DAYANANDA SAGAR ACADEMY OF TECHNOLOGY & MANAGEMENT

CURRICULUM

Scheme and Syllabus III to IV Semester

Outcome Based Education

(Academic Year 2024-2025)

Department of Electrical & Electronics 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 established during the 2011-2012 academic session with an initial intake of 60 students, the EEE Department aims to provide quality professional education to students nationwide, with a special focus on the Karnataka region. We offer a four-year (8-semesters) B.E. Programme under Visvesvaraya Technological University (VTU).

The department boasts excellent infrastructure, a highly talented teaching faculty, and a dedicated Training and Placement Cell, ensuring a bright future for our students. We are confident that our students will emerge as assets not only to this institution and the organizations they join but also to the country at large.

Credentials of the Department:

- Accredited by NBA-AICTE, New Delhi
- Approved by AICTE, New Delhi
- Permanently affiliated with Visvesvaraya Technological University (VTU)

The EEE department at DSATM encompasses a wide range of traditional and disruptive technologies in core and IT fields, including Smart Grid, Advanced Meter Infrastructure (AMI), EV-Battery Management Systems, Microgrids, Distributed Energy Resources (DERs), Better Battery Technologies, Cybersecurity in the Power Industry, Blockchain Technology in the Energy Market, IoT/IIoT, and Automation. The flexibility and heterogeneity of the EEE program at DSATM equip students with special personal skills, making them successful engineers and entrepreneurs.

VISION OF THE DEPARTMENT

To impart quality education and to develop a supportive and collaborative learning environment to meet the challenges by innovation and integration, consequently reflecting effective progress of our students in making a real difference in their profession and society.

MISSION OF THE DEPARTMENT

- M1: To provide a student-centric learning environment that facilitates the students to pursue their higher education.
- M2: To motivate the students to work professionally in several fields through pedagogy teaching and learning process.
- M3: To help students in developing their overall professional competence and social awareness by providing value-based and behavioral training programs.
- M4: To impart a supportive ecosystem to cultivate the innovation, research, and entrepreneurial culture in the faculty and students.

PROGRAM EDUCATION OBJECTIVES (PEO'S):

- PEO-1: Graduates will excel in their profession and career by applying the concepts of Electrical and Electronics Engineering.
- PEO 2: Graduates will have the potential to work in diverse sub domains of professional field.
- PEO 3: Graduates will have the desire for higher education and lifelong learning.
- PEO 4: Graduates will have fidelity regarding ethical and social responsibilities.

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)

PSO-1: Able to formulate, investigate the various problems in Power Systems, Power Electronics, Control Systems, Electrical Machines and Drives for different application.

PSO-2: Able to inculcate the knowledge of sustainable technologies with modern tools.

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

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

PROPOSED UG CREDIT STRUCTURE IN ALIGNMENT WITH VTU

Sl.No	Semester	No. of Credits
1	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	IPCC-1	EEE	EEE	2	2	2	0	6	4
2	IPCC-2	EEE	EEE	2	2	2	0	6	4
3	PCC-1	EEE	EEE	3	0	0	0	3	3
4	PCC-2	EEE	EEE	2	2	0	0	4	3
5	ETC	EEE	EEE	3	0	0	0	3	3
6	PCCL	EEE	EEE	0	0	2	0	2	2
7	AEC	EEE	EEE	0	0	0	2	2	1
8	SCR	EEE	EEE	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

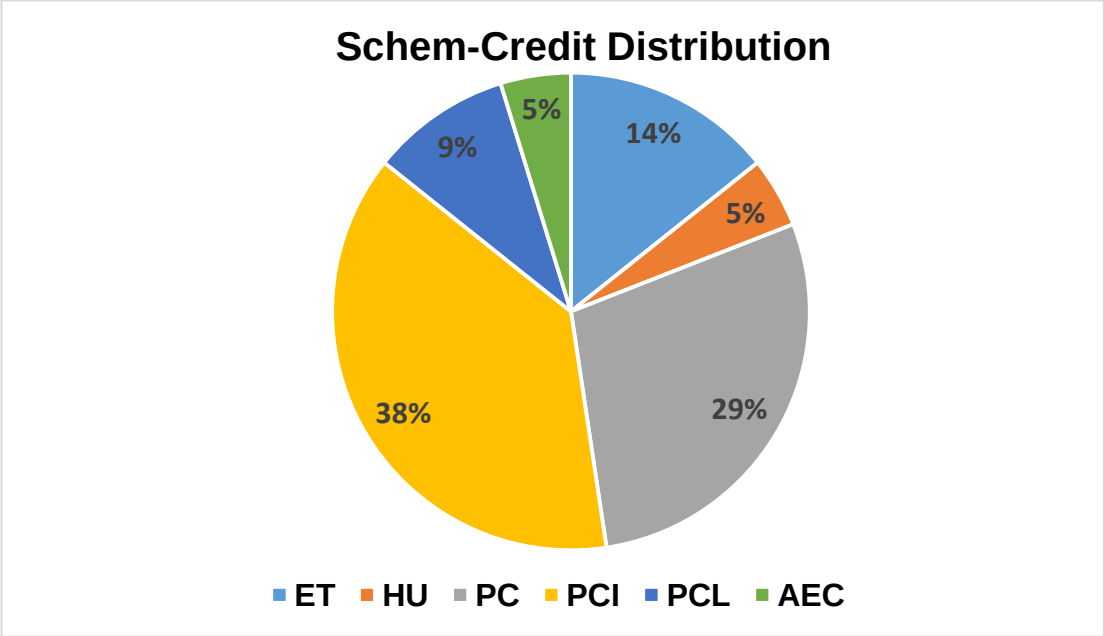
3rd Sem & 4th Sem

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

Scheme Distribution (3RD & 4TH SEM)

Department of Electrical & Electronics Engineering

Course Component	Credits	% of Credits
Basic Science (BS)	0	
Engineering Technology (ET)	3+3=6	14.3
Humanities (HU)	1+1=2	4.76
Program core (PC)	6+6=12	28.57
Program core Integrated (PCI)	8+8=16	38.09
Program core exclusive Lab(PCL)	2+2=4	9.52
Program elective (PE)	0	0
Open Elective (OE)	0	0
Internship (INT)	0	0
Ability Enhancement course (AEC)	1+1=2	4.76
Project (PR)	0	
Total	**42**	**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)	8	8							16
Engineering Sciences (ESC) / Emerging Technology Course(ETC)	9	9	3	3					24
Humanities, Social Sciences and Management (HSMC)	2	2	1		5				10
Ability Enhancement Course (AEC)	1	1	1	1		1			5
Universal Human Values (UHV)				1					1
Professional Core Courses (PCC)			6	6	6	7	4		29
Integrated Professional core Course (IPCC)			8	8	4	4	4		28
Professional Core Laboratory (PCL)			2	2	2	2			8
Professional Elective Course (PEC)					3	3	3		9
Institutional Open Elective Courses (IOE)						3	3		6
Internship (INT)								12	12
Mini Project / Project Work (PW)					2	2	6		10
Technical Seminar								2	2
Non-credit Mandatory Courses (NCMC)			(1)	(1)					
Total Credits	20	20	21	21	22	22	20	14	160

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

3rd SEMESTER: Electrical & Electronics Engineering (EEE)

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	BEE301	Electric Circuit Analysis	IPCC	EEE	EEE	2	2	2	0	6	4	3	50	50	100
2	BEE302	Analog & Digital Circuits	IPCC	EEE	EEE	2	2	2	0	6	4	3	50	50	100
3	BEE303	Power Generation, Transmission and Distribution	PCC	EEE	EEE	3	0	0	0	3	3	3	50	50	100
4	BEE304	Transformers and Generators	PCC	EEE	EEE	2	2	0	0	4	3	3	50	50	100
5	BEE305	Semiconductor Technology	ETC	EEE	EEE	3	0	0	0	3	3	3	50	50	100
6	BEEL306	Transformers and Generators Lab	PCL	EEE	EEE	1	0	2	0	3	2	3	50	50	100
7	BEE307	PCB Design & Linear Integrated Circuits	AEC	EEE	EEE	0	0	0	2	2	1	3	50	50	100
8	BSCK308	Social Connect Responsibility	SCR	EEE	EEE	0	0	2	0	2	1		100	--	100
9		National Service Scheme (NSS)	NCMC		NSS coordinator	0	0	2	0	2	0	--	100	--	100
		Physical Education (PE) (Sports and Athletics)			PED										
		Yoga			Yoga Teacher										
					Total	**13**	**6**	**10**	**2**	**31**	**21**		**550**	**350**	**900**
AICTE ACTIVITY POINTS															

4th SEMESTER: Electrical & Electronics Engineering (EEE)

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.	BEE401	Control Systems	IPCC	EEE	EEE	2	2	2	0	6	4	3	50	50	100
2.	BEE402	Microcontroller and Embedded systems	IPCC	EEE	EEE	2	2	2	0	6	4	3	50	50	100
3.	BEE403	Electric Motors & EV Motors	PCC	EEE	EEE	2	2	0	0	4	3	3	50	50	100
4.	BEE404	Sensors & Transducers	PCC	EEE	EEE	3	0	0	0	3	3	3	50	50	100
5.	BEE405	Communication Engineering	ETC	EEE	EEE	3	0	0	0	3	3	3	50	50	100
6.	BEEL406	Electric Motors Lab	PCL	EEE	EEE	1	0	2	0	3	2	3	50	50	100
7.	BEE407	Arduino & Raspberry Pi Circuit Models.	AEC	EEE	EEE	0	0	0	2	2	1	3	50	50	100
8.		Universal Human Values course	UHV	EEE	EEE	1	0	0	0	1	1	1	50	50-	100
9.		National Service Scheme (NSS)	NCMC		NSS coordinator	0	0	2	0	2	0	--	100	--	100
		Physical Education (PE) (Sports and Athletics)			PED										
		Yoga			Yoga Teacher										
					Total	**13**	**6**	**10**	**2**	**31**	**21**		**500**	**400**	**900**
AICTE ACTIVITY POINTS															

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	Nil	Nil
2.	List of New Existing Elective Courses	Nil	Nil
3.	List of New Industry Aligned Courses	(i) Semiconductor Technology (ii) Analog & Digital Circuits	(i) Communication Engineering (ii) Microcontroller & Embedded Systems (iii) Sensors &Transducers

Percentage of Change in the Syllabus

3rd Semester

Sl.No	Course Code	Course Name	Topics Added	Topics removed	Revised in %	Justification
	BEE301	Electric Circuit Analysis	• Concept of tree, Branch, Tree link, Incidence matrix • Tie-set matrix and loop currents • Cut set matrix and node pair potentials • Duality • Review of Laplace Transform • Analysis of electrical circuits using Laplace Transform for standard inputs • convolution integral	• Millman's Theorem • Analysis of Three phase unbalanced system • Calculation of real and reactive powers by direct mesh and nodal analysis	38%	**For topics removed:** Millman's theorem hardly finds application in real time applications. Analysis of three phase unbalanced system can be covered in power system analysis. **For topics added:** Any complex circuit analysis can be

			• inverse Laplace transform • transformed network with initial conditions • Dot convention, mutual Inductance. • H-parameters, initial value and final value theorem			made simple through graph theory and relevant network equations. Laplace transform is essential in analysis of frequency domain circuits. Hence detailed analysis is done using the transformation.
	BEE302	Analog & Digital Circuits	Basic features of DTL and ECL, Design of ROM, PLA, PAL. Basic Architecture of CPLD,FPGA. Logic families: Diode-Transistor Logic, Transistor-Transistor Logic, Emitter-Coupled Logic, NMOS and PMOS Logic, CMOS Logic.	Transistor frequency response: Multistage amplifiers, Quine-McCluskey minimization technique,	**30%**	Including the study of implementation technology, specifically transistor switches, in an analog and digital Circuits course is essential due to their fundamental role in modern electronics. This foundational knowledge is indispensable for anyone pursuing a career in electronics or related fields.
	BEE303	Power Generation, Transmission and Distribution	• Generation (Conventional and Non-Conventional) and Economics • Transmission and its Parameters • Substation and grounding • Power Distribution	• Hydro power plant, details • Thermal Power Generation • Nuclear	**30%**	• Power Generation, and Economics combined with Transmission and Distribution
	BEE304	Transformers and Generators	• PMG and DFG • Special Transformers	• Performance of synchronous Generators • Wind power and solar power generators	30%	• PMG and DFAG for Renewable Energy Generation is latest technology • Special Transformers are used in Industry and power sectors • 1st year syllabus Information is covered- Wind power and solar power generators • Performance of synchronous Generators- will is covered in PSA subject in detail.

