MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Bachelor of Engineering

PHYSICS GROUP

II Semester Scheme and Syllabus
(2025 Scheme)

VISION

To empower young minds through technology, research and innovation, to produce technically competent and socially responsible professionals in higher education.

MISSION

1. To deliver excellence in education through innovative teaching, impactful research, and continuous skill development, preparing students to meet global challenges with technical expertise and ethical responsibility.
2. To foster a transformative learning environment that integrates technology, research and practical experience, empowering students to become skilled professionals and socially conscious leaders.
3. To cultivate a culture of lifelong learning and professional excellence by encouraging creativity, research, and community engagement, equipping students with the skills to thrive in a dynamic world.
4. To provide a holistic educational experience that combines advanced technology, hands-on research, and community-focused learning, shaping students into competent, ethical professionals who contribute positively to society.

QUALITY POLICY

Rajarajeswari College of Engineering is committed to imparting quality technical education that nurtures competent, ethical professionals with global relevance. We ensure academic excellence through a dynamic, outcome-based curriculum, experienced faculty, and cutting-edge infrastructure. Continuous improvement is driven by innovation, research and strong industry collaboration. We foster holistic development and a progressive environment that supports lifelong learning, teamwork, and professional growth.

CORE VALUES

Academic Excellence, Integrity, Innovation, Global Competence, Continuous Improvement.

PROGRAM OUTCOMES (POs)

PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems /components / processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modeling, analysis & interpretation of data to provide valid conclusions. (WK8).

PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modeling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, WK7).

PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

PO9: Communication: Communicate effectively and inclusively within the community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

INDEX

Dept: CSD & ISE

Sl. No.	Course Code	Course Title	Page No.
1.	B25MCS201	Numerical Methods	2
2.	B25PCS202	Quantum Physics and Applications	5
3.	B25EGK203	Engineering Graphics	8
4.	B25ESB204	Introduction to Electrical Engineering	11
5.	B25ESC204	Introduction to Electronics and Communication	13
6.	B25PIC205	Programming in C	15
7.	B25CPL207	C Programming Lab	18

Dept: ECE

Sl. No.	Course Code	Course Title	Page No.
1.	B25MEE201	Calculus, Laplace Transform and Numerical Techniques	21
2.	B25PEC202	Quantum Physics and Electronics Sensors	23
3.	B25EGK203	Engineering Graphics	27
4.	B25ESE204	Essentials of Information Technology	30
5.	B25ECE205	Basics Electronics	32
6.	B25ECL207	Basics Electronics Lab	35

Dept: EEE

Sl. No.	Course Code	Course Title	Page No.
1.	B25MEE201	Calculus, Laplace Transform and Numerical Techniques	38
2.	B25PEE202	Electrical Engineering Materials	40
3.	B25EGK203	Engineering Graphics	44
4.	B25ESE204	Essentials of Information Technology	47
5.	B25EEE205	Basics of Electrical Engineering	49
6.	B25EEL207	Basics Electrical Engineering Lab	51

Dept: R&A

Sl. No.	Course Code	Course Title	Page No.
1.	B25MME201	Integral Calculus and Numerical methods	54
2.	B25PME202	Physics for Materials	56
3.	B25EGK203	Engineering Graphics	60
4.	B25ESE204	Essentials of Information Technology	63
5.	B25EME205	Elements of Mechanical Engineering	65
6.	B25MEL207	Elements of Mechanical Engineering Lab	68

Dept: CV

Sl. No.	Course Code	Course Title	Page No.
1.	B25MME201	Integral Calculus and Numerical Methods	71
2.	B25PCV202	Physics for Sustainable Structural Systems	73
3.	B25EGK203	Engineering Graphics	77
4.	B25ESE204	Essentials of Information Technology	80
5.	B25CIV205	Engineering Mechanics	82
6.	B25MML207	Mechanics and Materials Lab	85

II semester Physics Group Common Courses

Sl. No.	Course Code	Course Title	Page No.
1.	B25SSK206	Soft Skills	89
2.	B25PRJ208	Interdisciplinary Project Based Learning	91
3.	B25SKK209	Samskrutika Kannada	100
4.	B25BKK209	Balake Kannada	103

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Scheme of Teaching and Examinations – 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

II Semester — Physics Group: CSD — Academic Year: 2025-26

Sl. No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	SAAE	CIE Marks	SEE Duration Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	ASC	B25MCS201	Numerical Methods	Maths	**3**	**2**	**0**		**50**	**3**	**50**	**100**	**4**
2.	ASC(IC)	B25PCS202	Quantum Physics and Applications	PHY	**3**	**0**	**2**		**50**	**3**	**50**	**100**	**4**
3.	ESC	B25EGK203	Engineering Graphics	ME	**2**	**0**	**2**		**50**	**3**	**50**	**100**	**3**
4.	ESC	B25ESC204	Introduction to Electronics and Communication	ECE	**3**	**0**	**0**		**50**	**3**	**50**	**100**	**3**
5.	PSC	B25PIC205	Programming in C	CSE	**3**	**0**	**0**		**50**	**3**	**50**	**100**	**3**
6.	AEC NCMC	B25SSK206	Soft Skills	Humanities	**1**	**0**	**0**		**100**	**--**	**--**	**100**	**pp**
7.	PSC	B25CPL207	C Programming Lab	CSE	**0**	**0**	**2**		**50**	**3**	**50**	**100**	**1**
8.	AEC/ SDC	B25PRJ208	Interdisciplinary Project Based Learning	Combination of Depts.	**0**	**0**	**0**	**2**	**100**	**--**	**--**	**100**	**1**
9.	HSMS	B25SKK209 / B25BKK209	Samskrutika Kannada/ Balake Kannada	Humanities	**1**	**0**	**0**		**50**	**1**	**50**	**100**	**1**
								TOTAL	**550**		**350**	**900**	**20**

S-(SAAE) Students Academic Activity Engagement Hours, **ASC** – Applied Science Course, **ESC -** Engineering Science Courses, **IC -** Integrated Course (Practical Course with Theory Course), **PLC (IC) –** Programming Language Course (Integrated Course), **AEC -** Ability Enhancement Course, **AEC/SDC -** Ability Enhancement Course/Skill Development course, **ETC -**Emerging Technology Course, **TD/PSB -** Teaching Department/ Paper Setting Board, **HSMC -** Humanity, Social Science and management Course, **CIE -** Continuous Internal Evaluation, **SEE -**Semester End Examination, **PP/NP -**Pass/ Not Pass.

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Scheme of Teaching and Examinations – 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

II Semester — Physics Group: ISE (A&B) — Academic Year: 2025-26

Sl. No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	SAAE	CIE Marks	SEE Duration Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	ASC	B25MCS201	Numerical Methods	Maths	3	2	0		50	3	50	100	4
2.	ASC(IC)	B25PCS202	Quantum Physics and Applications	PHY	3	0	2		50	3	50	100	4
3.	ESC	B25EGK203	Engineering Graphics	ME	2	0	2		50	3	50	100	3
4.	ESC	B25ESB204	Introduction to Electrical Engineering	EEE	3	0	0		50	3	50	100	3
5.	PSC	B25PIC205	Programming in C	CSE	3	0	0		50	3	50	100	3
6.	AEC NCMC	B25SSK206	Soft Skills	Humanities	1	0	0		100	--	--	100	pp
7.	PSC	B25CPL207	C Programming Lab	CSE	0	0	2		50	3	50	100	1
8.	AEC/ SDC	B25PRJ208	Interdisciplinary Project Based Learning	Combination of Depts.	0	0	0	2	100	--	--	100	1
9.	HSMS	B25SKK209 / B25BKK209	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0		50	1	50	100	1
								TOTAL	550		350	900	20

S-(SAAE) Students Academic Activity Engagement Hours, **ASC** – Applied Science Course, **ESC** - Engineering Science Courses, **IC** - Integrated Course (Practical Course Integrated with Theory Course), **PLC (IC) –** Programming Language Course (Integrated Course), **AEC** - Ability Enhancement Course, **AEC/SDC** - Ability Enhancement Course/Skill Development course, **ETC** -Emerging Technology Course, **TD/PSB** - Teaching Department/ Paper Setting Board, **HSMC** - Humanity, Social Science and management Course, **CIE** - Continuous Internal Evaluation, **SEE** -Semester End Examination, **PP/NP** -Pass/ Not Pass.

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Scheme of Teaching and Examinations – 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

II Semester — Physics Group: ECE — Academic Year: 2025-26

Sl. No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	SAAE	CIE Marks	SEE Duration Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	ASC	B25MEE201	Calculus, Laplace Transform and Numerical Techniques	Maths	**3**	**2**	**0**		**50**	**3**	**50**	**100**	**4**
2.	ASC(IC)	B25PEC202	Quantum Physics and Electronics Sensors	PHY	**3**	**0**	**2**		**50**	**3**	**50**	**100**	**4**
3.	ESC	B25EGK203	Engineering Graphics	ME	**2**	**0**	**2**		**50**	**3**	**50**	**100**	**3**
4.	ESC	B25ESE204	Essentials of Information Technology	CSE (IC)	**3**	**0**	**0**		**50**	**3**	**50**	**100**	**3**
5.	PSC	B25ECE205	Basic Electronics	ECE	**3**	**0**	**0**		**50**	**3**	**50**	**100**	**3**
6.	AEC NCMC	B25SSK206	Soft Skills	Humanities	**1**	**0**	**0**		**100**	**--**	**--**	**100**	**pp**
7.	PSC	B25ECL207	Basic Electronics Lab	ECE	**0**	**0**	**2**		**50**	**3**	**50**	**100**	**1**
8.	AEC/ SDC	B25PRJ208	Interdisciplinary Project Based Learning (**Project-based learning**)	Combination of Depts.	**0**	**0**	**0**	**2**	**100**	**--**	**--**	**100**	**1**
9.	HSMS	B25SKK209 / B25BKK209	Samskrutika Kannada/ Balake Kannada	Humanities	**1**	**0**	**0**		**50**	**1**	**50**	**100**	**1**
								TOTAL	**550**		**350**	**900**	**20**

S-(SAAE) Students Academic Activity Engagement Hours, **ASC** – Applied Science Course, **ESC -** Engineering Science Courses, **IC -** Integrated Course (Practical Course Integrated with Theory Course), **PLC (IC) –** Programming Language Course (Integrated Course), **AEC -** Ability Enhancement Course, **AEC/SDC -** Ability Enhancement Course/Skill Development course, **ETC -**Emerging Technology Course, **TD/PSB -** Teaching Department/ Paper Setting Board, **HSMC -** Humanity, Social Science and management Course, **CIE -** Continuous Internal Evaluation, **SEE -**Semester End Examination, **PP/NP -**Pass/ Not Pass.

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Scheme of Teaching and Examinations – 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

II Semester **Physics Group: EEE** **Academic Year: 2025-26**

Sl. No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	SAAE	CIE Marks	SEE Duration Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	ASC	B25MEE201	Calculus, Laplace Transform and Numerical Techniques	Maths	3	2	0		50	3	50	100	4
2.	ASC(IC)	B25PEE202	Electrical Engineering Materials	PHY	3	0	2		50	3	50	100	4
3.	ESC	B25EGK203	Engineering Graphics	ME	2	0	2		50	3	50	100	3
4.	ESC	B25ESE204	Essentials of Information Technology	CSE (IC)	3	0	0		50	3	50	100	3
5.	PSC	B25EEE205	Basics of Electrical Engineering	EEE	3	0	0		50	3	50	100	3
6.	AEC NCMC	B25SSK206	Soft Skills	Humanities	1	0	0		100	--	--	100	pp
7.	PSC	B25EEL207	Basic Electrical Engineering Lab	EEE	0	0	2		50	3	50	100	1
8.	AEC/ SDC	B25PRJ208	Interdisciplinary Project Based Learning (**Project-based Learning**)	Combination of Depts.	0	0	0	2	100	--	--	100	1
9.	HSMS	B25SKK209 / B25BKK209	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0		50	1	50	100	1
				TOTAL	**550**						**350**	**900**	**20**

S-(SAAE) Students Academic Activity Engagement Hours, **ASC** – Applied Science Course, **ESC -** Engineering Science Courses, **IC -** Integrated Course (Practical Course Integrated with Theory Course), **PLC (IC) –** Programming Language Course (Integrated Course), **AEC -** Ability Enhancement Course, **AEC/SDC -** Ability Enhancement Course/Skill Development course, **ETC -**Emerging Technology Course, **TD/PSB -** Teaching Department/ Paper Setting Board, **HSMC -** Humanity, Social Science and management Course, **CIE -** Continuous Internal Evaluation, **SEE -**Semester End Examination, **PP/NP -**Pass/ Not Pass.

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Scheme of Teaching and Examinations – 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

II Semester — Physics Group: R&A — Academic Year: 2025-26

Sl. No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	SAAE	CIE Marks	SEE Duration Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	ASC	B25MME201	Integral Calculus and Numerical methods	Maths	3	2	0		50	3	50	100	4
2.	ASC(IC)	B25PME202	Physics for Materials	PHY	3	0	2		50	3	50	100	4
3.	ESC	B25EGK203	Engineering Graphics	RA/ME	2	0	2		50	3	50	100	3
4.	ESC	B25ESE204	Essentials of Information Technology	CSE (IC)	3	0	0		50	3	50	100	3
5.	PSC	B25EME205	Elements of Mechanical Engineering	RA/ME	3	0	0		50	3	50	100	3
6.	AEC NCMC	B25SSK206	Soft Skills	Humanities	1	0	0		100	--	--	100	pp
7.	PSC	B25MEL207	Elements of Mechanical Engineering Lab	RA/ME	0	0	2		50	3	50	100	1
8.	AEC/ SDC	B25PRJ208	Interdisciplinary Project Based Learning (**Project-based learning**)	Combination of Depts.	0	0	0	2	100	--	--	100	1
9.	HSMS	B25SKK209 / B25BKK209	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0		50	1	50	100	1
								TOTAL	550		350	900	20

S-(SAAE) Students Academic Activity Engagement Hours, **ASC** – Applied Science Course, **ESC -** Engineering Science Courses, **IC -** Integrated Course (Practical Course with Theory Course), **PLC (IC) –** Programming Language Course (Integrated Course), **AEC -** Ability Enhancement Course, **AEC/SDC -** Ability Enhancement Course/Skill Development course, **ETC -**Emerging Technology Course, **TD/PSB -** Teaching Department/ Paper Setting Board, **HSMC -** Humanity, Social Science and management Course, **CIE -** Continuous Internal Evaluation, **SEE -**Semester End Examination, **PP/NP -**Pass/ Not Pass.

