3	To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
4	To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
5	To interface motor using relay with Arduino/Raspberry Pi and write a program to 'turn ON' motor when push button is pressed.
6	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
7	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
8	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thingspeak cloud.
9	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thingspeak cloud.
10	To install MySQL database on Raspberry Pi and perform basic SQL queries.
Open Ended Experiments	
1	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker.
2	Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.
3	Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
4	Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Vijay Madisetti, Arshdeep Bahga, Internet of Things. "A Hands on Approach", University Press
2	Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs
Reference Books	
1	Pethuru Raj and Anupama C Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press
2	Jeeva Jose, "Internet of Things", Khanna Publishing House, Delhi

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand the Basics of IOT while interfacing with Arduino and Raspberry Boards.	L2	Understand
CO2	Apply the Knowledge of Arduino/Raspberry Pi programming to interface with various sensors and actuators.	L3	Apply
CO3	Analyse the logic of the program and the circuit to get the desired output in IOT Applications.	L4	Analyze
CO4	Investigate the program output with different test cases for IOT based Applications.	L5	Evaluate
CO5	Design a real-time IOT based application using Arduino/Raspberry Pi Programming.	L6	Create

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	3				2								2		
CO3		3			2									2	
CO4			3		2										1
CO5				3	2										2

Weblinks and Video Lectures (e-Resources)	
1	The Ultimate Guide to IoT with Raspberry Pi and Python -2024 | Udemy
2	IoT and its Applications Using Raspberry Pi Course| TCS iON Industry Honour Course

Projects Planned

Sl. No	Projects Title
1	ECG Waveform Segmentation
2	ECG Signal Classification
3	Radar Pulse Compression
4	Modulation Signal Classification
5	Human Health Monitoring
6	Hand Gesture Classification
7	Human Activity Recognition
8	EEG De-noising with Deep Learning
9	Acoustic Noise Cancellation
10	Cochlear Implant Speech Processor
11	Smart Speaker System
12	Speech Command Recognition
13	Keyword Spotting in Noisy Signals
14	Speech Emotion Recognition
15	Acoustic Scene Recognition
16	Detect Music using Sound Classifier
17	Low Light Image Enhancement
18	MRI Tumor Classification
19	Image Super-Resolution using Deep Learning
20	Defect Identification on Wafer Maps
21	Image Texture Segmentation
22	Object Recognition and Tracking

Universal Human Values

Universal Human Values

Teaching Hours/Week (L: T: P: S)	0:0:0:2
Total Hours of Pedagogy	40 hour Practical Session +15 hour Planning
Credits:	01
Programs / Experiments	12
CIE Marks	100
SEE Marks	------
Total Marks	100
Exam Hours	3
Examination nature (SEE)	No SEE only CIE For CIE Assessment - Activities Report Evaluation by College NSS Officer / HOD / Sports Dept / Any Dept.

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**4th**				
Course Title	:	**Universal Human Values**				
Course Code	:	**23CESC49**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**EC**		**CIE**	:	**50 Marks**
Teaching hours/ week (L:T:P:S)	:	**(1:0:0:0)**		**SEE**	:	**50 Marks**
Total Hours	:	**15+15**		**SEE Duration**	:	**1 Hour**
Credits	:	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Identify the needs of holistic vision and understand basic content and process of value in education universally.
2	Interpret Social, Environmental and Ethical responsibility of life and methods to live in harmony at various level of existence
3	Self-evaluation to discriminate between right & wrong, relationship and materialistic Satisfaction
4	Facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on natural acceptance.

Teaching-Learning Process

Pedagogical Initiatives:

Some sample strategies to accelerate the attainment of various course outcomes are listed below:

- Adopt different teaching methods to attain the course outcomes.
- Include videos to demonstrate various concepts.
- Encourage collaborative (Group) Learning to encourage team building.
- Ask at least three **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- Adopt **Problem-Based Learning (PBL),** which fosters students' analytical skills, and develops thinking skills such as evaluating, generalizing, and analyzing information rather than simply recalling it.
- Show different ways to solve a problem and encourage the students to come up with creative and optimal solutions.
- Discuss various case studies to map with real-world scenarios and improve the understanding.
- Devise innovative pedagogy to improve **Teaching-Learning Process (TLP)**.

DSATM

Scheme of Teaching and Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Introduction to Value Education:** Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations	3
Pedagogy	**Role Play :** Family Dinner Conversation on Respect, Classroom Discussion on Honesty	
2	**Harmony in the Human Being:** Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health	3
Pedagogy	**Experiential Learning :** Personal Harmony Journaling, Mindfulness and Meditation Session	
3	**Harmony in the Family and Society:** Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order	3
Pedagogy	**Collaborative Learning:** Intergenerational Dialogue, Nature Walk and Reflection	
4	**Harmony in the Nature/Existence:** Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence	3
Pedagogy	**Case Studies :** Existence of creatures in nature	
5	**Implications of the Holistic Understanding – a Look at Professional Ethics:** Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession	3
Pedagogy	**Poster Presentation :** Nutrition and Lifestyle-A Holistic Perspective on Diet	