	BEE305	Semiconductor Technology (New subject)	MODULE-1 Introduction to semiconductor processing technology MODULE-2 Crystal Growth, Silicon Oxidation and Photolithography MODULE-3 Etching, diffusion, ion implementation and film deposition methods and techniques or semiconductors MODULE-4 Process Integration MODULE-5 IC Manufacturing,	New course	**100%**	A semiconductor technology course is being introduced newly since the silicon chip industry is becoming the future of new industrial automation and IoT technologies. This cocourse is not offered by VTU
	BEEL306	Transformers and Generators Lab	• Parallel operation of single phase transformers • Delta-delta & open delta connection of 3 single ph transformer bank • Polarity test and and star- delta connections of transformer bank • Separation of hysteresis and eddy current losses in single phase transformer • Performance of synchronous generator connected infinite bus bar • Power angle curve of synchronous generator • Voltage and current ratio of A Multi tapped Transformer	• Voltage regulation by MMF method • Model transformer in Simscape for automatic voltage regulation • Simulate power angle curve of generator in MAT Lab	**10**	• Availability of Time duration. • Well connected to the syllabus on Transformers and generators. • Study of Electrical Machines Characteristics
	BEE307	PCB Design & 555 Integrated Timer Circuits	• PCB Design and Real time projects have been added	• Few no of experiments are restricted to 6	**20**	• Ability enhancement course is treated as project based learning(Project Based Learning)

4th Semester						
Sl.No	**Course Code**	**Course Name**	**Topics Added**	**Topics removed**	**Revised in %**	**Justification**
	BEE403	Electric Motors & EV Motors	• Electronics speed control method of DC motors. • Regenerative test of DC machines • Stepper Motor.	• Constructional feature of DC machine, Working principle of DC motor,	10%	• Students are studied the Constructional feature of DC machine, Working principle of DC motor in previous semester.
	BEE404	Sensors & Transducers	Special Sensors, Acoustic Sensors ,Sensor Applications	Mechanical Amplifiers Fluid Amplifiers, Optical Amplifiers, Strain Gauge, Load Cells	20%	The Applications of Sensors in various industries is added, The use of Special Sensors in various modern fields is also included. Understanding the standards ultimately leads to more effective and efficient sensor applications across various industries and technologies.
	BEE401	Control Systems	State variable analysis: introduction to state variable analysis, Concepts of state, state variables and state models for electrical systems. Solution of state equations. Introduction to PI, PD and PID Controllers (excluding design).	Nyquist plot: Principle of argument, Nyquist stability criterion, assessment of relative stability using Nyquist criterion	15%	state variable analysis enhances the flexibility and effectiveness of control system design, making it an indispensable tool for engineers. Means while it is better to have a basic idea on state variable as it will come in higher studies.
	BEE402	Microcontroller and Embedded systems (New subject)	ARM Micro Controller, Introduction to Embedded System, Operating System basics, RTOS	8051 Micro Controller	100%	ARM Controller provides latest development tools, extensive libraries, and active community support which can be used in modern applications and industries. The skills and

						knowledge gained from working with ARM microcontrollers are more applicable and relevant to both current and future projects. Also, a brief introduction to Embedded System and RTOS is v. essential for understanding of how to design, develop, and optimize systems that interact with hardware and meet real-time requirements
	BEE405	Communication Engineering (New subject)	• Digital communication system • Communication channels • Broad band Satellite and Micro wave communication • Digital Modulation Techniques • Wireless Telecommunication systems and Networks • GSM and TDMA Technology • CDMA Technology • Meaning, Evolution and Networking components of IoT • IoT Connectivity Technologies • IoT Interoperability • communication networks for smart grid. • Smart grid communication infrastructure.		**100%**	To impart Knowledge and know how of communication systems, IoT and use of communication in Electric vehicles and smart grids
	BEEL406	Electric Motors Lab	• Load test on dc shunt motor to draw speed – torque and horse power – efficiency characteristics. • Field Test on dc series machines. • Swinburne's Test on dc motor. • Regenerative test on dc	• Retardation test on dc shunt motor	**10%**	• Well connected to the syllabus on Electric Motors and EV Motors Syllabus.

			shunt machines. • Conduct an experiment to draw V and Λ curves of synchronous motor at no load and load conditions.			
	BEE407	Arduino & Raspberry Pi Circuit Models.(AEC)	• Smart Home Automation • Weather Station • Robotics using IoT • Security Systems • Health Monitoring:	**Experiment wise contents are removed.**	**20%**	Earlier it was a Laboratory course there was no scope for innovation and solutions to solve open ended problems.

3rd SEMESTER

INTEGRATED PROFESSIONAL CORE COURSE (IPCC)

IPCC Course – Integrated Professional Core Course

Teaching Hours/Week (L: T:P: S)	2:2:2:0
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	:	**3**				
Course Title	:	**Electric Circuit Analysis**				
Course Code	:	**BEE301**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**2:2:2:0**		**SEE**	:	**50**
Total Hours	:	**40+20**		**SEE Duration**	:	**3 hours**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Apply basic knowledge of AC and DC circuits to obtain solution for complex circuits using various techniques network theorems, Laplace transforms of various standard signals, Initial and final value theorems, two port networks and loop current and nodal pair potentials for Tie set matrix.concept of tree, branch and link to obtain Cut set matrix and Incidence matrix.
2	Analyze resonant circuits, transients during switching action and duality of circuits
3	Synthesize typical waveforms using Laplace transformation and network through graph theory
4	Simulate the networks and design graphs for electrical circuit using MATLab software

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 of basic MATLab 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)**.

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 Concepts**: Active and passive elements, Concept of ideal and practical sources, star – delta transformation. Analysis of networks by (i) Network reduction method including star and delta transformation, (ii) Mesh and Node voltage methods for ac and DC circuits with independent and dependent sources. Concept of Super-Mesh and Super node analysis, Duality.	8
Pedagogy	**Chalk and Talk, Experiential Learning.**	
2	Network Theorems: Super Position theorem, Thevenin's theorem, Norton's theorem, Reciprocity Theorem and Maximum power transfer theorem.	8
Pedagogy	**Chalk and Talk, Experiential Learning.**	
3	**Transient Analysis**: Dot convention, mutual inductance, coupled circuits, behaviour of circuit elements under switching action, Evaluation of initial conditions. Transient analysis of RL, RC and RLC circuits under DC and AC excitations.	8
Pedagogy	**Chalk and Talk, Experiential Learning.**	
4	**Graph theory and Networks equations**: Concept of Tree, Branch, Tree link, Incidence matrix, Tie-set matrix and loop currents, Cut set matrix and node pair potentials. Duality, Solution of Problems. **Two Port networks:** Definition, Open circuit impedance, Short circuit admittance and Transmission parameters and their evaluation for simple circuits, , h- parameters, Interconnection of systems	8
Pedagogy	**Chalk and Talk, Experiential Learning.**	

5	**Electrical Circuit Analysis Using Laplace Transforms:** Review of Laplace Transform, Analysis of electrical circuits using Laplace Transform for standard inputs, convolution integral, Initial value theorem and final value theorem, inverse Laplace transform, transformed network with initial conditions.	**8**
Pedagogy	**Chalk and Talk, Experiential Learning.**	
	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 • **Demonstration:** exhibits the implementation process • **Experiential Learning:** conducts experiments substantiating the concept more effectively	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Study of the effect of Open and Short circuits in active circuits.	**CO1**
2	Verification of Thevenin's and Norton's theorem (Simulation and hardware)	**CO2**
3	Verification of Superposition theorem. (Simulation and hardware)	**CO2**
4	Verification of maximum Power transfer theorem(Simulation and hardware)	**CO2**
5	Verification of maximum Reciprocity theorem(Simulation and hardware)	**CO2**
6	Determination of resonant frequency, bandwidth, and Q of a series and parallel circuit	**CO3**
7	Measurement of time constant of an RC and RL circuit.	**CO1**
8	Measurement of power in three phase Circuits using two watt meter method	**CO1**
9	Transient analysis of RL,RC and RLC circuits for DC excitations	**CO3**
10	Transient analysis of RL,RC and RLC circuits for AC excitations	**CO3**
	Open ended Programs	
1	Determination of different parameters of Two-port network and verification of their interrelations	**CO4**
2	Verification of Millman's Theorem (Simulation and hardware)	**CO2**
3	Virtual Labs-Graph theory and unbalanced three phase system	**CO5**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Engineering Circuit Analysis, William H Hayt et al, Mc Graw Hill,8th Edition,2014

2	Network Analysis, M.E. Vanvalkenburg, Pearson, 3rd Edition,2014..
3	Electric Circuits, Mohammed Nahvi, Joseph A Edminister, Schaum's Series, 5th edition, 2017
Reference Books	
1	Fundamentals of Electric Circuits, Charles K Alexander Matthew N O Sadiku, Mc Graw Hill, 5th Edition, 2013
2	DC Electrical Circuit Analysis: A Practical Approach, James M. Fiore, Mohawk Valley Community College, Copyright Year: 2020, ISBN 13: 9781654515478
3	Essential Circuit Analysis using LTspice, 28 August 2023 by Farzin Asadi

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 concept of basic electrical circuits like KCL, KVL, mesh and nodal analysis and theorems applied to circuits.	L2	U
CO2	Apply basic knowledge of AC and DC circuits to obtain solution for complex circuits using various techniques network theorems, Laplace transforms of various standard signals, Initial and final value theorems, two port networks and loop current and nodal pair potentials for Tie set matrix.concept of tree, branch and link to obtain Cut set matrix and Incidence matrix.	L3	A
CO3	Analyze resonant circuits, transients during switching action and duality of circuits	L4	An
CO4	Synthesize typical waveforms using Laplace transformation and network through graph theory	L5	E
CO5	Simulate the networks and design graphs for electrical circuit using MATLab software	L6	C

Mapping of Course Outcomes to Program Outcomes:

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

CO5	-	-	-	3	3	-	-	-	-	-	-	-	-	3

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/108/105/108105159/
2	http://vlabs.iitkgp.ac.in/
3	https://www.nitrc.org/docman/view.php/668/2262/manual_v2.0.0.pdf
4	https://www.mathworks.com/help/matlab/graph-and-network-algorithms.html

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	25M
Remember	-	-	-	-	-
Understand	5	5	-	-	-
Apply	15	10	20	10	25
Analyze	15	10	20	10	-
Evaluate	15	10	10	20	-
Create	-	15	-	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%

CO2	5	5	5	5	5	5	30	30%
CO3	10	5	5	5	5	-	30	30%
CO4	5	5	5	-	5	5	25	25%
CO5	-	-	-	-	-	10	10	10%
CO6	-	-	-	-	-	-	-	
Total	20	15	15	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

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

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module- 3	Module-4	Module-5		
CO1				5		5	5%
CO2	10	10	-	5	-	25	25%
CO3	-	10	10	-	10	30	30%
CO4	10	-	10	-	10	30	30%
CO5	-	-	-	10	-	10	10%
CO6	-	-	-	-	-		
Total	20	20	20	20	20	100	100%

Semester	**:**	**3rd Sem**				
Course Title	**:**	**Analog and Digital Circuits**				
Course Code	**:**	**BEE302**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**EEE**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:2:2:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40 + 20**		**SEE Duration**	**:**	**3 hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To provide an insight into the modeling of bipolar junction transistors, biasing technique
2	To illustrate the application and its design of BJTs as amplifiers and oscillators
3	Illustrate Boolean laws and minimization techniques for simplification of expressions like minterm, maxterm using K-Map and QMT
4	Introduce and differentiate between the Combinational and Sequential 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.
- 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)**.