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Scheme of Teaching and Examinations – 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

II Semester — Physics Group: CV — Academic Year: 2025-26

Sl. No	Course Category and Course Code		Course Title	TD / PSB	Teaching Hours / Week				Examination				Credits
					Lecture	Tutorial	Practical	SAAE	CIE Marks	SEE Duration Hrs	SEE Marks	Total Marks	
					L	T	P	S					
1.	ASC	B25MME201	Integral Calculus and Numerical Methods	Maths	3	2	0		50	3	50	100	4
2.	ASC(IC)	B25PCV202	Physics for Sustainable Structural Systems	PHY	3	0	2		50	3	50	100	4
3.	ESC	B25EGK203	Engineering Graphics	ME	2	0	2		50	3	50	100	3
4.	ESC	B25ESE204	Essentials of Information Technology	CSE (IC)	3	0	0		50	3	50	100	3
5.	PSC	B25CIV205	Engineering Mechanics	Civil	3	0	0		50	3	50	100	3
6.	AEC NCMC	B25SSK206	Soft Skills	Humanities	1	0	0		100	--	--	100	pp
7.	PSC	B25MML207	Mechanics and Materials Lab	Civil	0	0	2		50	3	50	100	1
8.	AEC/ SDC	B25PRJ208	Interdisciplinary Project Based Learning (**Project-based learning**)	Combination of Depts.	0	0	0	2	100	--	--	100	1
9.	HSMS	B25SKK209 / B25BKK209	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0		50	1	50	100	1
								TOTAL	550		350	900	20

S-(SAAE) Students Academic Activity Engagement Hours, **ASC** – Applied Science Course, **ESC** - Engineering Science Courses, **IC** - Integrated Course (Practical Course Integrated with Theory Course), **PLC (IC) –** Programming Language Course (Integrated Course), **AEC** - Ability Enhancement Course, **AEC/SDC** - Ability Enhancement Course/Skill Development course, **ETC** -Emerging Technology Course, **TD/PSB** - Teaching Department/ Paper Setting Board, **HSMC** - Humanity, Social Science and management Course, **CIE** - Continuous Internal Evaluation, **SEE** -Semester End Examination, **PP/NP** -Pass/ Not Pass.

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)

Scheme of Teaching and Examinations – 2025

Outcome Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the Academic Year 2025-26)

Applied Mathematics – II					Applied Physics			
Code	**Title**	**L**	**T**	**P**	**Code**	**Title**	**L**	**T**
B25MME201	Integral Calculus and Numerical Methods: CV & ME	3	2	0	B25PCV102/ 202	Physics for Sustainable Structural System: CVStream	3	0
B25MEE201	Calculus, Laplace Transform and Numerical Techniques: EEE Stream	3	2	0	B25PME102/ 202	Physics for Materials ; ME Stream	3	0
B25MCS201	Numerical Methods: CSE Stream	3	2	0	B25PEC102/ 202	Quantum Physics and Electronic Sensors :EC Stream	3	0
					B25PEE102/ 202	Electrical Engineering Materials: EE Stream	3	0
					B25PCS102/202	Quantum Physics and Applications :CS Stream	3	0
Programme Specific Courses (PSC)					**Engineering Science Course-II (ESC-II)**			
B25CIV105/ 205	Engineering Mechanics	3	0	0	B25ESA104/ 204	Building Sciences and Mechanics	3	0
B25EME105/ 205	Elements of Mechanical Engineering	3	0	0	B25ESB104/ 204	Introduction to Electrical Engineering	3	0
B25EEE105/ 205	Basics of Electrical Engineering	3	0	0	B25ESC104/ 204	Introduction to Electronics and Communication	3	0
B25ECE105/ 205	Basic Electronics	3	0	0	B25ESD104/ 204	Introduction to Mechanical Engineering	3	0
B25PIC105/ 205	Programming in C	3	0	0	B25ESE104/ 204	Essentials of Information Technology	3	0
B25EBT105/ 205	Elements of Biotechnology	3	0	0				
B25SSA105/ 205	Principles of Soil Science and Agronomy	3	0	0				
Programme Specific Course Lab (PSCL)								
B25MML107/ 207	Mechanics and Materials Lab	0	0	2				
B25MEL107/ 207	Elements of Mechanical Engineering Lab	0	0	2				
B25EEL107/ 207	Basic Electrical Engineering Lab	0	0	2				
B25ECL107/ 207	Basic Electronics Lab	0	0	2				
B25CPL107/ 207	C Programming Lab	0	0	2				
B25EBL107/ 207	Elements of Biotechnology Lab	0	0	2				
B25SSL107/ 207	Soil Science and Agronomy Field lab	0	0	2				

***Interdisciplinary Project* (B25PRJ208):** Students of different engineering disciplines form a team to complete the project. For example, a team may include students from Mechanical Engineering, Electronics and Communication Engineering (ECE), and Computer Science and Engineering (CSE), working collaboratively implement the project.

Dean-Academics **Principal**

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Computer Science and Design

Information Science and Engineering

(2025 Scheme)

SEMESTER-II					
NUMERICAL METHODS **Category: ASC(IC)**					
Course Code	:	B25MCS201	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:2:0	SEE	:	50 Marks
Total Hours	:	45(L) + 30(T)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To Develop the knowledge of numerical methods and apply them to solve algebraic and Transcendental equations.
2.	To Analyze the properties and application of vector norms and LU decomposition.
3.	To Familiarize about interpolation techniques to estimate values between data points.
4.	To analyze boundary and initial value problems for differential equations.
5.	Develop the knowledge of numerical methods and apply them to solve differential equations.

Module– 1:Differential Equations of First and Higher Order	**No. of Hours**
Linear and Bernoulli`s differential equations. Exact and reducible to exact differential equations with integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{-1}{M}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$. Homogeneous and non-homogeneous Differential equations of higher order with constant coefficients. Inverse differential operators - $e^{ax}\ sin(ax+b), cos(ax+b)$and x^n.	9
Module– 2: Introduction to Numerical Methods	**No. of Hours**
Errors and their computation: Round off error, Truncation error, Absolute error, Relative error and Percentage error. Solution of algebraic and transcendental equations: Bisection, Regula-Falsi, Secant and Newton-Raphson methods.	9
Module– 3: Numerical solutions for system of linear equations	**No. of Hours**
Norms: Vector norms and Matrix norms- L_1, L_2 and L_∞, Ill conditioned linear system, condition number. Solution of system of linear equations: Gauss Seidel method and LU-decomposition method (Chowlesky method). Eigen values and Eigen vectors: Rayleigh power method, Jacobi's method.	9
Module– 4: Interpolation	**No. of Hours**
Finite differences, interpolation using Newton Gregary forward and Newton Gregary backward difference formulae, Newton's divided difference. Lagrange interpolation formulae, piecewise interpolation-linear and quadratic.	9
Module– 5: Numerical Integration and Numerical Solution of Differential Equations	**No. of Hours**
Numerical integration: Trapezoidal, Simpson's 1/3rd, Simpson's 3/8th rule and Weddle's rule. Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector method.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply numerical methods to solve transcendental equations, perform interpolation, numerical integration, and solve ordinary differential equations.
CO2	Solve first and higher-order differential equations using analytical methods and apply them to mathematical models.
CO3	Demonstrate the applications of computer science and allied engineering science using modern ICT tools.

Text Books	
1.	M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 8thEdition, 2022.
2.	David C Lay, Linear Algebra and its Applications, Pearson Publishers, 5thEdition, 2023.
3.	B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEdition, 2021.

Reference Text Books	
1.	V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Edition, 2017
2.	N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications, 10th Edition, 2022.
3.	S. S. Sastry, Introductory Methods of Numerical Analysis, PHI Learning Private Limited, 5th Edition, 2012.

Web links and Video lectures (e-Resources)
• https://nptel.ac.in/courses/111105160 • https://nptel.ac.in/courses/127106019 • https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/ • https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring-2012/pages/syllabus/

ASSESSMENT STRUCTURE: CIE and SEE

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments / practicing the problems**	**10**	**05**	
	Lab activity	**10**	**05**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	2	1	-	-	-	-	-	2
CO2	3	2	1	2	1	-	-	-	-	-	2
CO3	3	2	1	2	1	-	-	-	-	-	2

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom instruction (CI) in hours / semester		Lab instruction (LI) in hours / semester	Term work (TW) and self learning (SL) in hours /sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25MCS201 (L:T:P:S 3:2:0:3)	Numerical Methods	**45**	**30**	**0**	**45**	**120**	**4**

SEMESTER-II					
QUANTUM PHYSICS AND APPLICATIONS **Category: ASC(IC)**					
Course Code	:	B25PCS202	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:2	SEE	:	50 Marks
Total Hours	:	45(T)+26(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To introduce the foundations of quantum mechanics, including wave-particle duality, uncertainty principle, Schrödinger's equation, and tunneling, and to relate them to real-world computational and physical systems.
2.	To analyze the electrical properties of materials, using classical and quantum models to understand conductivity, density of states, carrier concentration, Fermi energy, and the Hall effect in metals and semiconductors.
3.	To explain the principles of superconductivity, such as critical parameters, Meissner effect, Cooper pair formation, Josephson junctions, and SQUIDs, along with their relevance in advanced quantum systems.
4.	To explore light–matter interactions and photonics, covering lasers, optical fibers, modulators, photo detectors, and interferometers, with applications in communication and sensing technologies.
5.	To introduce the fundamentals of quantum computing, including qubits, Bloch sphere representation, quantum gates, and simple circuit simulations, preparing students for emerging quantum technologies.

Module– 1	**No. of Hours**
Quantum Mechanics: de Broglie Hypothesis, Heisenberg's Uncertainty Principle and its application (Broadening of Spectral Lines), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical significance of a wave function and Born Interpretation, Expectation value and its physical significance, Eigen functions and Eigen values, Particle inside one dimensional infinite potential well, Role of higher dimensions (Qualitative), Waveforms and Probabilities, quantum tunneling, Numerical Problems.***Text Book : 1, 2***	9
Module– 2	**No. of Hours**
Electrical Properties of Metals and Semiconductors: Classical free electron theory (Assumption and failures) Merits of Quantum Free Electron Theory, Mechanisms of electron scattering in solids, Matheissen's rule, Assumptions of Quantum Free Electron Theory, Density of States, Fermi Dirac statistics, Fermi Energy, Variation of Fermi Factor With Temperature and Energy, Expression for carrier concentration, Derivation of electron concentration in an intrinsic semiconductor, Expression for electron and hole concentration in extrinsic semiconductor, Fermi level for intrinsic(with derivation) and extrinsic semiconductor (no derivation), Hall effect, Numerical Problems. ***Text Book : 1 and 3***	9
Module– 3	**No. of Hours**
Superconductivity: Zero resistance state, Persitent current, Meissner effect, Critical temperature, Critical current (Silsbee Effect) – Derivation for a cylindrical wire using ampere's law, Critical field, Formation of Cooper pairs - Mediation of phonons, Two-fluid model, BCS Theory - Phase coherent state, Limitations of BCS theory, Examples of systems with low and high electron-phonon coupling, Type-I and Type-II superconductors, Formation of Vortices, Explanation for upper critical field, Cooper pair Tunneling (Andreev reflection), Josephson junction, Flux quantization, DC and AC SQUID, Numerical Problems. ***Text Books : 1, 3***	9
Module– 4	**No. of Hours**
Photonics : Interaction of radiation with matter – Einstein's A and B coefficients, Prerequisites for lasing actions, Types of LASER – Semiconductor diode LASER, Use of attenuators for single photon sources, Optical modulators – Pockel's effect, Kerr effect, Photo detectors – Single Photon Avalanche Diode, Superconducting Nanowire Single Photon Detector, Optical fiber, Derivation of Numerical aperture, V-number, Number of modes, losses in optical fiber, Mach-Zehnder interferometer, Numerical problems. ***Text Books: 1, 2***	9
Module– 5	**No. of Hours**
Quantum Computing: Moore's law - limitation of VLSI, Classical v/s Quantum Computation, bit, Qubit and its properties, Bloch Sphere, Dirac notation, Brief discussion on types of qubit, Superconducting qubits, Harmonic oscillator (qualitative) – Need for anharmonicity, Charge qubit, Quantum Gates – Pauli Gates, Phase gate (S, T), Hadamard Gate, Two qubit gates – CNOT gate, Predicting the outputs of various combinations of single and two-qubit gates, Numerical Problems. ***Text Book: 4***	9

LABORATORY

Practical Component of IPCC (10 Experiments)

Sl. No	Name of the experiments
1.	Determination of wavelength of LASER using Diffraction Grating.
2.	Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3.	Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Light.
4.	Determination of Planck's constant using LEDs.
5.	Determination of Fermi Energy of Copper.
6.	Determination of Energy gap of the given Semiconductor.
7.	Black-Box Experiment (Identification of basic Electronic Components).
8.	Resonance in LCR circuit.
9.	Characteristics of a Bipolar Junction Transistor.
10.	Determination of resistivity of a semiconductor by Four Probe Method.
11.	Predicting the outputs of various combinations of single and two-qubit gates using QUIRK Quantum Simulator.
12.	Predicting the outputs of various combinations of single and two-qubit gates using QUISKIT.
13.	Air-wedge / Newtons to study the interference by the division of amplitude.
14.	Data Analysis using Spread Sheet.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain the core concepts of quantum mechanics such as matter waves, uncertainty principle, wave functions, and quantization of energy, with relevance to computational applications
CO2	Analyze the behavior of electrons in metals and semiconductors using classical and quantum models to derive key material properties such as conductivity and carrier concentration
CO3	Evaluate the principles and characteristics of superconductivity, including Meissner's effect, critical parameters, and Cooper pair formation, and their relevance in quantum systems
CO4	Interpret the interaction of radiation with matter and the operational principles of photonic devices such as lasers, optical fibers, modulators, and photo detectors
CO5	Summarize the basic concepts of quantum computing including qubits, quantum gates, and quantum logic, and predict simple outcomes using theoretical circuit models

Text Books	
1.	Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018
2.	Engineering Physics, S L Kakani, Shubra Kakani, 3rdEdition, 2020, CBS Publishers and Distributers Pvt
3.	Solid State Physics, S. O. Pillai, New Age International
4.	Quantum Computing, Parag. K. Lala, McGraw Hill, 2020.