	Pedagogical Initiatives (Not limited to): • **Think Pair and Share (Blended Learning):** provides an opportunity for students to learn from one another • **Problem Solving**: encourages cognitive thinking and enables creative problem solving • **Poster Presentation:** allows students to represent the concepts visually in order to understand the topics easily. • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
2	The Teacher"s Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G
Reference Books	
1	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3	The Story of Stuff (Book).
4	Small is Beautiful - E. F Schumacher.
5	Slow is Beautiful - Cecile Andrews

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	**Understand** the concepts of UHV in understanding the harmony and ethical human conduct in their life.	**L2**	
CO2	**Analyse** and associate the holistic perception of harmony at all levels of existence.	**L2**	**PO1**
CO3	**Evaluate** the role of harmony in family, society and universal order by natural acceptance and self-evaluation and exploration.	**L4**	**PO8,9,10**
CO4	**Create** an appropriate technologies and management patterns to impart harmony in professional and personal life in all the levels of harmony.	**L5**	**PO5,8,9,10**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1															
CO2	2														
CO3								3	3	3					
CO4					1			2	2	3					1

Web links and Video Lectures (e-Resources)	
1	https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
2	https://fdp-si.aicte-india.org/8dayUHV_download.php
3	https://www.youtube.com/watch?v=OgdNx0X923I
4	https://www.youtube.com/watch?v=nGRcbRpvGoU
5	https://www.youtube.com/watch?v=sDxGXOgYEKM

Activities:

Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

PEDAGOGY:

The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersionwith NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?

COURSE TOPICS:

The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversional will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem.

Duration :

A total of 40 - 50 hrs engagement per semester is required for the 3rd semester of the B.E. /B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic ,and poetry) Faculty mentors has to design the evaluation system as per guidelines of scheme & syllabus.

Continuous Internal Evaluation (CIE):

- After completion of the course, the student shall prepare, with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period.
- The report should be signed by the mentor.
- The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50.
- Planning and scheduling the social connect Information/Data collected during the social connect Analysis of the information/data and report writing
- Considering all above points allotting the marks as mentioned below

Excellent	: 80 to 100
Good	: 60 to 79
Satisfactory	: 40 to 59
Unsatisfactory and fail: <39	

Pedagogy – Guidelines:

It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl.No	Topic	Group size	Location	Activity execution	Reporting	Evaluation Of the Topic
1.	Plantation and adoption of a tree:	May be individual or team	Farmers land/ parks / Villages / roadside/ community area / College campus etc.…	Site selection /proper consultation/Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
2.	Heritage walk and crafts corner:	May be individual or team	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc…..	Site selection /proper consultation/Contin uous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
3.	Organic farming and waste management:	May be individual or team	Farmers land / parks / Villages visits / roadside/ community area / College campus etc.…	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
4.	Water conservation: & conservation techniques	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Government Schemes officers / campus etc…..	Site selection / proper consultation/Contin uous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
5.	Food walk: Practices in societ	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/ Governme nt Schemes officers/ campus etc…	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty

1 Credit Course – Practical + Planning

Assessment Details (both CIE and SEE)

NO SEE – Semester End Exam – Completely Practical and activities based evaluation

Plan of Action (Execution of Activities)	
Sl.No	**Practice Session Description**
1.	Lecture session in field to start activities
2.	Students Presentation on Ideas
3.	Commencement of activity and its progress
4.	Execution of Activity
5.	Execution of Activity
6.	Execution of Activity
7.	Execution of Activity
8.	Case study-based Assessment, Individual performance
9.	Sector/ Team wise study and its consolidation
10.	Video based seminar for 10 minutes by each student At the end of semester with Report.

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

Assessment Details for CIE (both CIE and SEE)

Weightage	**CIE – 100%**	• Implementation strategies of the project (NSS work). • The last report should be signed by NSS Officer, the HOD and principal. • At last report should be evaluated by the NSS officer of the institute.
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study-based Assessment Individual performance with report	20 Marks	
Sector wise study & its consolidation 5*5 = 25	25 Marks	
Video based seminar for 10 minutes by each student At the end of semester with Report. Activities 1 to 5, 5*5 = 25	25 Marks	
Total marks for the course in each semester	100 Marks	
For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.		
Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.		

Course - Skills Mapping Table

4th Semester					
Sl.No	**Name of the Course**	**Course Code**	**Course Type**	**Course Category**	**Skills attained by the students**
1	Analog Electronic Circuits	23CECE41	Theory & Practical	**IPCC**	**Skill-1(Analog Circuits Design)**
2	HDL Programming	23CECE42	Theory & Practical	**IPCC**	**Skill-2(Verilog Programming)**
3	Raspberry Pi Programming	23CECE46	Project	**PBL**	**Skill-3(Raspberry Pi Programming)**
4	DAQ using Lab View	23CECE47	Practical	**AEC**	**Skill-4(Lab View Programming)**