Outcome Based Education and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2024-25)

COURSE CURRICULUM

Module No.	Topics	Hours
1	***Prerequisites:*** *Diode basics* **-** *Knowledge of how diodes work, including forward and reverse bias conditions, and their I-V characteristics, Transistor Basics - structure, operation, and characteristics of BJTs. Transistor Configurations: Emitter, base, and collector connections, and the meaning of NPN and PNP types.* **Diode Wave shaping circuits**: Clipper (series, shunt) and Clamper circuits(Positive, Negative), simple examples. **Transistor Biasing:** The operating point, load line analysis, DC analysis and design of fixed bias circuit, emitter bias circuit, voltage divider bias circuit, RC- Coupled BJT Amplifier, **Low frequency analysis:** re-model, h- parameter model, miller theorem.	8
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	
2	***Prerequisites:*** *Familiarity with how BJTs and FETs work as amplifiers, including their operating regions.* **Feedback Amplifiers:** General Feedback Structure, feedback amplifier topologies. **Power amplifiers:** Introduction – definitions and amplifier types, series fed class A amplifier, transformer coupled class A amplifier, class B amplifier, Amplifier Distortion, Relevant Problems. **Oscillators:** Oscillator operation, Phase shift Oscillator, Tuned Oscillator circuits, Crystal Oscillator. (BJT, MOSET Version Only). **Component Selection for Circuit Design:** Importance of components selection in circuit design, selection criteria for resistance, inductor, capacitor, diode, and BJT, overview on data sheets.	8
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	
3	***Prerequisites:*** *Basic Digital Logic Concepts - basic logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR) and their truth tables, basics of Boolean algebra, full adder and subtractor.* **Minimization Techniques Analysis and Design of combinational Circuits:** Introduction to combinational logic circuits, Canonical forms, Generation of switching equations from truth tables, , Karnaugh maps-3 and 4 variables, Ripple carry , carry alook adder **Analysis and Design of Combinational Logic:** Principle of Encoder and Decoder with cascading of decoders, Multiplexers and Demultiplexer	8
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	

4	***Prerequisites:*** *Basic Sequential Logic Concepts- Sequential vs. Combinational Logic, dge Triggering vs. Level Triggering* **Flip-Flops**: Basic bistable element, S R Latch , application of SR latch as a switch debouncer, Edge triggering – Level Triggering, Flip-flops - SR, JK, D, T, Registers, Shift Register, Universal shift register. **Counters:** Binary Ripple Up/Down Counter, Design of synchronous Mod- n counter using flip-flop. **Sequential Circuit Design:** Mealy and Moore model, State diagram.	**8**
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	
5	***Prerequisites:*** *Understanding of RAM and ROM* **Implementation Technology:** Transistor Switches, Basic features of DTL and ECL, Design of ROM, PLA, PAL. Basic Architecture of CPLD,FPGA. **Logic families:** Diode-Transistor Logic, Transistor-Transistor Logic, Emitter-Coupled Logic, NMOS and PMOS Logic, CMOS Logic.	**8**
	Chalk and Talk, , Animated/NPTEL videos	
	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	Experiments on clippers and clampers.	**CO3**
2	Frequency response of single stage BJT RC coupled amplifier and determination of half power points, bandwidth, input and output impedances	**CO3**
3	Design and simulation (MATLAB) of BJT -RC phase shift oscillator and Wien bridge oscillator for given frequency of oscillation	**C04**
4	Design and test a counter with JK Flip Flop that goes through following repeated sequence	**C04**
5	Simplification and realization of Boolean expressions using logic gates/Universal gates.	**CO3**
6	To design and implement: a)mod-N synchronous UP counter and down counter using 7476 JK Flip-Flop b)mod-N counter using IC 7490/7476 c)synchronous counter using IC 74192	**C04**
7	To realize the following flip-flops using NAND gates S-R flip-flop, D&T flip-flop	**CO3**

8	Realize the following shift registers using IC7495 a)Ring counter b)Johnson Counter	**CO3**
9	simulation (MATLAB) and harware of half/full adder and half/full subtractors	**CO3**
10	Opamp applications : Adder, subtractor, Integrator, Differentiator etc	**C04**
Open ended Programs		
1	Realize half adder and Full adder usimg ROM,	**C04**
2	Design and simulate Hartley oscillator and verify it to the theoretical value.	**C04**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Electronic Devices and Circuit Theory, Robert L. Boylestad and Louis Nashelsky, PHI/Pearson Education, 9th Edition.
2	Digital Principles and Design, Donald D Givone, Tata McGraw Hill Edition, 2002.
3.	Analog Electronic Circuits: A Simplified Approch by U.B Mahadevaswamy
4.	Digital Logic and computer design, M Morris Mono, Prentice Hall
Reference Books	
1	Integrated Electronics, Jacob Millman & Christos C. Halkias, Tata - McGraw Hill, 2nd Edition.
2	Analog Electronics Circuits: A Simplified Approach, U.B. Mahadevaswamy, Pearson Saguine, 2007.
3	Fundamentals of logic design, Charles H Roth, Jr; Thomson Learning, 2004.
4	Logic and computer design Fundamentals, Mono and Kim, Pearson, Second edition, 2001

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 concept of amplifiers, oscillators and logic circuits	**L2**	**U**
CO2	Apply the fundamental and electrical engineering concepts to solve the different AEC, Logic circuit problems	**L3**	**A**
CO3	Analyze circuits such as amplifiers, oscillators using BJT and Sequential circuits	**L4**	**An**
CO4	Design Analog circuits and Digital logic circuits	**L6**	**E**

CO5	Carry out experiments on analog amplifiers, oscillators, realization of digital	**L3**	**A**
CO6	Evaluate analog and digital circuits with the help of modern tools	**L5**	**E**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	**3**												**2**	
CO3		**3**												
CO4			**3**											
CO5									**2**	**2**			**2**	
CO6					**3**									**3**

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc20_ee32/preview
2	https://www.ti.com/design-resources/design-tools-simulation/analog-circuits/overview.html
3	https://www.analog.com/en/education/education-library/tutorials/analog-electronics.html

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	05	05	**5**	**5**	5
Understand	15	15	**5**	**5**	5
Apply	20	20	**10**	**10**	10

Analyse	10	10	10	10	
Evaluate			10	10	5
Create			10	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	10	5	10	10	5	10	50	50%
CO2	10	5		10			25	25%
CO3		10			5		15	15%
CO4		5			10		15	15%
CO5								
Total	20	20	10	20	20	10	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	20
Understand	30
Apply	30
Analyse	20
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	7	5	3	5	5	5	30	30%
CO2	7	5	5	3	5	5	30	30%
CO3	5	7	5	3	5	5	30	30%
CO4	2	2	2	2	2	2	10	10%
CO5								
Total	21	19	15	13	17	17	100	100%

PROFESSIONAL CORE COURSE (PCC)

PCC Course - Professional Core Course

Teaching Hours/Week (L: T:P: S)	3:0:0:0 /2:2:0:0
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 **10 Marks**.

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

Total score for CCA is **10 Marks**

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

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 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	**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	:	**3**				
Course Title	:	**Power Generation, Transmission and Distribution**				
Course Code	:	**BEE303**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 hours**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Learn The Economics Connected With Power Generation
2	Understand The Types And Constructional Features of Cables And Insulation.
3	Analyse The Performance Of Transmission Lines.
4	Know About The Transmission And Distribution Substation Schemes
5	Familiarize With IE Rules For Transmission And Distribution 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 to understand transmission and distribution
- 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	**Generation and its economics:** Load curve and load duration curve – load, demand and diversity factors– plant capacity and plant use factors, choice of type of generation– choice of size &no. of units–cost of energy generated–tariffs, conventional source of electrical energy-basic layout of thermal power generation, hydroelectric power, generation and nuclear power plants, site selection, merits & demerits, energy, power, efficiency calculations of conventional power plant. Basic layout of sustainable[renewable] energy resources (pv, wind, biomass, tidal, OTEC)	8
Pedagogy	**Chalk and Talk, NPTEL Videos and Group Discussion, Pictorial Demo**	
2	**Transmission line parameters:** An introduction to EHV ac transmission, HVDC transmission, i.e. rules for insulators, cables, OHT and substation. Different operating voltages of generation, transmission and distribution– advantage of higher operating voltage for ac transmission. Transmission line parameters, types of conductors (single and double circuits-solid, stranded and bundled conductors). Impact of transmission line parameters by introducing RES to utility-resistance and inductance calculation for conductor in transmission line, inductance calculation for symmetrical & unsymmetrical conductors-qualitative analysis, capacitance calculation for symmetrical& unsymmetrical conductors-qualitative analysis, skin and proximity effects-interference with neighboring communication circuits-corona discharge characteristics	8
Pedagogy	**Chalk and Talk, NPTEL Videos and Group Discussion, Pictorial Demo**	
3	**Performance of transmission lines** Performance of short, medium and long transmission line. Ferranti effect-surge impedance, attenuation constant and phase constant –voltage regulation and transmission efficiency. Performance of transmission lines and voltage regulation quantitative analysis. Real and reactive power flow in lines– power circle diagrams Shunt and series compensation-surge-impedance loading, loadability limits based on thermal loading	8
Pedagogy	**Chalk and Talk, NPTEL Videos and Group Discussion, Pictorial Demo**	
4	**Insulators, cables& sag calculation** Classification of insulators for transmission and distribution purpose – voltage distribution in insulator string and grading. Improvement of string efficiency underground cables-constructional features of LT and HT cables. Insulation, resistance, capacitance, dielectric stress and grading–tan δ and power loss-thermal characteristics. Stress and sag calculations – effect of wind and ice	8
Pedagogy	**Chalk and Talk, NPTEL Videos and Group Discussion, Pictorial Demo**	
5	**Substation, grounding system and distribution system** Classification, major components of substations & bus-bar arrangements. Substation bus schemes-(single buses, double bus with double breaker, double bus with single breaker, main and transfer bus, double bus-bar with bypass isolators). Interconnection of power stations& grids with inter-connecting transformers. Importance of earthing in a substation-qualitative treatment to neutral grounding and earthing practices in substations. Feeders, distributors and service mains. DC distributor–quantitative analysis of radial distribution [controls & protections]ring main distribution-ac distribution– 1 ph & 3-ph 4-wiredistribution.	9

	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	BH Khan "Non-conventional energy resources" 3rd Edn.
2	Wadwa. C.L., "Electric Power Systems, Wiley Eastern Ltd", New Dellhi 2001
3	Metha.V.K, and Rohit Metha, Principles of Power System", S.Chand, 2005.
4	Electrical power Generation, Transmission & Distribution 2nd Edn. by S.n. Singh
Reference Books	
1	Luces M. Fualkenberry, Walter Coffer, electrical Power Distribution and Transmission, Pearson Edn, 1996.
2	Despande.M.V, electrical Power Systems Design",Tata McGraw Hill Publishing Company, NewDelhi,2005.
3	William.D.Stevenson.Jr.,"ElementsofPowerSystemAnalysis",McGrawHill,NewDelhi, 2014
4	Nagarath.I.J.& Kothari.D.P., "Modern Power System Analysis", Tata McGraw Hill Publishing Company, New Delhi,2014.
5	Central Electricity Authority(CEA),"Guidelines for Transmission System Planning", New Delhi