Reference Text Books	
1.	Beiser, A. (2002). Concepts of Modern Physics (6thedition). McGraw-Hill Education..
2.	Griffiths, D. J. (2018). Introduction to Quantum Mechanics (2nd or 3rd edition). Pearson.
3.	Tinkham, M. (2004). Introduction to Superconductivity (2ndedition). Dover Publications.
Web links and Video lectures (e-Resources)	
• https://nptel.ac.in/courses/115106066 • https://nptel.ac.in/courses/115106127 • https://www.youtube.com/watch?v=SHoGV-sezNI • https://digimat.in/nptel/courses/video/115105131/L01.html • https://nptel.ac.in/courses/108106135/03 • https://nptel.ac.in/courses/108108174/05	

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50/2 = 25**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**10+10**	**10**	
Laboratory	**Lab Conduction & Record**	**Evaluating each expt. for 10 marks*12 expts.**	**10**	**25**
	Lab Internal Test	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25PCS202 (L:T:P:S 3:0:2:3)	Quantum Physics and Applications	**45**	**00**	**26**	**50**	**120**	**4**

SEMESTER-II					
ENGINEERING GRAPHICS **Category: ESC**					
Course Code	:	B25EGK203	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	30(T)+30(P)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To construct orthographic projections of points, lines, planes, and solids using manual drafting methods and computer-aided tools.
2.	To construct orthographic projections of solids and apply them to real-world engineering applications
3.	To develop and construct the lateral surfaces of solids and apply them to real-world engineering applications.
4.	To draw isometric views of objects and convert isometric drawings into corresponding orthographic projections.
5.	To create basic 3D models of engineering components and parts using appropriate tools.

Module– 1	**No. of Hours**
Introduction: Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves. **Orthographic Projections of Points, Lines and Planes:** Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only as per BIS) Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).	10
Module– 2	**No. of Hours**
Orthographic Projection of Solids: Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.	10
Module– 3	**No. of Hours**
Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice) **Development of Lateral Surfaces of Solids:** Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.	9
Module– 4	**No. of Hours**
Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block. Conversion of simple isometric drawings into orthographic views: Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.	9
Module– 5	**No. of Hours**
Computer Network Drawing (For CIE Only): 2D Network drawing with wired and wireless, Network topology - wired and wireless. 3D Modeling: Raspberry Pi / Arduino boards, Router & switches, IoT devices - Concept of converting to 3D printing format (stl) Concept of Industrial drawing	7

Course Outcomes: At the end of the course, the students will be able to	
CO1	Generate orthographic projections of points, lines, planes, and solids manually and with computer aided tools.
CO2	Develop the lateral surfaces of solids for real-world applications.
CO3	Draw isometric views and convert isometric drawings to orthographic views.
CO4	Create 3D models of embedded, networking, and IoT devices.

Text Books	
1.	K. R. Gopalakrishna, &SudhirGopalakrishna: A Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
2.	Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd Edition, Charotar Publishing House Pvt. Limited, 2023.
Reference Text Books	
1.	S. N. Lal and T. Madhusudhan, Engineering Visualisation, engage Learning India Pvt. Ltd.; 1st Edition, 2022
2.	P.J. Shah, Computer Aided Engineering Drawing, S. Chand Publishing, 2021

Web links and Video lectures (e-Resources)
• https://nptel.ac.in/courses/112104172 • https://nptel.ac.in/courses/112102304 • https://nptel.ac.in/courses/112105294

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Self Learning	**Sketch Book**		**20**	**50**
Theory	**Internal Assessment1**	**50**	**15 (Average of two Assessments)**	
	Internal Assessment2	**50**		
Laboratory	**Laboratory Test**	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. SEE shall be conducted in batches similar to practical's and evaluated for maximum of 100 Marks. Obtained marks shall be accounted for SEE final marks, reducing it by 50%.
2. Two full questions shall be set from Modules 1, 2, 3 and 4. Students need to answer one full question from each module. Two full questions set from each Module shall cover the entire topic of the respective module.
3. SEE shall be conducted by one Internal and one External Examiner. Evaluation shall be carried out jointly by both the examiners. The student may be awarded full marks, if he/she completes a solution on computer display without sketch.

CO-PO Mapping: Level 3 - High, Level 2 - Moderate, Level 1 - Low

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

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours/sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EGK203 (L:T:P:S-2:0:2:2)	**Engineering Graphics**	**30**	**00**	**30**	**30**	**90**	**3**

SEMESTER-II					
INTRODUCTION TO ELECTRICAL ENGINEERING **Category: ESC**					
Course Code	:	B25ESB204	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To explain the power generation concepts and laws used in the analysis of DC circuits.
2.	To explain the behavior of circuit elements in single-phase and three phase circuits.
3.	To describe the construction and operation DC machines and Transformers.
4.	To describe the application of renewable energy and introduction to EV.
5.	To describe domestic wiring and safety measures.

Module– 1	**No. of Hours**
Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach. **Power Generation:** Hydel, Nuclear, Solar & Wind power generation (Block Diagram approach). **DC Circuits:** Ohm's Law and its limitations, KCL & KVL, Series, Parallel, Series- Parallel circuits. Simple Numerical.	9
Module– 2	**No. of Hours**
Single Phase Circuits: Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Analysis of R-L, R-C, R-L-C Series circuits, Active power, Reactive power and Apparent power, Concept of power factor. **Three Phase Circuits:** Generation of Three phase AC quantity, Advantages and limitations; Star and Delta connection, Relationship between line and phase quantities	9
Module– 3	**No. of Hours**
DC Machines: DC Generator: Principle of operation, Constructional details, Induced EMF expression, Types of generators, Relation between induced EMF and terminal voltage, simple numericals on EMF equation, DC Motor: Principle of operation, Back EMF and its significance, Types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only), Torque equation, Applications of DC motors **Transformers:** Necessity of transformer, Principle of operation, Types and construction of single phase transformers, EMF equation, Losses of transformer, Efficiency, Simple numerical on Losses and Efficiency	9
Module– 4	**No. of Hours**
Applications of Renewable energy: Photovoltaic Systems, Solar distillation; Solar Pond electric power plant, Off grid solar inverter, Urban waste to energy conversion, Hydrogen based transportation system **Introduction to EV:** History, General block diagram, Application and Benefits	9
Module– 5	**No. of Hours**
Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load. **Domestic Safety:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits, Electric Shock, Earthing and its types, Safety Precautions to avoid shock **Electricity bill:** Power consumption of electrical energy, Two-part electricity tariff, Case study on calculation of electricity bill for domestic consumers.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand the concepts of power generation and solve DC circuit problems.
CO2	Analyze single-phase circuits, solve R-L,R-C, and R-L-C circuits and comprehend three-phase circuit principles.
CO3	Understand DC machines, transformers and their characteristics.
CO4	Understand the application of renewable energy and basics of EV.
CO5	Understand domestic wiring and safety measures.

Text Books	
1.	D C Kulshreshtha, Basic Electrical Engineering, Tata McGraw Hill, 1st Edition2019

Reference Text Books	
1.	B.L. Theraja, A text book of Electrical Technology, S Chand and Company, reprint edition 2014.
2.	G D Rai, Nonconventional Energy sources, , Khanna Publication, 4th Edition, 1988
3.	D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, , Tata McGraw Hill 4th edition, 2019.
4.	V. K. Mehta, Rohit Mehta, Principles of Electrical Engineering & Electronics, S. Chand and Company Publications, 2nd edition, 2015.
5.	Rajendra Prasad, Fundamentals of Electrical Engineering, PHI, 3rd edition, 2014.

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 – Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25ESB204 (L:T:P:S 3:0:0:3)	Introduction to Electrical Engineering	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
INTRODUCTION TO ELECTRONICS AND COMMUNICATION **Category: ESC**					
Course Code	:	B25ESC204	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To study the operation of Semiconductor diode, Zener diode and their applications.
2.	To study the operation of linear Op-amps and its applications
3.	To study the Basic Logic gates, circuits and their optimization.
4.	To study the Principles of Communication system.
5.	To study the operation of embedded system and its classification.

Module– 1	**No. of Hours**
Diode Theory: PN Junction Diode, Load line analysis, Series- diode configuration. Sinusoidal inputs - half wave rectification, Full wave Rectification, voltage multiplier Circuits, Zener Diodes. **Bipolar Junction Transistor:** Introduction, Common Base Configuration, Common Emitter Configuration. ***Text book: 1***	9
Module– 2	**No. of Hours**
Operational amplifier –Operational amplifier basics, practical Op-Amp circuits, Op-Amp specification –DC offset parameter, frequency parameter, Differential and common mode operation. Practical Op-Amp circuits– Inverting amplifier, non-inverting amplifier, Unity follower, Summing amplifier, Integrator, Differentiator. ***Text book: 1***	9
Module– 3	**No. of Hours**
Number Systems: Binary numbers, Number Base Conversion, Octal & Hexadecimal Numbers, Complements (1's & 2's Complements). **Boolean Algebra and Logic Circuits:** Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates. Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder. ***Text book: 2***	9
Module– 4	**No. of Hours**
Communication scheme: Elements of a Communication System, Need for Modulation, Amplitude Modulation, Frequency Modulation, Phase modulation, Comparison of FM& PM, Comparison of FM and AM. ***Text book: 3***	9
Module– 5	**No. of Hours**
Embedded systems: Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded System, Core of the Embedded System: Microprocessors, GPP Vs ASIP, Microcontrollers, Microprocessor Vs Microcontroller, DSP, RISC Vs CISC, Memory: ROM, Sensors, Actuators, LED, 7-Segment LED display. ***Text book: 4***	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyze basic electronic circuits using the principles of rectifiers, voltage regulators.
CO2	Apply the knowledge on working principle of Operational amplifier.
CO3	Apply the concepts of Boolean Algebra and Logic Circuits.
CO4	Apply the concepts of embedded systems, sensors and interfacing.
CO5	Apply the concepts of analog and digital communication schemes.

Text Books	
1.	Electronic Devices and Circuit Theory, Robert L Boylestad and Louis Nashelsky, 11th Edition, Pearson Education, 2013, ISBN: 978-93-325-4260-0.
2.	Digital Design, M Moris Mano, 5th Edition, Prentice Hall of India
3.	Electronics communication systems, George Kennedy, 5thEdition, TataMcGraw hill.
4.	Introduction to embedded systems, Shibu K V,2nd Edition, Mc Graw Hill

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/122106025 2. https://nptel.ac.in/courses/108105132 3. https://nptel.ac.in/courses/117104072

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40**	**50**
	Internal Assessment2	**50**	**(Average of Best two Assessments)**	
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25ESC204 (L:T:P:S 3:0:0:3)	Introduction to Electronics and Communication	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
PROGRAMMING IN C **Category: PSC**					
Course Code	:	B25PIC205	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To learn fundamental concepts of C programming.
2.	To learn concepts of decision statements and basic data structure.
3.	Able to implement programs by user define statements.
4.	Able to design a model by using structures and unions.
5.	Able to design and implement the real time scenarios by using various data types and data structures.

Module– 1	**No. of Hours**
Fundamentals to Computer: Introduction to computers, Generation and its Characteristics, program design tools: Algorithms, Flowcharts, Pseudocode. **Overview of C:** Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs. **Expressions:** Data Types, variables, constants, Input/output statements in C, Types of errors.	9
Module– 2	**No. of Hours**
Expressions (Conti): Operators in C, Type conversion and typecasting. **Decision control and looping statements:** Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.	9
Module– 3	**No. of Hours**
Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions. **Arrays:** Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays: Traversing, Searching and sorting, Passing arrays to functions, applications of arrays.	9
Module– 4	**No. of Hours**
Strings: Declaration and Initialization, String Input / Output functions, String manipulation functions. **Pointers:** Introduction to pointers, Declaration of pointer variables, Types of pointers, passing arguments to functions using pointers.	9
Module– 5	**No. of Hours**
Structure, Union, Enumerated Data Type and Files: Introduction to structure, Declaration and Initialization, Array of structures, Nested structure, Introduction to Unions, Declaration and Initialization, differentiate between structure and union, Enumerated data type. **File management in C:** File Operations-open, close, read, write, append, simple program on reading and writing data files.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understanding the basic concepts of computers and c programming.
CO2	Knowing the concepts of expression & control statements.
CO3	Illustrate user defined data structures like arrays and functions for solving problems.
CO4	Understand the concepts of strings and pointers.
CO5	Make use of structures, union, and I/O files operations.

Text Books	
1.	ReemaThareja, “Computer fundamentals and programming in C”, Oxford University, 2nd edition, 2017.
Reference Text Books	
1.	E. BalaGuruswamy, “Programming in ANSI C”, 7th Edition, Tata McGraw-Hill.
2.	Brian W. Kernighan and Dennis M. Ritchie, The ‘C’ Programming Language, 2nd Edition, Prentice Hall of India.