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	To Understand the basic concepts of electrical power generation, transmission and Distribution, different types of insulators, underground cables, effect of corona, Earthing	**L1/L2**	**R/U**
CO2	To develop the expression of transmission line parameters & computation of line parameters, sag of an overhead transmission line & string efficiency of insulators.	**L3**	**Apply**
CO3	To analyze the performance of various types of transmission lines and distribution system topologies.	**L4**	**Analyse**
CO4	To evaluate transmission line parameters, determine their performance using modern tools, generator capacity, No. Of Units produced –Cost of Energy &Tariffs	**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	-	-	1	-	-	-	-	-	-	3	2
CO5		-	-	3	-	-	-	-	-	-	-	-	3	2

Weblinks and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/108102047

CIE- Continuous Internal Evaluation (50 Marks)

Bloom's Category	Continuous Comprehensive Assessment (CCA)			
	IAT-1	IAT-2	CCA-1	CCA-2
	50 Marks	50 Marks	50 Marks	50 Marks
Remember	10	10		
Understand	10	10		
Apply	20	20		
Analyse	10	10		
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	20	5	5	5	5	5	45	45%
CO2		10	5	5	10	10	40	40%
CO3		5			5	5	15	15%
CO4							0	
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	12
Understand	18
Apply	35
Analyse	25
Evaluate	10
Create	

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module-3	Module-4	Module-5		
CO1	20	5	10	5	5	45	45%
CO2		10	10	10	10	40	40%
CO3		5		5	5	15	15%
CO4						0	
CO5							
Total						100	

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**3rd**				
Course Title	**:**	**Transformers and Generators**				
Course Code	**:**	**BEE304**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**PCC**				
Stream	**:**	**EEE**		**CIE**	**:**	**50 Marks**
Teaching hours/ week (L:T:P:S)	**:**	**2:2:0:0**		**SEE**	**:**	**50 Marks**
Total Hours	**:**	**40 Hrs**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the concepts of transformers and their analysis.
2	Suggest a suitable three phase transformer connection for a particular operation.
3	Apply the concepts of generator and to evaluate their performance.
4	Explain the requirement for the parallel operation of transformers and synchronous generators.

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 of Electrical Machine.
- 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	**Prerequisite:** Elements of Electrical Engineering **Single phase Transformers:** Equivalent circuit, Operation of practical transformer under no-load and on-load with phasor diagrams. Polarity test, Sumpner's test. Open circuit and Short circuit tests, calculation of equivalent circuit parameters. Predetermination of efficiency, voltage regulation and its significance. Numerical. Load sharing in case of similar and dissimilar transformers.	8
Pedagogy	1. Blended Learning 2. Animated/NPTEL videos 3. Problem Based Learning 4. Experiential Learning	
2	**Prerequisite:** Electromagnetism **Three-phase Transformers:** Introduction, Constructional features of three-phase transformers. Transformer connection for three phase operation– star/star, delta/delta and star/delta, comparative features. Labeling of three-phase transformer terminals. Parallel **Operation of Transformers:** Necessity of Parallel operation, conditions for parallel operation– three phase. Load sharing in case of similar and dissimilar transformers. All day efficiency, Numerical.	8
Pedagogy	1. Blended Learning 2. Problem Based Learning 3. Experiential Learning 4. Cut sections 5. Demonstration	
3	**Synchronous Generators:** Armature windings, winding factors, EMF equation. Harmonics– causes, reduction and elimination. Armature reaction, Synchronous reactance, Equivalent circuit. **Synchronous Generators Analysis**: Open circuit and short circuit characteristics, Assessment of reactance-short circuit ratio, Alternator on load. Voltage regulation. Voltage regulation by EMF and MMF and ZPF methods. Excitation control for constant terminal voltage. Numerical	8
Pedagogy	1. Blended Learning 2. Animated/NPTEL videos 3. Problem Based Learning 4. Experiential Learning 5. Cut sections Demo	
4	**Prerequisite:** Electrical Power Generation **Synchronous Generators (Salient Pole):** Effects of saliency, two-reaction theory, Parallel operation of generators and load sharing. Methods of Synchronization, Synchronizing power. Capability curve for large turbo generators. Numerical. Permanent Magnet Generators and Doubly Fed Generators for renewable energy generation.	8
Pedagogy	1. Blended Learning 2. Animated/NPTEL videos 3. Problem Based Learning 4. Experiential Learning	

5	**Special transformers:** Instrument transformers (Current transformers, voltage transformers), pulse transformers, isolation transformer, High reactance or flux leakage transformer, welding Transformer. Pole Mounted Transformers. HVDC transformers. Autotransformer-copper economy and tap changing transformers applications.	8
Pedagogy	1. Blended Learning 2. Animated/NPTEL videos 3. Experiential Learning 5. Case study	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Electric Machines, D. P. Kothari, et al, 5th Edition, 2017
2	Electric Machines, Ashfaq Hussain, Dhanpat Rai & Co, 2nd Edition, 2013.
Reference Books	
1	Principals of Electrical Machines V.K Mehta, Rohit Mehta S Chand 2 nd edition, 2009
2	The J & P Transformer Book Martin J. Heathcote, CEng, FIEE Thirteenth edition Elsevier Ltd.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	To understand the types of transformers their construction ,Equivalent circuit and Operation methods of synchronous generators	**L1,L2**	**R,U**
CO2	Apply the engineering fundamentals to determine the efficiency and regulation of transformers and synchronous generators.	**L3**	**A**
CO3	Analyze the performance of transformers and synchronous generators by various tests and parallel operation.	**L4**	**An**
CO4	Modern tool usage to show the performance of transformers and synchronous generators	**L5**	**E**

Mapping of Course Outcomes to Program Outcomes:

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

CO3														
CO4					3				3	3				3

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/108/105/108105155/
2	https://elearning.vtu.ac.in/econtent/courses/video/EEE/10EE54.html
3	https://www.youtube.com/watch?v=ikqXDWrwf4c
4	https://www.youtube.com/watch?v=fbwZkhaF0dk
5	https://www.youtube.com/watch?v=UchitHGF4n8

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	8	05	5
Understand	10	10	10	10
Apply	30	20	25	10
Analyse		12	10	20
Evaluate				05

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	5	5		4	14	38	38%
CO2	10	10	10	10	10		50	50%
CO3				8	4		12	12%

CO4								
Total	20	15	15	18	18	14	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	10
Understand	17
Apply	20
Analyse	03
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module - 3	Module-4	Module-5		
CO1	10	5	10	10	5	40	40%
CO2	10	15	10	5	10	50	50%
CO3			5	5		10	10%
CO4							
Total	20	20	25	20	15	100	100%

EMERGING TECHNOLOGY COURSE (ETC)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**III**				
Course Title	:	**Semiconductor Technology**				
Course Code	:	**BEE305**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**ETC**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 hours**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Students will understand the fundamental principles and theories underlying semiconductor processes, including the physics and chemistry involved in the fabrication of semiconductor devices.
2	Students will gain proficiency in the key semiconductor fabrication techniques such as etching, diffusion, ion implantation, and film deposition.
3	Students will learn to analyze and integrate various semiconductor processes to design and fabricate complete semiconductor devices.
4	Students will evaluate the effectiveness and efficiency of various semiconductor manufacturing technologies and propose improvements or innovations.

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 semiconductor processing technologies.
- 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 semiconductor processing technology** **Brief Overview of Integrated Circuit:** Manufacturing materials, Processing equipment, Metrology tools, Wafer manufacturing. Yield, Cleanroom Basics. **Introduction to semiconductor materials and manufacturing processes:** Basic Structure of an Integrated Circuit Fabrication Facility Semiconductor Process Technology, Basic Fabrication Steps- Oxidation, Photolithography and Etching, Diffusion and Ion Implantation, Metallization	08
Pedagogy	**Lectures and Presentations-**Use well-organized lectures with visual aids such as slides, diagrams, and videos to explain complex processes **Flipped Classroom:** Assign pre-recorded lectures or reading materials on semiconductor materials and manufacturing processes for students to study at home	
2	**Crystal Growth, Silicon Oxidation and Photolithography** **Crystal Growth:** Silicon Crystal Growth from the Melt, Silicon Float-Zone Process, GaAs Crystal Growth Techniques, Material Characterization. **Silicon Oxidation:** Thermal Oxidation Process, Impurity Redistribution During Oxidation, Masking Properties of Silicon Dioxide, Oxide Quality, Oxide Thickness Characterization, Oxidation Simulation. **Photolithography:** Optical Lithography, Next-Generation Lithographic Methods, Photolithography Simulation	08
Pedagogy	**Lectures and Multimedia Presentations**- Use slides with diagrams, flowcharts, and videos to visually explain the crystal growth processes, **Guest Lectures and Industry Interaction-** Invite industry professionals and researchers to discuss the latest advancements and challenges in crystal growth, silicon oxidation, and photolithography.	
3	**Etching, diffusion, ion implementation and film deposition methods and techniques or semiconductors** **Etching mechanism:** Wet Chemical Etching, Dry- Etching, Etch Simulation **Basic Diffusion Process:** Extrinsic Diffusion, Lateral Diffusion and Diffusion Simulation **ion implementation:** Range of Implanted Ions, Implant Damage and Annealing, Implantation-Related Processes **Film Deposition:** Epitaxial Growth Techniques, Structures and Defects in Epitaxial Layers, Dielectric Deposition, Polysilicon Deposition, Metallization.	08
Pedagogy	**Case-Based Learning-** Present students with detailed case studies that involve real-world semiconductor processing challenges. **Interactive Lectures with Demonstrations**- Use multimedia aids such as videos, diagrams, and animations to illustrate complex processes.	
4	**Process Integration.** Passive Components- Resister, inductor, Capacitor. Bipolar Technology- Basic Fabrication, Dielectric Isolation, Self-Aligned Double-Polysilicon. MOSFET Technology- Basic Fabrication, Memory Devices, CMOS Technology, BiCMOS Technology. MEMS Technology- Bulk Micromachining, Surface Micromachining, LIGA Process.	08
Pedagogy	**Collaborative Learning-** Divide the class into small groups and assign each group a specific semiconductor device to research and map out the entire process integration flow.	

	Interactive Lectures with Visual Aids- Use slides with detailed diagrams, flowcharts, and videos to illustrate each step of IC manufacturing, from wafer fabrication to packaging	
5	**IC Manufacturing.** Electrical Testing, Packaging, Statistical Process Control, Statistical Experimental Design, Yield. Computer-Integrated Manufacturing. Future Trends and Challenges- Challenges for Integration. System-on-a-Chip.	**08**
Pedagogy	**Interactive Lectures with Visual Aids-** Use slides with detailed diagrams, flowcharts, and videos to illustrate each step of IC manufacturing, from wafer fabrication to packaging. • **Case Studies and Group Discussions-** resent students with real-world case studies of IC manufacturing challenges and innovations	

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	May, G. S., & Sze, S. M. (2004). Fundamentals of semiconductor fabrication. John Wiley & Sons. ISBN: 978-0-471-23279-7.
2	Xiao, Hong (2012) Introduction to Semiconductor Manufacturing Technology (2nd Edition) SPIE, SBN: 9780819490926; 081949092X; 9781628701043; 1628701048
Reference Books	
1	S.M. Sze, "Semiconductor Devices: Physics & Technology", Wiley
2	S.O. Kasap, "Principles of Electronic Materials and Devices", Tata McGraw Hil.

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 processes and techniques used in semiconductor fabrication.	**L1, L2**	**R/U**
CO2	Apply semiconductor processing techniques to design and fabricate basic semiconductor devices.	**L3**	**A**
CO3	Analyze different semiconductor processing technologies to determine their advantages and limitations.	**L4**	**An**
CO4	Evaluate the effectiveness of various semiconductor processing methods and suggest improvements or alternatives using modern tools.	**L5**	**E**

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	3				3	3				3

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/113/105/113105025/ NPTEL course on processing of semiconductor materials
2	https://www.coursera.org/specializations/semiconductor-packaging Coursera - Semiconductor Packaging Specialization

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	**10**	**10**
Understand	20	20	**10**	**10**
Apply	10	10	**10**	**10**
Analyse	10	10	10	10
Evaluate			10	10
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	10	10	10	10	10	10	60	60
CO2		5	5		5	5	20	20
CO3		5	5		5	5	20	20
CO4								
Total	10	20	20	10	20	20	100	100

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	10
Understand	20
Apply	10
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	20	10	5	5	10	10	60	60
CO2		5	5		5	5	20	20
CO3		5	5		5	5	20	20
CO4								
Total	20	20	15	5	20	29	100	100

Professional Core Laboratory (PCL)

Semester	**:**	**III**				
Course Title	**:**	**TRANSFORMERS AND GENERATORS LABORATORY**				
Course Code	**:**	**BEEL306**				
Course Type (Theory/ Practical/ Integrated)	**:**	**PRACTICAL**				
Category	**:**	**PCL**				
Stream	**:**	**EEE**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**1:0:2:0**		**SEE**	**:**	**50**
Total Hours	**:**	**20**		**SEE Duration**	**:**	**3.00 Hrs**
Credits	**:**	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To conduct various tests on transformers and synchronous machines and evaluate their performance
2	To perform the parallel operation on two single phase transformers.
3	To study and verify the performance of synchronous generator.
4	To calculate the voltage regulation of an alternator using different methods for comparison.

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)

List of Programs:

Sl. No.	Experiments/Programs
1	Open Circuit and Short circuit tests on single phase step up or step down transformer and pre- determination of (i) Efficiency and regulation (ii) Calculation of parameters for equivalent circuit.
2	Sumpner's test on similar transformers and determination of combined and individual transformer efficiency.
3	Parallel operation of two dissimilar single-phase transformers of different kVA and determination of load
4	Polarity test and connection of 3 single-phase transformers in star – delta and determination of efficiency and regulation under balanced resistive load.
5	Comparison of performance of 3 single-phase transformers in delta – delta and V – V (open delta) connection under load.
6	Separation of hysteresis and eddy current losses in single phase transformer.
7	Investigate the voltage and current ratios of a multi-tapped transformer and verify the ideal transformer ratio.
8	Voltage regulation of an alternator by EMF
9	Power angle curve of synchronous generator or Direct load test on three phase synchronous generator to determine efficiency and regulation.
10	Performance of synchronous generator connected to infinite bus.
11	Model transformer in Simscape for Automatic Voltage Regulation.
12	Simulate power angle curve of generator in MATLAB.
13	**Demonstration Experiment**: Slip test – Measurement of direct and quadrature axis reactance and predetermination of regulation of salient pole synchronous machines.

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Electric Machines, D. P. Kothari, et al, 4th Edition, 2011.
2	Electric Machines, Ashfaq Hussain, Dhanpat Rai & Co, 2nd Edition, 2013
Reference Books	
1	Electric Machines, Mulukuntla S. Sarma, at el, Cengage, 1st Edition, 2009
2	Electrical Machines, Drives and Power systems, Theodore Wildi, Pearson, 6th Edn, 14
3	Principals of Electrical Machines, V.K Mehta, Rohit Mehta, S Chand, 2nd edn, 2009

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Predetermine the performance characteristics on transformers and synchronous machines.	L3	A
CO2	Perform load test on transformers and synchronous machines.	L3	A
CO3	Verify the performance characteristics of synchronous generator.	L4	An
CO4	Evaluate the performance of synchronous generators from the test data and assess the performance of synchronous generator connected to infinite bus	L4	An

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	-	-	-	-	-	-	-	3	3	-	-	2	-
CO2	-	3	-	-	-	-	-	-	3	3	-	-	2	-
CO3	-	3	-	-	-	-	-	-	3	3	-	-	2	-
CO4	-	3	-	-	-	-	-	-	3	3	-	-	2	-

Weblinks and Video Lectures (e-Resources)	
1	NPTEL & Video Display

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	20	20	20	20	
Understand	25	25	25	25	100
Apply	25	25	25	25	100
Analyze	10	10	10	10	40

Evaluate	10	10	10	10	40
Create	10	10	10	10	40

SEE- Semester End Examination (50 Marks)

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

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

(Autonomous Institute under VTU)

Semester	:	**3rd**				
Course Title	:	**PCB Design & 555 Integrated Timer Circuits**				
Course Code	:	**BEE307**				
Course Type (Theory/ Practical/ Integrated)	:	**Project**				
Category	:	**AEC**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:0:2**		**SEE**	:	**50**
Total Hours	:	**24 hours**		**SEE Duration**	:	**3 hours**
Credits	:	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmer at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept
2	Provide unhindered access to perform whenever the students wish.
3	Vary different parameters to study the behavior of the circuit without the risk of damaging equipment/ device or injuring themselves.

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 and Linear Integrated 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.

Sl. No.	Experiments/Programs
1	Study of IC 741,555 & 565
2	Construct integrator and differentiator using IC 741 op-amp
3	Construct &Analyze active filter applications - LPF& HPF (1st order)
4	Design a Waveform Generator which generates Sine, Square and Triangular waveforms using IC741 and to verify it's various output waveforms
5	Design a Monostable Multivibrator using IC555 and compare it's theoretical and practical pulse width.
6	Study the Schmitt trigger characteristics by using IC741 and compare theoretical and practical values of the Upper Threshold voltage, VUT and the Lower Threshold voltage
7	Introduction to proteus, Orcad or other tool., Schematic entry / drawing, net listing, layering, component foot print library selection & designing, design rules, component placing: Manual & automatic, track routing: automatic & manual, rules: track length, angle, joint & size, Auto router setup. Design Rules.
8	PCB Designing Practice: PCB Designing of Basic and Analog Electronic Circuits, PCB. Designing of Power Supplies.

List of Project :

Students can select appropriate projects with the approval of the guide. The projects be application oriented and can be considering any of the following or any other.

- Basic Timer Circuit.
- LED Flasher Circuit.
- PWM (Pulse Width Modulation) Generator.
- Monostable Multivibrator for Time Delay.
- Sound Synthesizer or Tone Generator.
- Touch Sensor or Capacitive Touch Switch.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understanding of the fundamental operating principles of Linear Integrated Circuits including its modes of operation (astable, monostable) and the principles of PCB design,	L2	Understand
CO2	Design, simulate, and implement various Linear Integrated Circuits Applications on a PCB, ensuring the Op-Amp ICs to achieve specific functions such as timers, oscillators, PWM	L5	Design
CO3	Analyze the Linear Integrated Circuits electronic circuits and systems on a PCB, ensuring functionality and compliance with design specifications.	L3	Analyze

CO4	Evaluate the performance of 555 timer electronic circuits and systems on a PCB & **Evaluate** the cost implications of different PCB manufacturing techniques.	**L4**	Evaluate
CO5	Innovate new applications or modifications for 555 timer IC electronic circuits and systems on a PCB, integrating additional components or changing operational parameters to achieve novel functionalities beyond standard applications.	**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
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	3	3		2	2	
CO3		3							3	3		2	2	
CO4			3						3	3		2	2	
CO5				3	2				3	3		2	2	

Web-links and Video Lectures (e-Resources)	
1	https://www.youtube.com/watch?v=9RZfFOnPtqg
2	https://www.me.psu.edu/cimbala/me345/Lectures/The_555_Timer_IC.pdf
3	https://ieeexplore.ieee.org/document/187309/
4	https://ieeexplore.ieee.org/document/8262466/
5	http://learn.pcbcupid.com/

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.

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	:					
Course Title	:					
Course Code	:					
Course Type (Theory/ Practical/ Integrated)	:					
Category	:					
Stream	:			**CIE**	:	
Teaching hours/ week (L:T:P:S)	:			**SEE**	:	
Total Hours	:			**SEE Duration**	:	
Credits	:					

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 surrounding.
2	create a responsible connection with the society.
3	Understand the community in general in which they work.
4	Identify the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	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

General Instructions - Pedagogy :

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

- 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.
- State the need for activities and its present relevance in the society and Provide real-life examples.
- Support and guide the students for self-planned activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills

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

Contents :

The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.

The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-long activities conducted by faculty mentors.

In the following a set of activities planned for the course have been listed:

Module No.	Topics	Hours
1	**Part I:** **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.	
Pedagogy		
2	**Part II :** **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.	
Pedagogy		
3	**Part III :** **Organic farming and waste management:** Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus –Objectives,Visit, case study, report, outcomes.	
Pedagogy		
4	**Part IV:** **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.	
Pedagogy		

5	**Part V :** **Food walk:** City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study,report, outcomes.	
	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	
2	
Reference Books	
1	
2	

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
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															
CO2															
CO3															
CO4															
CO5															

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	Electric Circuit Analysis	BEE301	Core	IPCC	Application of MATLab and Graph Theory for analyzing circuits
2	Analog and Digital Circuit	BEE302	Core	IPCC	Analyzing and Designing electronic circuits , implementing digital logic for various applications
3	Transformers and Generators Laboratory	BEEL306	Lab	PCL	• collaboration • Hands-on Experience • Skill Development • Performance Characteristics of Transformers and generators. • Problem Solving • Familiarity with Electrical Machines with testing and operation
4	555 Integrated Timer Circuits	BEE307	Project	AEC	• Project planning and management • Problem Solving • collaboration and communication • Hands-on Experience • Innovation and creativity • Critical thinking

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	**:**	**4th Sem**				
Course Title	**:**	**Control Systems**				
Course Code	**:**	**BEE401**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Integrated**				
Category	**:**	**IPCC**				
Stream	**:**	**EEE**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:2:2:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40+20**		**SEE Duration**	**:**	**3 hours**
Credits	**:**	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To introduce students with the concept of Control systems and its applications
2	To familiarize the students with the mathematical modelling, writing transfer functions and stability analysis by various methods.
3	To familiarize the students with software package in stability analysis

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 control system.
- 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	**Prerequisites: Differential equations and Laplace Transforms for modeling and analyzing dynamic systems.** **Introduction to control systems:** Classifications of Control Systems, Open loop v/s Closed loop Systems with Examples. Transfer functions for servomotors, synchros, gear trains, Mathematical Modelling of linear systems: Mechanical Systems, Electrical systems, Analogous system based on F-V and F-I analogy. (Translational and Rotational Systems).	8
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	
2	**Block Diagram:** Block diagram of a closed loop system, procedure for drawing block diagram and block diagram reduction to find transfer function. **Signal Flow Graphs:** Construction of signal flow graphs, basic properties of signal flow graph, signal flow graph algebra, construction of signal flow graph for control systems.	8
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	
3	**Time response of Feedback Control System:** Standard Test signals, Steady state error and error constants. Unit step Response of first order and second order systems, response specifications of 2nd order systems. Static error constants	8
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	
4	**Stability analysis:** Necessary conditions for stability, RH criterion, applications of RH criterion with limitations. Root locus Techniques: Introduction to root locus concepts, Construction rules, Analysis of stability by root locus plot, Polar plot	8
Pedagogy	**Chalk and Talk, , Animated/NPTEL videos**	
5	**Frequency Response Analysis:** Bode plots, Relative stability, and Frequency domain specification. Introduction to lead, lag and lead- lag compensating networks (excluding design). Introduction to PI, PD and PID Controllers (excluding design). **State variable analysis:** introduction to state variable analysis, Concepts of state, state variables and state models for electrical systems. Solution of state equations.	8

Pedagogy	Chalk and Talk, , Animated/NPTEL videos	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	

List of Programs:

Sl. No.	Experiments/Programs	COs
1	Experiment to draw the speed torque characteristics of (i) AC servo motor (ii) DC servo motor.	CO1
2	Experiment to draw synchro pair characteristics.	CO1
3	Experiment to determine frequency response of a second order system	CO3
4	To design a passive RC lead compensating network for the given specifications, viz, the maximum phase lead and the frequency at which it occurs and to obtain the frequency response.	CO6
5	To design a passive RC lag compensating network for the given specifications, viz, the maximum phase lag and the frequency at which it occurs and to obtain the frequency response	CO6
6	To study a second order system and verify the effect of (a) P, (b) PI, (c) PD and (d) PID controller on the step response.	CO5
7	To simulate a typical second order system and determine step response and evaluate time response specifications.	CO4
8	To simulate a D.C. Position control system and obtain its step response.	CO4
9	To examine the relationship between open-loop frequency response and stability, open-loop frequency and closed loop transient response.	CO3
10	Comparative study of Bode, Nyquist and root locus with respect to stability.	CO3
Open ended Programs		
1	Simulation of level control system	CO5
2	Simulation of temperature control system	CO5

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	J. Nagrath & M. Gopal, “control systems engineering”, 5th Edition - 2005, New Age International Publishers, New Delhi, India.
2	Control Systems, Anand Kumar, PHI, 2ndEdition, 2014.