3.	ReemaThareja, Programming in C, 3rdEdition, Oxford University Press, 2023.
4.	YashwanthKanethkar, "Let us C", 13th Edition, BPB Publications.

Web links and Video lectures (e-Resources)
• elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html • Introduction to Programming in C [https://onlinecourses.nptel.ac.in/noc23_cs02/preview] • C for Everyone: Programming Fundamentals [https://www.coursera.org/learn/c-for-everyone] • Computer Programming Virtual Lab [https://cse02-iiith.vlabs.ac.in/exp/pointers/]

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple Choice Questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		

B25PIC205 (L:T:P:S 3:0:0:3)	Programming in C	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
C PROGRAMMING LAB **Category: PSC**					
Course Code	:	B25CPL207	CIE	:	50 Marks
Teaching Hours L : T : P	:	0:0:2	SEE	:	50 Marks
Total Hours	:	30(P)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	2Hrs

Course Objectives	
1.	Able to write programs in C using basic constructs.
2.	Apply user-defined data structures like arrays, structures in implementing solutions to problems.
3.	To develop applications by using Strings and Structures.

Sl. No	**Part – A** **Note:** Students must write the algorithm & flowchart for PART-A questions in the Record book
1.	To read radius value from the keyboard and calculate the area of circle and print the result in both floating and exponential notation.
2.	Programs using decision-making constructs a) Pay Calculation. b) To find if a number is negative, positive or zero. c) To check if entered alphabet is vowel or a consonant.
3.	Write a C Program to display the following by reading the number of rows as input 1 121 12321 123432 1 …… n^{th} row
4.	Two dimensional array with height and weight of persons and compute the Body Mass Index of the individuals.
5.	Display all prime numbers between two intervals using functions.
6.	Write a program to Sort the given set of N numbers using Bubble sort technique.
7.	Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
	Part – B
1.	A math app needs to determine the type of roots for a quadratic equation based on user input. Develop a C Program to calculate and display the roots based on the given coefficients.
2.	Using 2D performs the Matrix multiplication and validates the rules of multiplication.
3.	Develop a C program that takes a unique identification input like PAN Number, AADHAR_Number, APAAR_Id, Driving License, Passport and checks it against a set of stored KYC records. Based on the input, display whether the individual is verified or not. Use an appropriate control structure to handle multiple possible ID matches. Assume all unique identification are of integer type.
4.	Develop a C program that accepts a course description string and a keyword from the user. Search whether the keyword exists within the course description using appropriate string functions. If found, display: "Keyword " found in the course description." Otherwise, display: "Keyword " not found in the course description."
5.	In an ATM system, two account balances need to be swapped temporarily for validation. Develop a C program that accepts two balances and uses a function with pointers to swap them. Display the balances before and after swapping.
6.	Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
7.	Write a C program to copy a text file to another, read both the input file name and target file name.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate the concepts on simple applications making use of basic constructs, arrays and strings.
CO2	Apply the methods to involving functions, recursion, pointers, and structures.
CO3	Design applications using sequential and random access file processing.

Text Books	
1.	Hassan Afyouni, Behrouz A. Forouzan. "A Structured Programming Approach in C", 4th Edition, Cengage.

Reference Text Books	
1.	Schildt, Herbert. "C the complete reference", 4th Edition, Mc GrawHill.
2.	Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, 2nd edition, Prentice Hall of India.

Web links and Video lectures (e-Resources)
• https://www.coursera.org/learn/c-for-everyone • https://cse02-iiith.vlabs.ac.in/exp/pointers/ • https://www.pdfdrive.com/c-programming-the-ultimate-way-to-learn-the-fundamentals-of-the-c language-e187584209.htm • https://viden.io/knowledge/programming-in-c language/attachment/28313/c-the-complete-reference-herbert-schildt-4th-edition-pdf/preview]

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Laboratory	**Lab Conduction & Record**	**Evaluate each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25CPL207	C Programming Lab **(L:T:P:S 0:0:2:0)**	**00**	**00**	**30**	**00**	**30**	**1**

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Electronics and Communication Engineering

(2025 Scheme)

SEMESTER-II					
CALCULUS, LAPLACE TRANSFORM AND NUMERICAL TECHNIQUES **Category: ASC**					
Course Code	:	B25MEE201	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:2:0	SEE	:	50 Marks
Total Hours	:	45(L)+30(T)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	Familiarize the importance of Integral calculus.
2.	Familiarize the fundamentals of Vector calculus.
3.	Develop the knowledge of numerical methods and apply them to solve algebraic and Transcendental equations.
4.	Develop the knowledge of numerical methods and apply them to solve differential equations.
5.	Have an insight into solving ordinary differential equations by using Laplace transform techniques.

Module– 1: Integral Calculus and its Applications	**No. of Hours**
Multiple Integrals: Evaluation of double and triple integrals, change of order of integration, changing to polar co-ordinates. Area and volume using double and triple integrals. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.	9
Module-2: Vector Calculus and its Applications	**No. of Hours**
Vector Differentiation: Scalar and vector fields, gradient of a scalar field, directional derivatives, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, physical interpretation of gradient, divergence and curl and scalar potential. Vector Integration: Line integrals, Statement of Green's and Stokes' theorem without verification problems.	9
Module– 3: Numerical Methods-1	**No. of Hours**
Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method. Finite Differences and Interpolation: Forward and backward differences, Interpolation, Newton forward and backward interpolation formulae, Newton's divided difference interpolation formula and Lagrange's interpolation formula. Numerical Integration: Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$rule.	9
Module– 4:Numerical Methods-2	**No. of Hours**
Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector method and Adam-Bashforth predictor-corrector method.	9
Module– 5: Laplace Transform	**No. of Hours**
Laplace Transform (LT): Definition and Formulae of Laplace Transform, LT of elementary functions. Properties linearity, scaling, shifting property, differentiation in the s domain, division by t. LT of periodic functions, square wave, saw-tooth wave, triangular wave, full and half wave rectifier, Heaviside Unit step function. Inverse Laplace Transforms: Definition, properties, evaluation using different methods, and applications to solve ordinary differential equations.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply the concepts of integral calculus and vector calculus to model and solve problems in engineering applications such as area, volume.
CO2	Apply appropriate numerical methods to find approximate solutions of algebraic, transcendental, and ordinary differential equations and to perform interpolation and numerical integration in engineering contexts.
CO3	Apply Laplace transform techniques for time domain, wave forms, periodic functions and solving differential equations.
CO4	Demonstrate the applications of electrical engineering and allied engineering science using modern ICT tools.

Text Books	
1.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44^{th} Edition, 2021.
2.	E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10^{th} Edition, 2018.
3.	M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 8^{th}Edition, 2022.

Reference Text Books	
1.	B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Edition, 2017
2.	Srimanta Pal &SubodhC.Bhunia, Engineering Mathematics, Oxford University Press, 3rd Edition, 2016.
3.	N. P. Bali and Manish Goyal, ATextbook of Engineering Mathematics, LaxmiPublications,10th Edition, 2022.
Web links and Video lectures (e-Resources)	
• https://nptel.ac.in/courses/111105160 • https://nptel.ac.in/courses/127106019 • https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/ • https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring 2012/pages/syllabus/	

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments / practicing the problems**	**10**	**05**	
	Lab activity	**10**	**05**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping: Level 3 - High, Level 2 - Moderate, Level 1 - Low

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

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom instruction (CI) in hours / semester		Lab instruction (LI) in hours / semester	Term work (TW) and self learning (SL) in hours /sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25MEE201 (L:T:P:S 3:2:0:3)	Calculus, Laplace Transform and Numerical Techniques	**45**	**30**	**0**	**45**	**120**	**4**

SEMESTER-II					
QUANTUM PHYSICS AND ELECTRONIC SENSORS **Category: ASC(IC)**					
Course Code	:	B25PEC202	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:2	SEE	:	50 Marks
Total Hours	:	45(T)+26(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To introduce the fundamental principles of quantum mechanics such as wave-particle duality, Schrödinger's equation, and tunneling, enabling students to analyze microscopic physical systems.
2.	To develop an understanding of the electrical properties of materials, by applying classical and quantum models to metals and semiconductors, and exploring concepts like carrier concentration, Fermi energy, and Hall effect.
3.	To explore the phenomenon of superconductivity, including critical parameters, Meissner effect, BCS theory, and applications of Josephson junctions and SQUIDs in modern electronics.
4.	To examine light–matter interactions and photonics, covering laser principles, optical fibers, modulators, and photo detectors, with emphasis on applications in communication and sensor technologies.
5.	To provide knowledge of semiconductor devices and electronic sensors, including diodes, LEDs, photodiodes, piezoelectric and MOS sensors, and superconducting nanowire detectors, linking their principles to practical electronic and photonic systems.

Module– 1	**No. of Hours**
Quantum Physics: de Broglie Hypothesis, Heisenberg's Uncertainty Principle and its application (Non-existence of electrons inside the nucleus), Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical significance of a wave function and Born Interpretation, Expectation value and its physical significance, Eigen functions and Eigen values, Particle inside one dimensional infinite potential well, Role of higher dimensions (Qualitative), Waveforms and Probabilities, Particle inside a finite potential well and quantum tunneling, Numerical Problems. ***Text Book : 1 and 2***	9
Module– 2	**No. of Hours**
Electrical Properties of Metals and Semiconductors: Classical free electron theory (Assumptions and failures), Merits of Quantum Free Electron Theory, Mechanisms of electron scattering in solids, Matheissen's rule, Assumptions of quantum free electron theory, Density of states, Fermi Dirac statistics, Fermi energy, Fermi factor, Variation of Fermi factor with temperature and energy, Merits of quantum free electron theory, Expression for electrical conductivity in intrinsic semiconductor, Expression for electron concentration in conduction band and hole concentration in valence band (expressions only), Fermi level for intrinsic (with derivation) and extrinsic semiconductor (no derivation), Relation between Fermi energy and energy gap in intrinsic semiconductor, Hall effect, Numerical Problems. ***Text Books : 1, 3***	9
Module– 3	**No. of Hours**
Superconductivity: Variation of resistance with temperature, Zero resistance state, Meissner effect, Critical temperature, Critical field, Formation of Cooper pairs - Mediation of phonons, Two-fluid model, BCS Theory - Phase coherent state, Limitations of BCS theory, Examples of systems with low and high electron-phonon coupling, Type-I and Type-II superconductors, Formation of Vortices, Explanation for upper critical field, Cooper pair Tunneling (Andreev reflection), Josephson junction, Flux quantization, DC and AC SQUID, Numerical Problems. ***Text Books: 1, 2***	9
Module– 4	**No. of Hours**
Photonics : Interaction of radiation with matter – Einstein's A and B coefficients, Prerequisites for lasing actions, Population inversion and metastable states, Types of LASER – Semiconductor diode LASER, Applications of laser in barcode scanner and laser printing, Photo diode, working and applications, Avalanche Diode, Superconducting Nanowire Single Photon Detector, Optical fiber, Derivation of Numerical aperture, Types of optical fibers, V-number, Number of modes, Mechanism of attenuation in optical fiber, Application of optical fiber in point to point communication system, Numerical problems. ***Text Books: 1, 2***	9
Module– 5	**No. of Hours**
Semiconductor devices and Sensors: Direct and indirect band gap, Band gap engineering, Zener Diode, LED, PhotoDiode, Photo Transistor, Light dependent resistor, Resistance temperature detectors	9

(high, medium, low), Sensing mechanisms, Piezo electric Sensors, Metal Oxide Semiconductor (MOS) sensors, Hall sensor, Superconducting Nanowire Single Photon Detector, Numerical Problems.	

LABORATORY

Practical Component of IPCC (10 Experiments)

Sl. No	Name of the experiments
	Part – A: Fixed Set of Experiments
1.	Determination of wavelength of LASER using Diffraction Grating.
2.	Determination of acceptance angle and numerical aperture of the given Optical Fiber.
3.	Determination of resistivity of a semiconductor by Four Probe Method
4.	Determination of dielectric constant of the material of capacitor by Charging and Discharging method.
5.	Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of inverse square law of light.
6.	Determination of Plank's Constant using LEDs.
7.	Determination of Fermi Energy of Copper.
8.	Interference by the division of amplitude (Air-wedge/Newton's Rings)
9.	Black-Box Experiment
10.	Construction and Analyzing Electronic circuits (Expeyes Simulator / circuitlab)
11.	Verification of Inverse Square Law of Intensity of Light.
12.	I-V Characteristics of a Bipolar Junction Transistor.
13.	Resonance in LCR circuit
14.	Energy Gap of a Semiconductor
	Part – B: Open Ended Experiments
	Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply fundamental principles of quantum mechanics to analyze microscopic physical systems and predict quantized energy states and tunneling phenomena.
CO2	Analyze electrical conduction mechanisms in metals and semiconductors using classical and quantum models, and interpret carrier concentration and Fermi energy calculations.
CO3	Evaluate superconductivity phenomena including Meissner effect, Cooper pair formation, and Josephson junction behavior for advanced material applications.
CO4	Describe light-matter interaction, laser operations, optical modulators, and photonic devices to illustrate principles of photonics in sensor technologies.
CO5	Demonstrate the principles, characteristics, and applications of semiconductor and optical devices, sensors, and transducers used in electronic and photonic systems.

Text Books	
1.	Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
2.	Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributers Pvt. Ltd.
3.	Solid State Physics, S. O. Pillai, New Age International
4.	Basic Electronics, B L Theraja, Multi-color Edition, S Chand, 2006

Reference Text Books	
1.	Engineering Physics, S Mani Naidu, Pearson, Fourteenth Impression, 2024.

2.	Beiser, A. (2002). Concepts of Modern Physics (6th edition). McGraw-Hill Education..
3.	Griffiths, D. J. (2018). Introduction to Quantum Mechanics (2nd or 3rd edition). Pearson.

Web links and Video lectures (e-Resources)
• https://nptel.ac.in/courses/115106066 • https://archive.nptel.ac.in/courses/115/104/115104096 • https://nptel.ac.in/courses/115106127 • https://www.youtube.com/watch?v=SHoGV-sezNI

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50/2 = 25**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**10+10**	**10**	
Laboratory	**Lab Conduction & Record**	**Evaluating each expt. for 10 marks*12 expts.**	**10**	**25**
	Lab Internal Test	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):
1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping: Level 3 - High, Level 2 - Moderate, Level 1 - Low

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

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		

B25PEC202 (L:T:P:S 3:0:2:3)	Quantum Physics and Electronic Sensors	**45**	**00**	**26**	**50**	**120**	**4**

SEMESTER-II					
ENGINEERING GRAPHICS **Category: ESC**					
Course Code	:	B25EGK203	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	30(T)+30(P)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To construct orthographic projections of points, lines, planes, and solids using manual drafting methods and computer-aided tools.
2.	To construct orthographic projections of solids and apply them to real-world engineering applications
3.	To develop and construct the lateral surfaces of solids and apply them to real-world engineering applications.
4.	To draw isometric views of objects and convert isometric drawings into corresponding orthographic projections.
5.	To create basic 3D models of engineering components and parts using appropriate tools.

Module– 1	**No. of Hours**
Introduction: Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves. **Orthographic Projections of Points, Lines and Planes:** Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only as per BIS) Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).	10
Module– 2	**No. of Hours**
Orthographic Projection of Solids: Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.	10
Module– 3	**No. of Hours**
Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice) **Development of Lateral Surfaces of Solids:** Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.	9
Module– 4	**No. of Hours**
Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block. **Conversion of simple isometric drawings into orthographic views:** Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.	9
Module– 5	**No. of Hours**
Electronic Components Visualization (For CIE Only): 3D Modelling: Optical fibre cable with core and cladding, photonic crystal fibers, Antenna: Single element patch antenna, antenna array. Sheet Metal & Surface Design: PCB Enclosures: Creation of different geometry with slots as per Standards: NMEA-0183, applying material properties for heat sink and water/dust proofing and rendering for realistic visualization. Concept of Industrial drawing	7

Course Outcomes: At the end of the course, the students will be able to	
CO1	Generate orthographic projections of points, lines, planes, and solids manually and with computer aided tools.
CO2	Develop the lateral surfaces of solids for real-world applications.
CO3	Draw isometric views and convert isometric drawings to orthographic views.
CO4	Create basic 3D models of electronic components and parts.

Text Books	
1.	K. R. Gopalakrishna, &SudhirGopalakrishna: A Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
2.	Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd Edition, Charotar Publishing House Pvt. Limited, 2023.

Reference Text Books	
1.	S. N. Lal and T. Madhusudhan, Engineering Visualisation, engage Learning India Pvt. Ltd.; 1st Edition, 2022
2.	P.J. Shah, Computer Aided Engineering Drawing, S. Chand Publishing, 2021
3.	M. B. Shah & B.C. Rana., Engineering Drawing, Pearson Education, Revised Edition, 2009

Web links and Video lectures (e-Resources)

- https://nptel.ac.in/courses/112104172
- https://nptel.ac.in/courses/112102304
- https://nptel.ac.in/courses/112105294

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Self Learning	**Sketch Book**		**20**	**50**
Theory	**Internal Assessment1**	**50**	**15 (Average of two Assessments)**	
	Internal Assessment2	**50**		
Laboratory	**Laboratory Test**	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. SEE shall be conducted in batches similar to practical's and evaluated for maximum of 100 Marks. Obtained marks shall be accounted for SEE final marks, reducing it by 50%. Two full questions shall be set from Modules 1, 2, 3 and 4. Students need to answer one full question from each module.
2. Two full questions set from each Module shall cover the entire topic of the respective module.SEE shall be conducted by one Internal and one External Examiner. Evaluation shall be carried out jointly by both the examiners. The student may be awarded full marks, if he/she completes a solution on computer display without sketch.

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours/ semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours/sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EGK203 (L:T:P:S-2:0:2:2)	**Engineering Graphics**	**30**	**00**	**30**	**30**	**90**	**3**

SEMESTER-II					
ESSENTIALS OF INFORMATION TECHNOLOGY **Category: ESC**					
Course Code	:	B25ESE204	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To demonstrate different information representation and manipulation schemes.
2.	To study Information Technology (IT) infrastructure for information exchange.
3.	To understand basic software engineering concepts for Website and application development.
4.	To develop queries for quick insert, access and updating of structured information.
5.	To analyze role of cyber security and ethics issues in Information Technology (IT).

Module– 1	**No. of Hours**
Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions. **Data Manipulation:** Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices. ***Textbook 1: Chapter-1 (1.1-1.7), Chapter-2 (2.1-2.5)***	9
Module– 2	**No. of Hours**
Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security. **Algorithms:** The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery. ***Textbook 1: Chapter-3, Chapter-5 (5.1-5.3)***	9
Module– 3	**No. of Hours**
Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security. **Cybersecurity:** Overview—What is Cybersecurity?, Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity. Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content. ***Textbook 1: Chapter-4 Textbook 2: Chapter-16, Chapter-17***	9
Module– 4	**No. of Hours**
Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade. **Database Systems:** Database Fundamentals, The Relational Model. ***Textbook 1: Chapter-7 (7.1-7.5), Chapter-9 (9.1-9.2)***	9
Module– 5	**No. of Hours**
Introduction to HTML and Website Development: What is HTML?, Cascading Style Sheets (CSS), Website Design and Storyboarding, Structure of a Website. **Computer Graphics:** The Scope of Computer Graphics, Overview of 3D Graphics, Modeling, Rendering. ***Textbook 2: Chapter-12. Textbook 1: Chapter-10 (10.1-10.4)***	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate different information representation and manipulation schemes.
CO2	Make use of Information Technology (IT) infrastructure for information exchange.
CO3	Apply basic software engineering concepts for Website and application development.
CO4	Develop queries for quick insert, access and updating of structured information.
CO5	Identify role of cybersecurity and ethics issues in Information Technology (IT).

Text Books	
1.	J. Glenn Brookshear and Dennis Brylow, Computer Science: An Overview, 12th Edition, Pearson Education Limited, 2017.
2.	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish, "Fundamentals of Information Technology", Digital Commons at The University of South Florida (2023). https://digitalcommons.usf.edu/dit_tb_eng/19

Reference Text Books	
1.	V. Rajaraman, "Introduction to Information Technology", 3rd Edition, PHI Learning, 2018.
2.	PelinAksoy, Information Technology in Theory, 1st Edition, Cengage.

Web links and Video lectures (e-Resources)

- Information Technology: https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
- Computer Organization and Architecture: https://nptel.ac.in/courses/106103068
- Introduction To Internet: https://nptel.ac.in/courses/106105084

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40**	**50**
	Internal Assessment2	**50**	**(Average of Best two Assessments)**	
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25ESE204 (L:T:P:S 3:0:0:3)	Essentials of Information Technology	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
BASIC ELECTRONICS **Category: PSC**					
Course Code	:	B25ECE205	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To study the operation of Semiconductor diode, Zener diode and their applications.
2.	To study the Transistor operation and Different configurations, working and construction of FET and MOSFET.
3.	To study the operation of linear Op-amps and its applications
4.	To study the Principles of Communication system.
5.	To study the Basic Logic gates, circuits and their optimization.

Module– 1	**No. of Hours**
Diodes Theory: PN Junction Diode, Characteristics and Parameters, Diode Approximation, DC Load Line Analysis, Half Wave Rectifier, Full Wave Rectifiers, Capacitor Filter Circuit (Only Qualitative Approach), Zener Diode and Its Use in Voltage Regulation. ***Text book: 1***	9
Module– 2	**No. of Hours**
Bipolar Junction Transistors: Introduction, BJT Voltages & Currents, BJT Amplification, BJT Switching, Common Base Characteristics, Common Emitter Characteristics, BJT Biasing, Fixed Biasing and Voltage Divider, DC Load Line and Bias Point. **Field Effect Transistor**: Junction Field Effect Transistor (N-Channel), JFET Characteristics, MOSFETS: Enhancement MOSFETs. Case Study: MOSFET as a Amplifier. ***Text book: 1***	9
Module– 3	**No. of Hours**
Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op Amp. **Op-Amp Parameters:** Gain, Input Resistance, Output Resistance, CMRR, Slew Rate, Bandwidth, Input Offset Voltage, Input Bias Current and Input Offset Current, The Ideal Op-Amp, Equivalent Circuit of Op-Amp, Open Loop Op-Amp Configurations. **Op-Amp Applications:** Inverting Configuration, Non-Inverting Configuration, Differential Configuration, Voltage Follower, Integrator, Differentiator. ***Text book: 2***	9
Module– 4	**No. of Hours**
Fundamentals Of Communication: Elements of a Communication System, Communication Channels and Their Characteristics: Wireline, Fiber Optic, Wireless Electromagnetic Channels **Introduction to Analog Modulation:** Amplitude Modulation, Frequency and Phase Modulation, Waveforms. (Excluding Derivation and Spectral Diagrams), Super heterodyne FM Receiver. ***Text book: 3***	9
Module– 5	**No. of Hours**
Number Systems: Binary numbers, Number Base Conversion, Octal & Hexadecimal Numbers, Complements (1's & 2's Complements). **Boolean Algebra and Logic Circuits:** Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates. Combinational logic: Introduction, Design procedure, Adders- Half adder, Full adder. Case study: 4-bit Adder simulation. ***Text book: 4***	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply the working principles, fundamental characteristics of various semiconductor devices including diodes, transistors and operational amplifiers in basic electronic circuits.
CO2	Analyze basic rectifier and amplifier circuits using the principles of diodes, BJTs, and operational amplifiers.
CO3	Illustrate the fundamental concepts of communication systems and their applications.
CO4	Design basic combinational circuits using the fundamental principles of digital systems.
CO5	Analyze the fundamental concepts of electronic circuits, communication systems, and digital systems for their role in building basic electronic applications.

Text Books	
1.	Electronic Devices and Circuit Theory, Robert L Boylestad and Louis Nashelsky, 11th Edition, Pearson Education, 2013, ISBN: 978-93-325-4260-0.
2.	Ramakanth A Gayakwad, Op-amps and Linear Integrated Circuits, 4thEdition, Pearson Education, 2015.
3.	Electronics communication systems, George Kennedy, 5thEdition, TataMcGraw hill.
4.	M.Morris Mano and Michael D.Ciletti, Digital Design - With an Introduction to the Verilog HDL, VHDL and System Verilog 6thEdition, Pearson Education Inc, 2024.
Reference Text Books	
1.	Mike Tooley, Electronic Circuits, Fundamentals & Applications, 5thEdition, Elsevier, 2020.
2.	Albert Malvino, Electronic Principles, 9thEdition, McGraw Hill Publications, 2021.
Web links and Video lectures (e-Resources)	
• Introduction to Basic Electronics: https://nptel.ac.in/courses/122106025 • Digital Electronic Circuits https://nptel.ac.in/courses/108105132	

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40** (Average of Best two Assessments)	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 – Low

Course Code	Course Title	**Teaching and Learning Scheme**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits =Total hours/30
		L	**T**	**P**	**SAAE**		
B25ECE205 (L:T:P:S 3:0:0:3)	Basics Electronics	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
BASIC ELECTRONICS LAB **Category: PSC**					
Course Code	:	B25ECL207	CIE	:	50 Marks
Teaching Hours L : T : P	:	0:0:2	SEE	:	50 Marks
Total Hours	:	15(P)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	2Hrs

Course Objectives	
1.	To design the applications of the diodes.
2.	To design and test the applications of the opamp.
3.	To analyze the input and output characteristics of the BJT and MOSFET.
4.	To design and test the clipping and clamping circuits.
5.	To design half, full adder and subtractor circuits with logic gates.

Part – A : Core/Basic Hardware Experiments

1. Design and Testing of Half-Wave and Full-Wave Rectifiers With and Without Filter for Determining Ripple Factor, Voltage Regulation, and Efficiency.
2. Design and Testing of Bridge Rectifier with and Without Filter for Determining Ripple Factor, Voltage Regulation, and Efficiency.
3. Analysis of Input and Output Characteristics of a Bipolar Junction Transistor in Common Emitter Configuration.
4. Study of Transfer and Drain Characteristics of a MOSFET in Common Source Configuration.
5. Design and Testing of Op-Amp in Inverting and Non-Inverting amplifier.
6. Study of Truth Tables for OR, AND, NOT, NAND, and NOR Gates Using Basic and Universal Gates.

Part – B: Open Ended Hardware Experiments

1. Design and Testing of Clipping and Clamping Circuits to obtain desired Transfer Characteristics.
2. Design and test a single stage bipolar junction transistor amplifier to obtain desired gain and bandwidth requirements.
3. Testing of Op-Amp as voltage follower and a weighted summer with waveform analysis.
4. Design and Testing of Integrator and Differentiator Circuits using Op-Amp with Waveform Analysis.
5. Amplitude Modulation using Discrete Components for Given Specifications.
6. Realization of Half/ Full Adder and Subtractor using Logic Gates.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply the operating principles of diodes, transistors, and MOSFETs to construct and test basic analog circuits.
CO2	Implement operational amplifier configurations such as inverting, non-inverting, integrator, and differentiator for analog signal processing applications.
CO3	Analyze the functionality of logic gates and combinational circuits including adders, subtractors, and code converters using digital ICs.
CO4	Apply amplitude modulation techniques to explore the fundamentals of analog communication system.
CO5	Develop solutions to open-ended electronic design problems by selecting appropriate components, constructing circuits, and interpreting results to meet defined objectives.