3	Automatic Control Systems, Farid Golnaraghi, Benjamin C. Kuo, Wiley, 9th, Edition, 2010.
4.	Modern Control Systems, Richard C Dorf et al, Pearson, 11th Edition, 2008.
Reference Books	
1	Richard C. Dorf, Robert H. Bishop, "Modern Control Systems", 12th Edition, PHI-Imprint of Pearson, USA.
2	Joseph Cyril Babu & S.P. Xavier Eugene, "Principles of Control System", 1st Edition, Schand Publishers, New Delhi, India

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	To remember and understand the basic concepts of control systems.	L2	U
CO2	To apply the concepts of control system in developing mathematical model and transfer function of physical system and to find time response.	L3	A
CO3	To analyze the stability of control system using different methods.	L4	An
CO4	Examine controller or compensator configuration controlled process.	L5	E
CO5	To analyze the stability of control system using MATLAB	L4	An
CO6	To design compensating network and to obtain the frequency response.	L6	C

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3												2	
CO3		3												
CO4			3										2	
CO5		3			3				2					3
CO6			3		3				2				2	

Weblinks and Video Lectures (e-Resources)	
1	https://onlinecourses.nptel.ac.in/noc24_de18/preview
2	https://www.youtube.com/watch?v=XMfH2P2Fc6Q
3	https://www.analog.com/en/education/education-library/tutorials/analog-electronics.html

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	05	05	**5**	**5**	5
Understand	15	15	**5**	**5**	5
Apply	20	20	**10**	**10**	10
Analyse	10	10	10	10	
Evaluate			10	10	5
Create			10	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	10	5	10	10	5	10	50	50%
CO2	10	5		10			25	25%
CO3		5			5		10	10%
CO4		5			10		15	15%

CO5								
CO6								
Total								
	20	20	10	20	20	10	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	20
Understand	30
Apply	30
Analyse	20
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	7	5	3	5	5	5	30	30%
CO2	7	5	5	3	5	5	30	30%
CO3	5	7	5	3	5	5	30	30%
CO4	2	2	2	2	2	2	10	10%
CO5								
CO6								
Total	21	19	15	13	17	17	100	100%

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**				
Course Title	:	**Microcontroller and Embedded systems**				
Course Code	:	**BEE402**				
Course Type (Theory/ Practical/ Integrated)	:	**Integrated**				
Category	:	**IPCC**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**2:2:2:0**		**SEE**	:	**50**
Total Hours	:	**40+20**		**SEE Duration**	:	**3 hours**
Credits	:	**4**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the fundamentals of ARM-based systems, including programming modules with registers and the CPSR.
2	Use the various instructions to program the ARM controller.
3	Program various embedded components using the embedded C program.
4	Identify various components, their purpose, and their application to the embedded system's Applicability.
5	Understand the embedded system's real-time operating system and its application

Teaching-Learning Process

Pedagogical Initiatives:

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

1. Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.

3. Encourage collaborative (Group) Learning in the class.
4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyse information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning

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	**Prerequisites:** Understanding of Micro Processor and Microcontrollers, Difference between Microprocessors and Microcontrollers, RISC and CISC ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware, Embedded System Software. ARM-32 bit Microcontroller: ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extensions	8
Pedagogy	**Demonstration of registers, memory access, and CPSR in a program module- Experiential Learning, Chalk and talk , Animated/NPTEL videos**	
2	**Prerequisites:** Basics of Assembler, Memory, types **Introduction to the ARM Instruction Set:** Data Processing Instructions, Branch Instructions, Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants Instruction Sets: Assembly basics, Instruction list and description, useful instructions, Memory Systems, Memory maps, Cortex M3 implementation overview, pipeline and bus interface	8

	ARM programming using Assembly language: Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation, Conditional Execution, Looping Constructs	
Pedagogy	**Demonstration of sample code using Keil software, Chalk and talk , Animated/NPTEL videos**	
3	**Prerequisites:** Basics of C Programming **C Compilers and Optimization :**Basic C Data Types, C Looping Structures, Register Allocation, Function Calls, Pointer Aliasing, :Structure Arrangement, Bit-fields, Unaligned Data and Endian ness, Division, Floating Point, Inline Functions and Inline Assembly, Portability Issues. **Exception and Interrupt Handling** : Exception Handling, Interrupts, Interrupt Handling Schemes	**8**
Pedagogy	**Chalk and talk , Animated/NPTEL videos, Demonstration of sample code using Keil software.**	
4	***Prerequisites:*** Embedded vs General computing system **Embedded System Components:** History of embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems. Core of an Embedded System including all types of processor/ controllers, Memory, Sensors, Actuators, LED, 7 segment LED display, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components. (excluding C language). (Text 2: Ch-3, Ch-4, Ch-7 (Sections 7.1, 7.2 only), Ch-9 (Sections 9.1, 9.2, 9.3.1, 9.3.2 only)	**8**
Pedagogy	**Chalk and talk , Animated/NPTEL videos, Blended Learning, Experiential Learning**	
5	***Prerequisites:*** *State Machines, FSM* **RTOS and IDE for Embedded System Design:** Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program), Task synchronization issues – Racing and Deadlock, Concept of Binary and counting semaphores (Mutex example without any program), How to choose an RTOS, Integration and testing of Embedded hardware and firmware, Embedded system Development Environment – Block diagram (excluding Keil),	**8**

	Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan. (Text 2 Ch-10 (Sections 10.1, 10.2, 10.3, 10.5.2 , 10.7, 10.8.1.1, 10.8.1.2, 10.8.2.2, 10.10 only), Ch 12, Ch-13 (a block diagram before 13.1, 13.3, 13.4, 13.5, 13.6 only)	
Pedagogy	**Chalk and talk , Animated/NPTEL videos, Blended Learning, Experiential Learning**	
	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 • **Case studies:** maps different domains in real time applications • **Demonstration:** exhibits the implementation process	

List of Programs:

Sl. No.	Experiments/Programs	COs
	PART A	
1	Using Keil software, observe the various registers, dump, CPSR, with a simple ALP program.	**CO2**
2	Write an ALP to i) multiply two 16-bit binary numbers. ii) add two 64-bit numbers.	**CO2**
3	Write an ALP to find the i)sum of the first 10 integer numbers ii) add an array of 16-bit numbers and store the 32-bit result in internal RAM	**CO2**
4	Write an ALP to find i)the factorial of a number, ii)square of a number (1 to 10) using a look-up table	**CO2**
5	Write an ALP to find i)the largest or smallest number in an array of 32 numbers ii) arrange a series of 32-bit numbers in ascending/descending order.	**CO2**
6	Write an ALP to i)count the number of ones and zeros in two consecutive memory Locations ii) Scan a series of 32 bit numbers to find how many are negative	**CO2**
	PART B **Conduct the following experiments on an ARM CORTEX M3 evaluation board using evaluation version of Embedded 'C' & Keil Uvision-4 tool/compiler**	
7	Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.	**CO3**
8	Interface a DAC and generate Triangular and Square waveforms.	**CO3**
9	Display the Hex digits 0 to F on a 7-segment LED interface, with a suitable delay in between.	**CO3**
10	Interface a simple Switch and display its status through Relay, Buzzer and LED.	**CO3**
11	Determine Digital output for a given Analog input using Internal ADC of ARM controller	**CO3**
12	Interface and Control a DC Motor	
	Open ended Programs	
1	Porting Embedded OS to ARM controller	**CO4**
2	Measure Ambient temperature using a sensor and SPI ADC IC	**CO5**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Andrew N Sloss, Dominic System and Chris Wright, "ARM System Developers Guide", Elsevier, Morgan Kaufman publisher, 1st Edition, 2008.
2	Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited, 2nd Edition.
Reference Books	
1	Raghunandan. G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019
2	The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd.,1st edition, 2005.
3	Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
4	Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Explain C-Compilers ARM microcontroller's architectural features, Working of Embedded System and its components, Need for RTOS and IDE Tools	**L1, L2**	**R,U**
CO2	Apply the knowledge gained from programming on ARM to different applications.	**L3**	**A**
CO3	Analyze to access ARM Microcontroller ports using Embedded C program	**L4**	**An**
CO4	Determine the hardware /software co-design and firmware design approaches for Embedded Systems	**L5**	**E**
CO5	Develop ARM Programming for connecting basic hardware components and their application.	**L6**	**C**

Mapping of Course Outcomes to Program Outcomes:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														

CO2	3													3
CO3		3			3									3
CO4			3		3									3
CO5			3		3				3	3				3

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/106/105/106105193/
2	https://onlinecourses.nptel.ac.in/noc22_cs93/preview
3	https://ebooks.inflibnet.ac.in/csp13/chapter/introduction-to-arm-processor/
4	https://www.arm.com/resources/education/education-kits/efficient-embedded-systems

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	10	10			5
Understand	20	15			5
Apply	20	15	10		10
Analyze			10	10	
Evaluate		10	10	20	5
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	15	10	5	5	10	10	45	45%
CO2		10	10	10	5	10	45	45%
CO3					5	5	10	10%
CO4								
Total	15	20	15	15	10	25	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	15
Apply	20
Analyze	
Evaluate	5
Create	

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module -3	Module-4	Module-5		
CO1	10	5	10	10	5	40	40%
CO2	10	15	10	5	10	50	50%
CO3				5	5	10	10%
CO4							
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 **10 Marks**.