Web links and Video lectures (e-Resources)

- Introduction to Basic Electronics: https://nptel.ac.in/courses/122106025
- Digital Electronic Circuits: https://nptel.ac.in/courses/108105132

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	**Lab Conduction & Record**	**Evaluate each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self- learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25ECL207 (L:T:P:S 0:0:2:0)	Basic Electronics Lab	**00**	**00**	**30**	**00**	**30**	**1**

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Electrical and Electronics Engineering

(2025 Scheme)

SEMESTER-II					
CALCULUS, LAPLACE TRANSFORM AND NUMERICAL TECHNIQUES **Category: ASC**					
Course Code	:	B25MEE201	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:2:0	SEE	:	50 Marks
Total Hours	:	45(L)+30(T)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	Familiarize the importance of Integral calculus.
2.	Familiarize the fundamentals of Vector calculus.
3.	Develop the knowledge of numerical methods and apply them to solve algebraic and Transcendental equations.
4.	Develop the knowledge of numerical methods and apply them to solve differential equations.
5.	Have an insight into solving ordinary differential equations by using Laplace transform techniques.

Module– 1: Integral Calculus and its Applications	**No. of Hours**
Multiple Integrals: Evaluation of double and triple integrals, change of order of integration, changing to polar co-ordinates. Area and volume using double and triple integrals. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.	9
Module-2: Vector Calculus and its Applications	**No. of Hours**
Vector Differentiation: Scalar and vector fields, gradient of a scalar field, directional derivatives, divergence of a vector field, solenoidal vector, curl of a vector field, irrotational vector, physical interpretation of gradient, divergence and curl and scalar potential. Vector Integration: Line integrals, Statement of Green's and Stokes' theorem without verification problems.	9
Module– 3: Numerical Methods-1	**No. of Hours**
Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method. Finite Differences and Interpolation: Forward and backward differences, Interpolation, Newton forward and backward interpolation formulae, Newton's divided difference interpolation formula and Lagrange's interpolation formula. Numerical Integration: Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$rule.	9
Module– 4:Numerical Methods-2	**No. of Hours**
Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor corrector method and Adam-Bashforth predictor-corrector method.	9
Module– 5: Laplace Transform	**No. of Hours**
Laplace Transform (LT): Definition and Formulae of Laplace Transform, LT of elementary functions. Properties linearity, scaling, shifting property, differentiation in the s domain, division by t. LT of periodic functions, square wave, saw-tooth wave, triangular wave, full and half wave rectifier, Heaviside Unit step function. Inverse Laplace Transforms: Definition, properties, evaluation using different methods, and applications to solve ordinary differential equations.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply the concepts of integral calculus and vector calculus to model and solve problems in engineering applications such as area, volume.
CO2	Apply appropriate numerical methods to find approximate solutions of algebraic, transcendental, and ordinary differential equations and to perform interpolation and numerical integration in engineering contexts.
CO3	Apply Laplace transform techniques for time domain, wave forms, periodic functions and solving differential equations.
CO4	Demonstrate the applications of electrical engineering and allied engineering science using modern ICT tools.

Text Books	
1.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44^{th} Edition, 2021.
2.	E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10^{th} Edition, 2018.
3.	M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 8^{th}Edition, 2022.

Reference Text Books	
1.	B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Edition, 2017
2.	Srimanta Pal &SubodhC.Bhunia, Engineering Mathematics, Oxford University Press, 3rd Edition, 2016.
3.	N. P. Bali and Manish Goyal, ATextbook of Engineering Mathematics, LaxmiPublications,10th Edition, 2022.
Web links and Video lectures (e-Resources)	
• https://nptel.ac.in/courses/111105160 • https://nptel.ac.in/courses/127106019 • https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/ • https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring 2012/pages/syllabus/	

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments / practicing the problems**	**10**	**05**	
	Lab activity	**10**	**05**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping: Level 3 - High, Level 2 - Moderate, Level 1 - Low

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

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom instruction (CI) in hours / semester		Lab instruction (LI) in hours / semester	Term work (TW) and self learning (SL) in hours /sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25MEE201 (L:T:P:S 3:2:0:3)	Calculus, Laplace Transform and Numerical Techniques	**45**	**30**	**0**	**45**	**120**	**4**

SEMESTER-II					
ELECTRICAL ENGINEERING MATERIALS **Category: ASC(IC)**					
Course Code	:	B25PEE202	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:2	SEE	:	50 Marks
Total Hours	:	45(T)+26(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To provide a fundamental understanding of dielectric and magnetic materials, their polarization and magnetization mechanisms, and their role in practical electrical components such as capacitors, transformers, and magnetic devices.
2.	To introduce thermoelectric phenomena and devices, focusing on Seebeck and Peltier effects, thermoelectric generators and coolers, and the selection of suitable materials for energy conversion applications.
3.	To analyze electrical transport properties in metals and semiconductors by applying classical and quantum free-electron models, and to understand carrier concentration, Fermi energy, and Hall effect for real-world applications.
4.	To explain superconductivity principles and applications, including Meissner effect, Cooper pair formation, BCS theory, high-Tc superconductors, and their technological uses such as SQUIDs and MAGLEV systems.
5.	To familiarize students with advanced engineering materials, including rare earths, ceramics, smart electroactive and magnetoactive materials, and to evaluate their properties and applications in modern energy and electronic systems.

Module– 1	**No. of Hours**
Dielectric and Magnetic Materials: Dielectrics : Introduction, Electrical Polarization Mechanisms, Internal fields in solids (qualitative), Clausius-Mossottirelation (Derivation) and its implications, Properties and Frequency dependence of Dielectric constant, Dielectric loss, Solid, Liquid and Gaseous dielectrics. Application of dielectrics in Capacitors, Transformers (Oils), SF6 in High Voltage application, Numerical Problems. **Magnetic material :** Classification of magnetic materials, Weiss Molecular field theory of ferromagnetism(Qualitative), Importance of Curie Temperature, Ferromagnetic Hysteresis and Explanation using Domain theory, Energy loss, Hard and soft ferromagnetic materials and Applications, Transformer Cores, Armature, Inductors and chokes, Permanent Magnets, Numerical Problems. ***Text Books : 1,2***	9
Module– 2	**No. of Hours**
Thermoelectric materials and devices: Thermo-emf and thermo current, Seebeck effect, Peltier effect, Seebeck and Peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo-emf in terms of T1 and T2, Thermo couples, thermopile, Construction and Working of Thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high temperature thermoelectric materials, Applications: Exhaust of Automobiles, Refrigerator, Space Program (Radioisotope Thermoelectric Generator), Numerical Problems ***Text Books : 1,2***	9
Module– 3	**No. of Hours**
Electrical Properties of Metals and Semiconductors: Classical free electron theory (Assumption and failures) Mechanisms of electron scattering in solids, Matheissen's rule, Assumptions of Quantum Free Electron Theory, Density of States, Fermi Dirac statistics, Fermi Energy, Variation of Fermi Factor With Temperature and Energy, Merits of Quantum Free Electron Theory, Derivation of electrical conductivity in an intrinsic semiconductor, Expression for electron concentration in conduction band and hole concentration in valence band (Expressions only), Fermi level for intrinsic (with derivation) and extrinsic semiconductor (no derivation), Relation between Fermi energy and energy gap in intrinsic semiconductor, Hall effect, Numerical Problems. ***Text Books : 1,2***	9
Module– 4	**No. of Hours**
Superconductivity Variation of resistance with temperature, Zero resistance state, Meissner effect, Critical temperature, Critical field, Formation of Cooper pairs - Mediation of phonons, Two-fluid model, BCS Theory - Phase coherent state, Limitations of BCS theory, Examples of systems with low and high electron-phonon coupling, Type-I and Type-II superconductors, Formation of Vortices, Explanation for upper critical field, Cooper pair Tunneling (Andreev reflection), Josephson junction, Flux quantization, DC and AC SQUID, Numerical Problems. ***Text Books :1, 3***	9

Module– 5	**No. of Hours**
Photonics : Interaction of radiation with matter – Einstein's A and B coefficients, Prerequisites for lasing actions, Population inversion and metastable states, Types of LASER – Semiconductor diode LASER, Applications of laser in barcode scanner and laser printing, Photo diode, working and applications, Avalanche Diode, Superconducting Nanowire Single Photon Detector, Optical fiber, Derivation of Numerical aperture, Types of optical fibers, V-number, Number of modes, Mechanism of attenuation in optical fiber, Application of optical fiber in point to point communication system, Numerical problems. ***Text Books: 1, 2***	9

LABORATORY

Practical Component of IPCC (10 Experiments)

Sl. No	Name of the experiments
	Part – A: Fixed Set of Experiments
1.	Determination of dielectric constant of the material of capacitor by Charging and Discharging Method.
2.	Determination of Magnetic Flux Density at any point along the axis of a circular coil.
3.	Determination of resistivity of a semiconductor by Four Probe Method
4.	Study the Characteristics of a Photo-Diode and to determine the power responsivity
5.	Study the frequency response of Series & Parallel LCR circuits.
6.	Determination of Fermi Energy of Copper.
7.	B-H Curve
8.	Maxwell's / Wheatstone Bridge Circuits
9.	Thermo-emf or Peltier Module
10.	Identification of Electronic and Electrical Components and Determination of Value
11.	Energy Gap of a Semiconductor
12.	Expeyes Simulations
13.	Distinguishing Hard and Soft Magnetic Material
14.	Light Emitting Diode
15.	Data Analysis using Spread Sheets
16.	Electrical Measuring Instruments : Multimeter
	Part – B: Open Ended Experiments
	Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Explain dielectric and magnetic properties of materials and apply them in electrical components like transformers, capacitors, and magnetic switches.
CO2	Analyze thermoelectric phenomena, device construction, and identify suitable materials and applications for energy conversion.
CO3	Evaluate electrical transport mechanisms in metals and semiconductors using classical and quantum models, and perform relevant calculations.
CO4	Describe superconducting principles, distinguish between types of superconductors, and explain their physical properties and technological uses.
CO5	Interpret the interaction of radiation with matter and the operational principles of photonic devices such as lasers, optical fibers, and photo detectors.

Text Books	
1.	Solid State Physics-S O Pillai, 8th Edition- New Age International Publishers-2018.
2.	Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
3.	A Text book of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar, S Chand, 2014, Revised Edition.
4.	Smart Materials and Structures, M. V. Gandhi and B. S. Thompson , Chapman & Hall

Reference Text Books	
1.	Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Dis tributers Pvt. Ltd., 2018
2.	Tinkham, M. (2004). Introduction to Superconductivity (2nd ed.). Dover Publications.
3.	Engineering Physics-Gaur and Gupta-Dhanpat Rai Publications-2017.
4.	Electrical Engineering Materials, R. K. Shukla, Tata McGraw-Hill Education, India , 2017 reprint edition.

Web links and Video lectures (e-Resources)
• https://www.youtube.com/watch?v=P9VyW2wq9ZE • https://www.youtube.com/watch?v=etjZmdmrjSU • https://www.youtube.com/watch?v=G9NgoxHMPwk

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50/2 = 25**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**10+10**	**10**	
Laboratory	**Lab Conduction & Record**	**Evaluating each expt. for 10 marks*12 expts.**	**10**	**25**
	Lab Internal Test	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25PEE202 (L:T:P:S 3:0:2:3)	Electrical Engineering Materials	**45**	**00**	**26**	**50**	**120**	**4**

SEMESTER-II					
ENGINEERING GRAPHICS **Category: ESC**					
Course Code	:	B25EGK203	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	30(T)+30(P)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To construct orthographic projections of points, lines, planes, and solids using manual drafting methods and computer-aided tools.
2.	To construct orthographic projections of solids and apply them to real-world engineering applications
3.	To develop and construct the lateral surfaces of solids and apply them to real-world engineering applications.
4.	To draw isometric views of objects and convert isometric drawings into corresponding orthographic projections.
5.	To create basic 3D models of engineering components and parts using appropriate tools.

Module– 1	**No. of Hours**
Introduction: Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves. **Orthographic Projections of Points, Lines and Planes:** Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only as per BIS) Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).	10
Module– 2	**No. of Hours**
Orthographic Projection of Solids: Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.	10
Module– 3	**No. of Hours**
Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice) **Development of Lateral Surfaces of Solids:** Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.	9
Module– 4	**No. of Hours**
Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block. **Conversion of simple isometric drawings into orthographic views:** Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.	9
Module– 5	**No. of Hours**
Electrical Drawing (For CIE Only): 2D drawing of switches, sockets, panels, junction boxes, antenna, electric circuits. Schematic diagrams of Automatic fire alarm, Call bell system, UPS system, Basic power system diagram. Concept of Industrial drawing	7

Course Outcomes: At the end of the course, the students will be able to	
CO1	Generate orthographic projections of points, lines, planes, and solids manually and with computer aided tools.
CO2	Develop the lateral surfaces of solids for real-world applications.
CO3	Draw isometric views and convert isometric drawings to orthographic views.
CO4	Create schematic diagrams of Electrical Systems.

Text Books	
1.	K. R. Gopalakrishna, &SudhirGopalakrishna: A Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
2.	Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd Edition, Charotar Publishing House Pvt. Limited, 2023.

Reference Text Books	
1.	S. N. Lal and T. Madhusudhan, Engineering Visualisation, engage Learning India Pvt. Ltd.; 1st Edition, 2022
2.	P.J. Shah, Computer Aided Engineering Drawing, S. Chand Publishing, 2021
3.	M. B. Shah & B.C. Rana., Engineering Drawing, Pearson Education, Revised Edition, 2009
4.	Bhattacharya S. K., Electrical Engineering Drawing, New Age International Publishers, 2nd edition 1998, reprints 2005.

Web links and Video lectures (e-Resources)
1. https://nptel.ac.in/courses/112104172 2. https://nptel.ac.in/courses/112102304 3.https://nptel.ac.in/courses/1121052

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Self Learning	**Sketch Book**		**20**	**50**
Theory	**Internal Assessment1**	**50**	**15 (Average of two Assessments)**	
	Internal Assessment2	**50**		
Laboratory	**Laboratory Test**	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. SEE shall be conducted in batches similar to practical's and evaluated for maximum of 100 Marks. Obtained marks shall be accounted for SEE final marks, reducing it by 50%.
2. Two full questions shall be set from Modules 1, 2, 3 and 4. Students need to answer one full question from each module. Two full questions set from each Module shall cover the entire topic of the respective module.
3. SEE shall be conducted by one Internal and one External Examiner. Evaluation shall be carried out jointly by both the examiners. The student may be awarded full marks, if he/she completes a solution on computer display without sketch.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P1O	PO11
CO1	3	1	1	2	2	1	-	1	-	1	-
CO2	2	1	1	3	2	1	-	1	-	1	-
CO3	2	1	1	3	2	1	-	1	-	1	-
CO4	2	1	1	2	2	1	-	1	-	1	-

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self- learning (SL) in hours/sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EGK203 (L:T:P:S-2:0:2:2)	**Engineering Graphics**	**30**	**00**	**30**	**30**	**90**	**3**

SEMESTER-II					
ESSENTIALS OF INFORMATION TECHNOLOGY **Category: ESC**					
Course Code	:	B25ESE204	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To demonstrate different information representation and manipulation schemes.
2.	To study Information Technology (IT) infrastructure for information exchange.
3.	To understand basic software engineering concepts for Website and application development.
4.	To develop queries for quick insert, access and updating of structured information.
5.	To analyze role of cyber security and ethics issues in Information Technology (IT).

Module– 1	**No. of Hours**
Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions. **Data Manipulation:** Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices. ***Textbook 1: Chapter-1 (1.1-1.7), Chapter-2 (2.1-2.5)***	9
Module– 2	**No. of Hours**
Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security. **Algorithms:** The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery. ***Textbook 1: Chapter-3, Chapter-5 (5.1-5.3)***	9
Module– 3	**No. of Hours**
Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security. **Cybersecurity:** Overview—What is Cybersecurity?, Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity. Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content. ***Textbook 1: Chapter-4 Textbook 2: Chapter-16, Chapter-17***	9
Module– 4	**No. of Hours**
Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade. **Database Systems:** Database Fundamentals, The Relational Model. ***Textbook 1: Chapter-7 (7.1-7.5), Chapter-9 (9.1-9.2)***	9
Module– 5	**No. of Hours**
Introduction to HTML and Website Development: What is HTML?, Cascading Style Sheets (CSS), Website Design and Storyboarding, Structure of a Website. **Computer Graphics:** The Scope of Computer Graphics, Overview of 3D Graphics, Modeling, Rendering. ***Textbook 2: Chapter-12. Textbook 1: Chapter-10 (10.1-10.4)***	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate different information representation and manipulation schemes.
CO2	Make use of Information Technology (IT) infrastructure for information exchange.
CO3	Apply basic software engineering concepts for Website and application development.
CO4	Develop queries for quick insert, access and updating of structured information.
CO5	Identify role of cybersecurity and ethics issues in Information Technology (IT).

Text Books	
1.	J. Glenn Brookshear and Dennis Brylow, Computer Science: An Overview, 12th Edition, Pearson Education Limited, 2017.
2.	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish, "Fundamentals of Information Technology", Digital Commons at The University of South Florida (2023). https://digitalcommons.usf.edu/dit_tb_eng/19

Reference Text Books	
1.	V. Rajaraman, "Introduction to Information Technology", 3rd Edition, PHI Learning, 2018.
2.	PelinAksoy, Information Technology in Theory, 1st Edition, Cengage.

Web links and Video lectures (e-Resources)

- Information Technology: https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
- Computer Organization and Architecture: https://nptel.ac.in/courses/106103068
- Introduction To Internet: https://nptel.ac.in/courses/106105084

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40**	**50**
	Internal Assessment2	**50**	**(Average of Best two Assessments)**	
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25ESE204 (L:T:P:S 3:0:0:3)	Essentials of Information Technology	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
BASICS OF ELECTRICAL ENGINEERING **Category: PSC**					
Course Code	:	B25EEE205	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To understand and apply basic concepts of DC circuits, electrostatics, and electromagnetism.
2.	To explain the behaviour of circuit elements in single-phase circuits.
3.	To explain the behaviour of circuit elements in three-phase circuits.
4.	To explain the basic concept and working of transformer and dc motor.
5.	To explain domestic wiring and safety measures.

Module– 1	**No. of Hours**
DC circuits: Ohm's law and Kirchhoff's laws, Analysis of Series, Parallel and series-parallel circuits, Reciprocity Theorem, Power and energy – Simple Numericals. **Electrostatics:** Coulombs law, definitions of absolute and relative permittivity, electric field, electric flux, electric field strength, flux density. **Electromagnetism:** Faraday's law of electromagnetic induction, Statically and Dynamically induced EMF, Fleming's right-hand rule, concepts of self and mutual inductance, Coefficient of Coupling, Energy stored in magnetic field, Fleming's left-hand rule.	9
Module– 2	**No. of Hours**
Single-phase AC circuits: Generation of sinusoidal voltage, frequency of generated voltage, average value, RMS value, form factor and peak factor of sinusoidal voltage and currents. Phasor representation of alternating quantities. Analysis of R, L, C, R-L, R-C and R-L-C circuits with phasor diagrams, Real power, Reactive power, Apparent power, and Power factor. Series, Parallel and Series-Parallel circuits. Simple Numerical.	9
Module– 3	**No. of Hours**
Three-phase AC circuits: Necessity and advantage of 3-phase system, Generation of 3-phase power, Definition of phase sequence, Balanced supply and balanced load, Relationship between line and phase values of balanced star and delta connections, Power in balanced 3-phase circuits, Measurement of 3-phase power by 2-wattmeter method, Simple Numerical.	9
Module– 4	**No. of Hours**
Transformers: Necessity of transformer, Principle of operation, Types and construction of single phase transformers, EMF equation, Losses of transformer, Efficiency (Simple numerical) **DC Motor:** Principle of operation, Back EMF and its significance, Types of motors, Characteristics and speed control (armature & field) of DC motors (series & shunt only), Torque equation, Applications of DC motors	9
Module– 5	**No. of Hours**
Measuring instruments: Classification, Deflecting, control and damping torques, Ammeters and Voltmeters, PMMC and PMMI type instruments **Domestic Wiring:** Requirements, Types of wiring: casing, capping, Two way and three-way control of load. **Electrical Safety:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits, Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Residual Current Circuit Breaker (RCCB) and Earth Leakage Circuit Breaker (ELCB). **Electricity bill:** Power consumption of electrical energy, Two-part electricity tariff, Case study on calculation of electricity bill for domestic consumers.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyze DC circuits, explain electrostatic and electromagnetic principles, and apply them to solve simple problems.
CO2	Analyze the behavior of single-phase circuits under various operating conditions.
CO3	Analyze the behavior of three-phase circuits under various operating conditions.
CO4	Understand the principle of operation and construction of transformer and DC motor.
CO5	Understand the concepts of measuring instruments, domestic wiring and safety measures.

Text Books	
1.	D C Kulshreshtha, Basic Electrical Engineering, Tata McGraw Hill, 1st Edition 2019

Reference Text Books	
1.	B.L. Theraja, A text book of Electrical Technology, S Chand and Company, reprint edition 2014
2.	D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, , Tata McGraw Hill 4th edition, 2019
3.	V. K. Mehta, Rohit Mehta Principles of Electrical Engineering & Electronics, S. Chand and Company Publications, 2nd edition, 2015

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EEE204 (L:T:P:S 3:0:0:3)	Basics of Electrical Engineering	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
BASIC ELECTRICAL ENGINEERING LAB **Category: PSC**					
Course Code	:	B25EEL207	CIE	:	50 Marks
Teaching Hours L : T : P	:	0:0:2	SEE	:	50 Marks
Total Hours	:	30(P)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	2Hrs

Course Objectives	
1.	To understand ohm's law, Kirchhoff's law and verification of resistance.
2.	To measure resistance, inductance, impedance and power factor using basic measuring equipments.
3.	To analyze three phase power measurement and power factor calculations.
4.	To develop circuit wiring skills for practical applications.
5.	To Promote creative problem solving and open ended experimental design.

Part – A : Conventional Experiments

1. Verification of Ohm's law and Kirchhoff's laws.
2. Measurement of low range resistance using voltmeter-ammeter method. Verification of resistance value using multimeter/LCR meter.
3. Measurement of earth's resistance by 3-electrode method.
4. Measurement of resistance, inductance, impedance and power factor using voltmeter, ammeter and wattmeter in single-phase AC circuits.
5. Wiring an appropriate electric circuit, understanding the basic principle used for 2-way control of load.
6. Wiring an appropriate electric circuit, understanding the basic principle used for 3-way control of load.

Part – B:Typical Open-Ended Experiments

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

1. Creation of short circuit to determine the time taken by a fuse of different length. Documenting the test data and the conclusions.
2. Trouble shooting experiments in simple DC circuits. The trouble may be due to loose connection, faulty component leading to open circuits or short circuits. Detection of fault and the reasons for that and conclusion.
3. Measurement of voltage between line and neutral, ground and line, ground and neutral in respect of healthy and unhealthy 3-pin socket. Conclusions arrived for the faulty wiring. Allowable ground voltage.
4. A 12 V batteryis available. It is required to obtain 3 V from the batterytocharge a mobile. Create a circuit to obtain the required voltage. Specify all the ratings of the components used.
5. Only three ammeters and standard resistance are available in the laboratory. Using the same measure the single phase power consumed by an inductive load.
6. Only three voltmeters and standard resistance are available in the laboratory. Using the same measure the single phase power consumed by an inductive load.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Conduct standard electrical experiments to verify theoretical principles.
CO2	Measure key electrical parameters such as resistance, inductance, impedance, power, and power factor with standard methods.
CO3	Design and perform experiments to solve practical open-ended electrical problems.
CO4	Analyze experimental data from non-routine method to arrive at a solution.

Web links and Video lectures (e-Resources)

- https://bes-iitr.vlabs.ac.in/List%20of%20experiments.html
  [Virtual Labs, an ministry of education (MOE) Govt. of India Initiative]

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Laboratory	**Lab Conduction & Record**	**Evaluate each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EEL207 (L:T:P:S 0:0:2:0)	Basic Electrical Engineering Lab	**00**	**00**	**30**	**00**	**30**	**1**

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Robotics and Automation

(2025 Scheme)

SEMESTER-II					
INTEGRAL CALCULUS AND NUMERICAL METHODS **Category: ASC**					
Course Code	:	B25MME201	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:2:0	SEE	:	50 Marks
Total Hours	:	45(L)+30(T)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To Familiarize the importance of Integral calculus.
2.	To analyze the application of PDE's in various engineering fields such as heat transfer, fluid dynamics.
3.	To Familiarize the fundamentals of Vector calculus.
4.	To Develop the knowledge of numerical methods and apply them to solve algebraic and Transcendental equations.
5.	To Develop the knowledge of numerical methods and apply them to solve differential equations.

Module– 1: Integral Calculus	**No. of Hours**
Multiple Integrals: Definition, Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integration. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.	9
Module– 2: Partial Differential Equations (PDE)	**No. of Hours**
Formation of PDEs by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Method of Separation of variables. Application of PDE: Derivation of one-dimensional heat equation and wave equation.	9
Module– 3: Vector Calculus	**No. of Hours**
Scalar and vector fields. Gradient, directional derivative, divergence and curl - physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential. Vector Integration: Line integrals, work done by a force and flux. Statement of Green's theorem and Stoke's theorem and problems without verifications.	9
Module– 4:Numerical Methods - 1	**No. of Hours**
Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods. Interpolation: Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula. Numerical integration: Trapezoidal, Simpson's 1/3rd and 3/8th rules.	9
Module– 5: Numerical Methods – 2	**No. of Hours**
Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor-corrector formula and Adams-Bashforth predictor-corrector method.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply the concepts of integral calculus, partial differential equations, and vector calculus to model and solve problems in engineering applications such as area, volume, heat conduction, and field analysis.
CO2	Apply appropriate numerical methods to find approximate solutions of algebraic, transcendental, and ordinary differential equations and to perform interpolation and numerical integration in engineering contexts.
CO3	Apply knowledge of numerical methods to solve differential equations.

Text Books	
1.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEdition, 2021.
2.	E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10thEdition, 2018.
3.	M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 8thEdition, 2022.
Reference Text Books	
1.	B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11thEdition, 2017
2.	Srimanta Pal &SubodhC.Bhunia, Engineering Mathematics, Oxford University Press, 3rdEdition, 2016.
3.	N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications,10thEdition,2022

Web links and Video lectures (e-Resources)
• https://nptel.ac.in/courses/111105160 • https://nptel.ac.in/courses/127106019 • https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/ • https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring 2012/pages/syllabus/

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Not with standing the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments / Practicing the problems**	**10**	**05**	
	Lab activity	**10**	**05**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

- The Question paper for each course contains two parts, Part – A and Part – B.
- Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
- Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	2	1	-	-	-	-	-	2
CO2	3	2	1	2	1	-	-	-	-	-	2
CO3	3	2	1	2	1	-	-	-	-	-	2

Level 3 - High, Level 2 - Moderate, Level 1 – Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom instruction (CI) in hours / semester		Lab instruction (LI) in hours / semester	Term work (TW) and self learning (SL) in hours /sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25MCV201 (L:T:P:S 3:2:0:3)	Differential Calculus and Numerical Methods	**45**	**30**	**0**	**45**	**120**	**4**

SEMESTER-II					
PHYSICS OF MATERIALS **Category: ASC(IC)**					
Course Code	:	B25PME202	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:2	SEE	:	50 Marks
Total Hours	:	45(T)+26(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To introduce the principles of oscillatory motion, including simple harmonic, damped, and forced oscillations, and to apply them in analyzing real-world mechanical and electrical systems.
2.	To develop an understanding of elasticity in solids, covering stress-strain relationships, elastic moduli, torsion, and failure mechanisms, in order to assess the mechanical behavior of engineering materials.
3.	To explore thermoelectric phenomena and materials, analyzing Seebeck and Peltier effects, device construction, and material suitability for energy conversion and thermal management applications.
4.	To provide knowledge of cryogenic principles and techniques, including gas liquefaction, Joule–Thomson effect, and applications of cryogenics in aerospace, superconductivity, and low-temperature engineering.
5.	To familiarize students with modern material characterization methods, such as XRD, SEM, AFM, and XPS, and to apply quantum concepts like confinement and tunneling to understand the microscopic and macroscopic properties of advanced materials.