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

Total score for CCA is **10 Marks**

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

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 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	**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	**:**	**IV**				
Course Title	**:**	**Electric Motors and EV Motors**				
Course Code	**:**	**BEE403**				
Course Type (Theory/ Practical/ Integrated)	**:**	**THEORY**				
Category	**:**	**PCC**				
Stream	**:**	**EEE**		**CIE**	**:**	**50**
Teaching hours/ week (L:T:P:S)	**:**	**2:2:0:0**		**SEE**	**:**	**50**
Total Hours	**:**	**40 Hrs**		**SEE Duration**	**:**	**3 Hours**
Credits	**:**	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Understand the constructional features of Rotating Machines
2	Describe the performance characteristics & applications of Electric motors
3	Control the speed of DC motor and AC motor
4	Explain the starting methods, equivalent circuit and phasor diagrams, torqueangle, effect of change in excitation and change in load, hunting and damping of synchronous motors

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.
- 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 Examinations for BE Programme -2024-25

Outcome Based Education and Choice Based Credit System (CBCS)

DSATM **(Effective from the Academic Year 2024-25)**

COURSE CURRICULUM

Module No.	Topics	Hours
1	**Pre-requisite:** *Constructional features of DC machines, working principle and types of DC motor* **DC Motors:** Torque equation, Characteristics of shunt, series & compound motors. Speed control of shunt, series and compound motors. Application of motors. DC motor. Losses and Efficiency-Losses in DC motors, Power flow diagram, efficiency, condition for maximum efficiency. **Testing of DC Motors:** Direct & indirect methods of testing of DC motors-Brake test, Swinburne's test, Hopkinson's test, Field's test, merits and demerits of tests.	8
Pedagogy	**Chalk and talk, ICT tools**	
2	**Pre-requisite:** *Review of concept and generation of Rotating Magnetic Field, Principle of operation, construction, classification and types; squirrel-cage, slip-ring.* **Three phase Introduction Motor**. Slip, Torque equation, torque-slip characteristic covering motoring, generating and braking regions of operation, Maximum torque, significance of slip. Phasor diagram of induction motor on no-load and on load, equivalent circuit, losses, efficiency, No-load and blocked rotor tests. Cogging and crawling. High torque rotors-double cage and deep rotor bars. Equivalent circuit and performance evaluation of double cage induction motor. Induction motor working as induction generator	10
Pedagogy	**Chalk and talk, ICT tools, experimental learning**	
3	**Pre-requisite:** *Basic laws; faraday's law of electromagnetic induction, Kirchoff's Law***.** **Need for starter.** Direct on line, Star-Delta, and autotransformer starting. Rotor resistance starting. Speed control by voltage, frequency and rotor resistance methods. **Single-Phase Induction Motor:** Double revolving field theory and principle of operation. 1phase IM Construction and operation of split-phase, capacitor start, and capacitor run, and shaded pole motors. Comparison of single phase motors and applications.	7
Pedagogy	**Chalk and talk, ICT tools, experimental learning**	
4	**Pre-requisite:** *Constructional features of Synchronous motors, working principle and different types of motor* **Synchronous Motor:** Principle of operation, phasor diagrams, torque and torque angle, effect of change in load, Power Flow within a synchronous motor effect of change in excitation, construction of V and inverted V curves. Synchronous condenser, hunting and damping. Methods of starting	7

	synchronous motors. Comparison of Induction motor and Synchronous Motor	
Pedagogy	**Chalk and talk, ICT tools, experimental learning**	
5	**Pre-requisite:** *Constructional features and working principle of DC machines and AC machines* **SPECIAL MACHINES:** Constructional features, operation and applications of Switched Reluctance Motor, Brushless DC motors, Permanent Magnet Synchronous motor, Linear Induction Motor Stepper motor and universal motor. Performance characteristics of BLDC, PMSM Linear Induction Motor and Stepper motor (Open loop and closed loop)	**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	Electric Machines, D. P. Kothari, et al, 4th Edition, 2011.
2	Electric Machines, Ashfaq Hussain, Dhanpat Rai & Co, 2nd Edition, 2013.
Reference Books	
1	Electric Machines, Mulukuntla S. Sarma, at el, Cengage, 1st Edition, 2009
2	Principals of Electrical Machines, V.K Mehta, Rohit Mehta, S Chand, 2nd edition, 2009

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

CO	**Course Outcomes**	**RBT Level**	**RBT Level Indicator**
CO1	Remember and understand the constructional features operation and classification of AC	**L1, L2**	**R,U**
CO2	Apply the fundamental concepts of electric motors to find performance parameters.	**L3**	**A**
CO3	Analyze the performance characteristics and their applications of electric Motors	**L4**	**An**

CO4	Estimate the speed of DC and AC motors using modern tool usage such as MATLAB, Proteus,	**L5**	**E**

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	https://archive.nptel.ac.in/courses/108/105/108105155/
2	https://nptel.ac.in/courses/108102146
3	https://onlinecourses.nptel.ac.in/noc21_ee24/preview

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	10	20		
Apply	20	20	**10**	**10**
Analyse	10		20	20

Evaluate			20	20
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	10	10	10		10	10	50	50%
CO2	5	5		10	10	10	40	40%
CO3	5	5					10	10%
CO4								
CO5								
Total	20	20	10	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (100% Theory)
Remember	10
Understand	20
Apply	13
Analyse	7
Evaluate	00
Create	00

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 3	Module-4	Module-5		
CO1	10	10	10	10	20	60	60%
CO2	5	5	5	10		25	25%
CO3	5	5	5			15	15%
CO4							
CO5							
Total							

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**				
Course Title	:	**Sensors and Transducers**				
Course Code	:	**BEE404**				
Course Type (Theory/ Practical/ Integrated)	:	**Theory**				
Category	:	**PCC**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**3:0:0:0**		**SEE**	:	**50**
Total Hours	:	**40**		**SEE Duration**	:	**3 hours**
Credits	:	**3**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To acquire a foundational understanding of the importance of sensors, classification, characteristics, and the criteria for selecting the right sensor for specific applications
2	Explain the working of various transducers and sensors.
3	Outline the recent trends in sensor technology and their selection.
4	Gain knowledge of data transmission and telemetry, configuration of Data Acquisition System and different data conversion.

Teaching-Learning Process

Pedagogical Initiatives:

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

1.Lecture method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.

2. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.

3. Encourage collaborative (Group) Learning in the class.

4. Ask at least three HOT (Higher-order Thinking) questions in the class, which promotes critical thinking.

5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the

ability to evaluate, generalize, and analyse information rather than simply recall it.

6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.
9. Individual teachers can device innovative pedagogy to improve teaching-learning

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	**Sensors:** Introduction, Importance and role of sensors in technology Classification of sensors based on sensing principles Sensor characteristics: accuracy, precision, resolution, and sensitivity Sensor selection criteria and trade-offs. Overview of various sensor types: Temperature, pressure, force, motion, proximity, optical, chemical, Fiber Optic Sensors, Reflector based ECG, EMG, etc. Working principles and operating mechanisms of different sensors	8
Pedagogy	**1. Chalk and talk 2. Animated/NPTEL videos 3. Blended Learning**	
2	**Pre-requisite:** *Understanding of Force, Strain, Pressure, Flow, Humidity, Moisture* **Measurement of Non – Electrical Quantities of Sensors:** Force, Strain, and Tactile Sensors - Strain Gauges, Tactile, Switch Sensors, Piezoelectric Sensors, Piezoresistive, MEMS Sensors, Capacitive Touch Sensors, Acoustic Touch Sensors, Optical Sensors, Pressure Sensors, Flow Sensors, Humidity and Moisture Sensors	8
Pedagogy	**1. Chalk and talk 2. Animated/NPTEL videos 3. Blended Learning**	
3	**Special Sensors:** GPS, Bluetooth, Smart Sensors - Film sensor, MEMS & Nano Sensors, LASER sensors. Touch screen sensor, Heading Sensors – Compass, Gyroscope, Inclinometers, Applications of sensors Sensor Standardization, Calibration and errors	8
Pedagogy	**1. Chalk and talk 2. Animated/NPTEL videos 3. Blended Learning**	
4	**Transducers**: Introduction, Classification of Transducers, Advantages and Disadvantages of Electrical Transducers, Transducers Actuating Mechanisms, Resistance Transducers, Variable	8

	Inductance Transducers, Capacitive Transducers, Piezoelectric Transducers, Hall Effect Transducers, Thermoelectric Transducers, Photoelectric Transducers, LVDT, Types, RVDT	
Pedagogy	**1. Chalk and talk 2. Animated/NPTEL videos 3. Blended Learning**	
5	**SIGNAL CONDITIONING and DAQ SYSTEMS:** Amplification, Filtering, Sample and Hold circuits, Data Acquisition: Single channel and multi-channel data acquisition, Data logging – applications- Automobile, Aerospace, Home appliances, Manufacturing, Environmental monitoring **DATA TRANSMISSION AND TELEMETRY:** Data/Signal Transmission, Telemetry.	**8**
Pedagogy	**1. Chalk and talk 2. Animated/NPTEL videos 3. Blended Learning**	
	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	Fraden, J. Handbook of Modern Sensors: Physics, Designs, and Applications. 4th ed. Springer, 2010. ISBN: 9781441964656.
2	Electrical and Electronic Measurements and instrumentation, R.K Rajput, S. Chand, 3rd Edition, 2013
Reference Books	
1	Ernest O Doebelin, "Measurement Systems – Applications and Design", Tata McGraw-Hill,2009
2	Sawney A K and Puneet Sawney, "A Course in Mechanical Measurements and Instrumentation and Control", 12th edition, Dhanpat Rai & Co, New Delhi, 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 fundamental types, classification and working of various Sensors and Transducers	**L1,L2**	**R,U**
CO2	Apply fundamental engineering concepts for the measurement of electrical and non-electrical quantities using Sensors and Transducers	**L3**	**A**

CO3	Analyze the signal conditioning and signal conditioning equipment, data transmission and telemetry	**L4**	**An**
CO4	Evaluate the performance of various sensors and transducers using Simulation tools	**L5**	**E**

Mapping of Course Outcomes to Program Outcomes:

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

Web links and Video Lectures (e-Resources)	
1	https://nptel.ac.in/courses/108108147
2	https://onlinecourses.nptel.ac.in/noc23_ee105/preview
3	https://sl-coep.vlabs.ac.in/

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	5		
Understand	20	20	10	10

Apply	20	20	15	15
Analyze		5	25	
Evaluate				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	20	10	5	5	15		55	55%
CO2		10	5	5	5	10	35	35%
CO3					5	5	10	10%
CO4								
Total	20	20	10	10	25	15	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks (90% Theory+10% Practical Questions)
Remember	10
Understand	20
Apply	10
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	20	15	10	10	5	60	60%
CO2		5	10		5	20	20%
CO3				10	10	20	20%
CO4							
Total	20	20	20	20	20	100	100%

EMERGING TECHNOLOGY COURSE (ETC)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	**:**	**4th**				
Course Title	**:**	**Communication Engineering**				
Course Code	**:**	**BEE405**				
Course Type (Theory/ Practical/ Integrated)	**:**	**Theory**				
Category	**:**	**ETC**				
Stream	**:**	**EEE**		**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	**:**	**03**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To introduce various types of communication systems and communication channels
2	To discuss digital modulation techniques, seven layer OSI model, GSM & TDMA, CDMA technology
3	To explain meaning and networking components of IoT, IoT connecting technology and IoT interoperability
4	To familiarize the students with Smart grid and SCADA
5	To explain communication engineering employed in Smart grid and SCADA

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 of Communication Engineering
- Encourage collaborative (Group) Learning to encourage team building.
- Ask **HOTS (Higher-order Thinking Skills)** module-wise questions to promote critical thinking.
- 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 :** Elements of an Electrical Communication System (The Transmitter, The Channel, The Receiver), Digital Communication System (Block Diagram), Communication channels and their characteristics – Fibre Optic Channels, Wireless Electromagnetic Channels **Broadband Satellite and Microwave Communication :** Introduction to Broadband Satellite and Microwave Systems, Broadband Satellite Applications, Broadband Microwave Applications, Fundamentals of Satellite Systems	**08**
Pedagogy	**Industrial Visit to ISRO Bangalore**	
2	**GSM, TDMA, CDMA Technology:** Introduction to GSM, TDMA and CDMA. CDMA Network and System Architecture **Communication Protocol:** Overview of Ethernet, IP, Ethercad, MOD Bus (Block Diagram level) and their applications.	**08**
Pedagogy	**Different Videos to demonstrate various concepts of Wireless Communication**	
3	**Internet of Things :** Meaning and Evolution of IoT, Networking Components of IoT, Tunneling, **IoT Connectivity Technologies :** Zigbee, Comparison among OSI stack, IEEE 802.15.4 communication protocol stack **IoT Interoperability :** Importance of interoperability in IoT, Heterogeneity in IoT devices, Taxonomy of Interoperability	**08**
Pedagogy	**Case Studies on IoT in agriculture and healthcare sector**	
4	**Communication Technologies for Electric Vehicle:** Introduction, Basics of CAN, LIN, Flexray and their applications, Overview of CANalyser Tool. Overview of EV charging solutions in an IoEV within a smart city infrastructure.	**08**
Pedagogy	**Use of CANalyser Tool**	

5	**Communications in Smart Grid and SCADA** **Introduction :** Overview and Benefits of Smart Grid **Advance Metering Infrastructure :** Importance of AMI, Communication Architecture for AMI **SCADA :** Traditional SCADA Schematics, Substation automation with IEC 61850-7-1 **Networking for SCADA :** DNP3 protocol architecture, DNP3 over IP	**08**

Text Books	
Sl. No.	**Title of the Book/Name of the author/Name of the publisher/Edition and Year**
1	Fundamental of Communication Systems by John G Proakis, Masoud Salehi, Published by Pearson, 2005, ISBN 978-81-317-0573-5
2	Data Communications and Networking by Behrouzan A. Forouzan, Published by McGraw Hill (India) Pvt Ltd, ISBN -13 : 978-1-25-906475-3
3	Introduction to Wireless Telecommunications Systems and Networks by Gary J. Mullet, Published by Cengage Learning, 2006, ISBN -13 : 978-81-315-0559-5
4	Introduction to IoT by Sudip Misra, Anandarup Mukherjee and Arijit Roy, Published by Cambridge University Press, Reprint 2023, ISBN 978-1-108-84295-2
Reference Books	
1	Modern Electric, Hybrid Electric, and Fuel Cell Vehicles: Fundamentals by M. Ehsani, Y. Gao, S.Gayand Ali Emadi, CRC Press, 2005
2	Electric and Hybrid Vehicles: Design Fundamentals by Iqbal Hussain, CRC Press, 2003

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understand digital, wireless, fibre optic and satellite communications, GSM CDMA, IoT, communication systems for Electric Vehicle, SCADA and Smart Grid.	**L1, L2**	**U**
CO2	Apply different concepts of various communication protocols and IoT interoperability, advance metering and SCADA.	**L3**	**A**
CO3	Analyse different communication technologies and protocols related to SCADA, AMI, Electric Vehicle, IoT and wireless communication networks	**L4**	**An**
CO4	Evaluate various protocols and associated software tools used in Smart Grid, SCADA, EV and IoT.	**L5**	**E**

Mapping of Course Outcomes to Program Outcomes:

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

Web links and Video Lectures (e-Resources)	
1	Communication Challenges and Solutions in the Smart Grid by Faycal Bouhafs, Michael Mackay, Madjid Merabti - Springer, 2014
2	Communication Networks for Smart Grids by Kenneth C Budka, Jayant G Deshpande and Marina Thottan – Springer, 2014
3	Review of Communication Technologies for Electric Vehicle Charging Management and Coordination by Eiman Elghaman, Mohamad Hassan and Ahmed Osman and Ibtihal Ahmed – WORLD Electric Vehicle Journal, MDPI, Published on 28 June 2021
4	Linking Electric Vehicle to the Smart Grid edited by Junwei Lu and Jahangir Hossain , published by the Institution of Engineering and Technology, London, UK in 2015, ISBN 978-1-84919-856-1

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	30	10		

Apply	20	20	20	20
Analyse		20	20	20
Evaluate			10	10
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	10	5	5	5	5	5	35	35%
CO2	6	6	8	-	10	10	40	40%
CO3	-	5	5	5	5	5	25	25%
CO4	-	-	-	-	-	-		
Total	16	16	18	10	20	20	100	100%

SEE- Semester End Examination (50 Marks)

Bloom's Category	SEE Marks
Remember	
Understand	20
Apply	20
Analyse	10
Evaluate	
Create	

SEE Course Plan

CO's	Marks Distribution					Total Marks	Weightage
	Module-1	Module-2	Module 2 to 3	Module-4	Module-5		
CO1	10	5	10	5	5	35	35%
CO2	6	6	8	10	10	40	40%
CO3		5	10	5	5	25	25%
CO4							
Total	16	16	28	20	20	100	100%

Professional Core Lab (PCL)

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:	**IV**				
Course Title	:	**Electric Motors Laboratory**				
Course Code	:	**BEEL406**				
Course Type (Theory/ Practical/ Integrated)	:	**Practical**				
Category	:	**PCL**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**1:0:2:0**		**SEE**	:	**50**
Total Hours	:	**30**		**SEE Duration**	:	**3 Hours**
Credits	:	**2**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	Perform load tests on DC and AC machines to determine their characteristics
2	Conduct test on synchronous motor to draw the performance curves.
3	Conduct test for pre-determination of the performance characteristics of DC machines
4	To control the speed of DC motor

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.
- 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

1.	Load test on DC shunt motor to draw speed–torque and horse power–efficiency characteristics	**Hours**
2.	Field Test on DC series machines.	**3**
3.	Speed control of DC shunt motor by armature and field control.	**3**
4.	Swin burne's Test on DC motor.	**3**
5.	Regenerative test on DC shunt machines.	**3**
6.	Load test on three phase induction motor.	**3**
7.	No-load and Blocked rotor test on three phase induction motor to draw (i) equivalent circuit and (ii) circle diagram. Determination of performance parameters at different load conditions.	**3**
8.	Load test on single phase induction motor to draw output versus torque, current, power and efficiency characteristics.	**3**
9.	Conduct suitable tests to draw the equivalent circuit of single phase induction motor and determine performance parameters	**3**
10.	Conduct an experiment to draw V and Inverted V curves of synchronous motor at no load and load conditions	**3**
11.	Model 3-phase induction motor using MATLAB and Simulink	**3**
12.	a) Model Brushless DC motor using MATLAB and Simulink	
13.	**Demonstration Experiment:** Load test on induction generator.	

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Determine their characteristics of AC and DC motors.	**L3**	**A**
CO2	Perform load test on AC and DC motor to assess its performance	**L3**	**A**
CO3	Pre-determine the performance characteristics of DC and AC machines by conducting suitable tests.	**L4**	**An**
CO4	To control the speed of DC motor	**L4**	**An**

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	-	-	-	-	-	-	-	3	3	-	-	2	-
CO2	-	3	-	-	-	-	-	-	3	3	-	-	2	-
CO3	-	3	-	-	-	-	-	-	3	3	-	-	2	-
CO4	-	3	-	-	-	-	-	-	3	3	-	-	2	-

Web links and Video Lectures (e-Resources)	
1	https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html
2	https://em-coep.vlabs.ac.in/List%20of%20experiments.html

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	06
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

(Autonomous Institute under VTU)

Semester	:	**4th**				
Course Title	:	**Arduino & Raspberry Pi Circuit Models.**				
Course Code	:	**BEE407**				
Course Type (Theory/ Practical/ Integrated)	:	**Experiential learning Project**				
Category	:	**AEC**				
Stream	:	**EEE**		**CIE**	:	**50**
Teaching hours/ week (L:T:P:S)	:	**0:0:0:2**		**SEE**	:	**50**
Total Hours	:	**24 Hours**		**SEE Duration**	:	**3 hours**
Credits	:	**1**				

Course Learning Objectives: Students will be able to:

Sl. No	Course Objectives
1	To impart necessary and practical knowledge of components of Internet of Things.
2	To apply skills required to build real-life IOT based projects.
3	To Develop skills in identifying and resolving common hardware and software issues in Arduino and Raspberry Pi projects.
4	To Gain proficiency in using Arduino boards, including setup, programming with Arduino IDE, and interfacing with sensors and actuators.

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 IoT Based Projects
- 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)**.

List of Programs:

Sl. No.	Experiments/Programs
1	To interface LED/Buzzer with Arduino and write a program to 'turn ON' LED For 1 sec after every 2 seconds.
2	To interface OLED with Arduino and write a program to print temperature and Humidity readings on it.
3	To interface motor using relay with Arduino and write a program to 'turn ON' motor when push button is pressed
4	To interface Bluetooth with Arduino and write a program to send sensor data to Smartphone using Bluetooth
5	To interface Bluetooth with Arduino and write a program to turn LED ON/OFF when '1'/'0' is received from Smartphone using Bluetooth
6	Write a program on Raspberry Pi to upload temperature and humidity data to thing speak cloud

List of Projects:

Students can select appropriate projects with the approval of the guide. The projects be application oriented and can be considering any of the following or any other.

- Smart Home Automation
- Weather Station
- Robotics
- Security Systems
- Health Monitoring
- Agricultural Automation

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
CO1	Understanding of the fundamental concepts of Internet of Things and its hardware and software components	L2	Understand
CO2	Remotely monitor data and control devices	L3/L4	Analyze/ Evaluate
CO3	Interface I/O devices, sensors & communication modules and Develop real life IoT	L5	Design

Mapping of Course Outcomes to Program Outcomes:

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

Weblinks and Video Lectures (e-Resources)	
1	http://digimat.in/nptel/courses/video/106105166/L28.html
2	https://www.youtube.com/watch?v=GsJ2q7ILS3g
3	https://ieeexplore.ieee.org/document/7916808
4	https://ieeexplore.ieee.org/document/10303459/

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.

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.

Dayananda Sagar Academy of Technology & Management

(Autonomous Institute under VTU)

Semester	:					
Course Title	:					
Course Code	:					
Course Type (Theory/ Practical/ Integrated)	:					
Category	:					
Stream	:			**CIE**	:	
Teaching hours/ week (L:T:P:S)	:			**SEE**	:	
Total Hours	:			**SEE Duration**	:	
Credits	:					

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 surrounding.
2	create a responsible connection with the society.
3	Understand the community in general in which they work.
4	Identify the needs and problems of the community and involve them in problem –solving.
5	Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6	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

General Instructions - Pedagogy :

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

- 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.
- State the need for activities and its present relevance in the society and Provide real-life examples.
- Support and guide the students for self-planned activities.
- You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
- Encourage the students for group work to improve their creative and analytical skills

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

Contents :

The course is mainly activity-based that will offer a set of activities for the student that enables them to connect with fellow human beings, nature, society, and the world at large.

The course will engage students for interactive sessions, open mic, reading group, storytelling sessions, and semester-long activities conducted by faculty mentors.

In the following a set of activities planned for the course have been listed:

Module No.	Topics	Hours
1	**Part I:** **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.	
Pedagogy		
2	**Part II :** **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.	
Pedagogy		
3	**Part III :** **Organic farming and waste management:** Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus –Objectives,Visit, case study, report, outcomes.	
Pedagogy		
4	**Part IV:** **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.	
Pedagogy		

5	**Part V :** **Food walk:** City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study,report, outcomes.	
	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	
2	
Reference Books	
1	
2	

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

CO	Course Outcomes	RBT Level	RBT Level Indicator
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															
CO2															
CO3															
CO4															
CO5															

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	Control Systems	BEE401	Core	IPCC	Designing, modelling and analysing system stability of a control system.
2	Micro Controller and Embedded Systems	BEE402	Core	IPCC	Design and Program Embedded Application circuits using ARM Microcontroller
3	Electric Motors Laboratory	BEEL406	Lab	PCL	• Hands-on Experience • Skill Development • Performance Characteristics of Electric Motors • Problem Solving • Familiarity with Electrical Machines with testing and operation
4	Arduino & Raspberry Pi Circuit Models.	BEE407	Project	AEC	• Programming Skills • Sensors integration • Problem solving • Project planning and management • Innovation and creativity