Module– 1	**No. of Hours**
Oscillations: Simple harmonic motion (SHM), Differential equation for SHM, Springs: Stiffness factor and its physical significance, Series and Parallel combination of springs (Derivation), Types of springs and their applications. Theory of damped oscillations, Types of damping (Graphical Approach). Engineering applications of damped oscillations, Theory of forced oscillations with derivation, Resonance, Sharpness of resonance, Resonance in LCR circuits (Qualitative), Numerical problems. ***Text Book : 1,2, Reference Book : 1(Forced Oscillation)***	9
Module– 2	**No. of Hours**
Elasticity: Review Stress-Strain Curve, Strain hardening and softening. Elastic Moduli, Poisson's ratio, Relation between Y, n and σ (with derivation), mention relation between K, Y and σ, limiting values of Poisson's ratio. Static and dynamic loading, Beams, Bending moment and derivation of expression, Cantilever, Torsion and Expression for couple per unit twist, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), S-N Curve, Numerical problems. ***Text Book : 2, Reference Book : 2***	9
Module– 3	**No. of Hours**
Thermoelectric materials and devices: Thermo-emf and thermo current, Seebeck effect, Peltier effect, Seeback and Peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo-emf in terms of T1 and T2, Thermo couples, thermopile, Construction and working of thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high temperature thermoelectric materials, Applications: Exhaust of automobiles, Refrigerator, Space program(Radioisotope Thermoelectric Generator- RTG), Numerical Problems ***Text Book : 3 Reference Book : 3***	9
Module– 4	**No. of Hours**
Cryogenics: Introduction to Thermodynamics, Carnot's principle, Efficiency, Production of low temperature - Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, Thermodynamical analysis of Joule Thomson effect, Liquefaction of Oxygen by cascade process, Lindey's air liquefier, Liquefaction of Helium and its properties (super fluidity), Platinum Resistance Thermometer, Applications of Cryogenics: Aerospace, Dewar Flask, Numerical Problems. **Text Book : 4 Reference Book : 4,5**	9
Module– 5	**No. of Hours**
Material Characterization and Instrumentation Techniques: Materials Properties: Schrodinger equation, Interpretation of wave function, Particle in an infinite 1D potential well, Quantum confinement in 0, 1, 2 and 3 Dimension (Qualitative), Density of states, Quantum tunnelling **Instrumentation Techniques:** Bragg's law, X-Ray Diffractometer (XRD), Schrerrer equation, Atomic Force Microscope (AFM), X-ray Photoelectron Spectroscopy (XPS), Scanning Electron	9

Microscope (SEM), Numerical Problems. **Text Book : 5 Reference Book : 6**	

LABORATORY

Practical Component of IPCC (10 Experiments)

Sl. No	Name of the experiments
	PART-A: Fixed Set of Experiments
1.	Determination of Young's modulus of the material of the given bar Uniform Bending.
2.	Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
3.	Study of Forced Mechanical Oscillations and Resonance.
4.	Study of the frequency response of Series & Parallel LCR circuits.
5.	Determination of effective spring constant of the given springs in series and parallel combinations.
6.	Verification of Newton's Law of Cooling.
7.	Determination of Young's modulus of the material of the given bar using Single Cantilever.
8.	Determination of Moment of Inertia of the given irregular body by setting Torsional Oscillations.
9.	Determination of Grating constant using LASER Diffraction / Estimation of particle size of lycopodium po using Laser Diffraction
10.	Data Analysis using Spread Sheets
11.	Study the working of Peltier Modules
12.	STEP Interactive Physical Simulations. (Springs, Simple Pendulum)
13.	Study of motion using spread Sheets (linear and Projectile motion)
14.	PHET Interactive Simulation (Relevant to Theory)
	Part – B: Open Ended Experiments
	Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyze the principles of simple harmonic, damped, and forced oscillations, and apply them to solve problems involving mechanical and electrical oscillatory systems.
CO2	Apply the concepts of stress, strain, and elastic moduli to evaluate the elastic behavior of solids under various loading conditions.
CO3	Evaluate the principles of thermoelectric effects and assess the performance of thermoelectric materials and devices for energy conversion and thermal management.
CO4	Demonstrate an understanding of low-temperature physics, including methods of cryogen production, and analyze the applications of cryogenics in scientific and engineering contexts.
CO5	Explain the material characterization techniques and instrumentation to analyze the macroscopic and microscopic properties of engineering materials.

Text Books	
1.	Physics, Oscillations and Waves, Optics and Quantum Mechanics, H M Agarwal and R M Agarwal, Pearson, 2025
2.	Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
3.	A Text book of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar, S Chand, 2014, Revised Edition.
4.	Fundamentals of Cryogenic Engineering,MamataMukhopadhyay, PHI Learning (India)
5.	Characterization of Materials- Mitra P.K. Prentice Hall India Learning Private Limited.

Reference Text Books	
1.	Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003 Edition
2.	Elements of Properties of Matter, D S Mathus, S Chand, Reprint 2016
3.	Engineering Physics, S L Kakani, Shubra Kakani, 3rdEdition, 2020, CBS Publishers and Distributers Pvt. Ltd.
4.	Cryogenics: A Text Book, S.S. Thipse, Alpha Science International, Limited, 2013.
5.	Treatise on Heat, M N Saha and B N Srivastava, 2nd Edition, Indian Press, 1935 ; Original from, the University of California,
6.	Materials Characterization Techniques-Sam Zhang, Lin Li, Ashok Kumar, CRC Press, 1stEdition, 2008.

Web links and Video lectures (e-Resources)
• https://www.youtube.com/watch?v=gnD8Se92hfk • https://www.youtube.com/watch?v=f08Y39UiC-o • https://www.youtube.com/watch?v=4gGMBNEzeuc

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50/2 = 25**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**10+10**	**10**	
Laboratory	**Lab Conduction & Record**	**Evaluating each expt. for 10 marks*12 expts.**	**10**	**25**
	Lab Internal Test	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25PME202 (L:T:P:S 3:0:2:3)	Physics of Materials	**45**	**00**	**26**	**50**	**120**	**4**

SEMESTER-II					
ENGINEERING GRAPHICS **Category: ESC**					
Course Code	:	B25EGK203	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	30(T)+30P)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To construct orthographic projections of points, lines, planes, and solids using manual drafting methods and computer-aided tools.
2.	To construct orthographic projections of solids and apply them to real-world engineering applications
3.	To develop and construct the lateral surfaces of solids and apply them to real-world engineering applications.
4.	To draw isometric views of objects and convert isometric drawings into corresponding orthographic projections.
5.	To create basic 3D models of engineering components and parts using appropriate tools.

Module– 1	**No. of Hours**
Introduction: Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves. **Orthographic Projections of Points, Lines and Planes:** Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only as per BIS) Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).	10
Module– 2	**No. of Hours**
Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice) **Orthographic Projection of Solids:** Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.	10
Module– 3	**No. of Hours**
Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.	9
Module– 4	**No. of Hours**
Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block. **Conversion of simple isometric drawings into orthographic views:** Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.	9
Module– 5	**No. of Hours**
Concept of Part Design (For CIE Only): 3D Modeling: Simple machine parts / engineering components. (Applying material properties and rendering for realistic visualization) Sheet Metal & Surface Design: Automotive panels, HVAC ducting Concept of Industrial drawing	7

Course Outcomes: At the end of the course, the students will be able to	
CO1	Generate orthographic projections of points, lines, planes, and solids manually and with computer aided tools.
CO2	Develop the lateral surfaces of solids for real-world applications.
CO3	Draw isometric views and convert isometric drawings to orthographic views.
CO4	Create basic 3D models of engineering components and parts.

Text Books	
1.	K. R. Gopalakrishna, &SudhirGopalakrishna: A Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
2.	Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd Edition, Charotar Publishing House Pvt. Limited, 2023.

Reference Text Books	
1.	S. N. Lal and T. Madhusudhan, Engineering Visualisation, engage Learning India Pvt. Ltd.; 1st Edition, 2022
2.	P.J. Shah, Computer Aided Engineering Drawing, S. Chand Publishing, 2021
3.	M. B. Shah & B.C. Rana., Engineering Drawing, Pearson Education, Revised Edition, 2009

Web links and Video lectures (e-Resources)

- https://nptel.ac.in/courses/112104172
- https://nptel.ac.in/courses/112102304
- https://nptel.ac.in/courses/112105294

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Self Learning	**Sketch Book**		**20**	**50**
Theory	**Internal Assessment1**	**50**	**15 (Average of two Assessments)**	
	Internal Assessment2	**50**		
Laboratory	**Laboratory Test**	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. SEE shall be conducted in batches similar to practical's and evaluated for maximum of 100 Marks. Obtained marks shall be accounted for SEE final marks, reducing it by 50%. Two full questions shall be set from Modules 1, 2, 3 and 4. Students need to answer one full question from each module.
2. SEE shall be conducted by one Internal and one External Examiner. Evaluation shall be carried out jointly by both the examiners. The student may be awarded full marks, if he/she completes a solution on computer display without sketch.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 – Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours/sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EGK203 (L:T:P:S-2:0:2:2)	**Engineering Graphics**	**30**	**00**	**30**	**30**	**90**	**3**

SEMESTER-II					
ESSENTIALS OF INFORMATION TECHNOLOGY **Category: ESC**					
Course Code	:	B25ESE204	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To demonstrate different information representation and manipulation schemes.
2.	To study Information Technology (IT) infrastructure for information exchange.
3.	To understand basic software engineering concepts for Website and application development.
4.	To develop queries for quick insert, access and updating of structured information.
5.	To analyze role of cyber security and ethics issues in Information Technology (IT).

Module– 1	**No. of Hours**
Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions. **Data Manipulation:** Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices. ***Textbook 1: Chapter-1 (1.1-1.7), Chapter-2 (2.1-2.5)***	9
Module– 2	**No. of Hours**
Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security. **Algorithms:** The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery. ***Textbook 1: Chapter-3, Chapter-5 (5.1-5.3)***	9
Module– 3	**No. of Hours**
Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security. **Cybersecurity:** Overview—What is Cybersecurity?, Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity. Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content. ***Textbook 1: Chapter-4 Textbook 2: Chapter-16, Chapter-17***	9
Module– 4	**No. of Hours**
Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade. **Database Systems:** Database Fundamentals, The Relational Model. ***Textbook 1: Chapter-7 (7.1-7.5), Chapter-9 (9.1-9.2)***	9
Module– 5	**No. of Hours**
Introduction to HTML and Website Development: What is HTML?, Cascading Style Sheets (CSS), Website Design and Storyboarding, Structure of a Website. **Computer Graphics:** The Scope of Computer Graphics, Overview of 3D Graphics, Modeling, Rendering. ***Textbook 2: Chapter-12. Textbook 1: Chapter-10 (10.1-10.4)***	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate different information representation and manipulation schemes.
CO2	Make use of Information Technology (IT) infrastructure for information exchange.
CO3	Apply basic software engineering concepts for Website and application development.
CO4	Develop queries for quick insert, access and updating of structured information.
CO5	Identify role of cybersecurity and ethics issues in Information Technology (IT).

Text Books	
1.	J. Glenn Brookshear and Dennis Brylow, Computer Science: An Overview, 12th Edition, Pearson Education Limited, 2017.
2.	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish, "Fundamentals of Information Technology", Digital Commons at The University of South Florida (2023). https://digitalcommons.usf.edu/dit_tb_eng/19

Reference Text Books	
1.	V. Rajaraman, "Introduction to Information Technology", 3rd Edition, PHI Learning, 2018.
2.	PelinAksoy, Information Technology in Theory, 1st Edition, Cengage.

Web links and Video lectures (e-Resources)

- Information Technology: https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
- Computer Organization and Architecture: https://nptel.ac.in/courses/106103068
- Introduction To Internet: https://nptel.ac.in/courses/106105084

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40**	**50**
	Internal Assessment2	**50**	**(Average of Best two Assessments)**	
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25ESE204 (L:T:P:S 3:0:0:3)	Essentials of Information Technology	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
ELEMENTS OF MECHANICAL ENGINEERING **Category: PSC**					
Course Code	:	B25EME205	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To analyze the properties of various engineering materials along with their classification and applications.
2.	To illustrate the basic concepts of thermodynamics, internal combustion engines and electric/hybrid vehicles.
3.	To demonstrate the working and operations of machines tools and metal joining techniques.
4.	To apply the concepts of belt and gear drives in solving basic numerical problems and to outline the configuration, anatomy and performance parameters of robots.
5.	To discuss the role of computer systems in manufacturing, their contribution to automation, and the applications of 3D printing and AI in mechanical engineering.

Module– 1	**No. of Hours**
Engineering materials: Introduction, Classification, Ferrous and Non-Ferrous metals: Types, Properties and their applications. **Composite materials:** Introduction, Constituents of a composite, Classification, Types of Matrix and Reinforcement materials, Advantages, Disadvantages and Applications of composite materials in Aerospace and Automobile industries. **Smart materials:** Introduction, Types - Piezoelectric materials, MR fluids, Shape memory alloys and Advantages, Disadvantages and Applications. **Nano materials:** Introduction, Types of nano materials, Advantages, Disadvantages and Applications.	9
Module– 2	**No. of Hours**
Concepts of Thermodynamics: Work, Energy, Heat, Modes of Heat transfer: Conduction, Convection and Radiation. Steam: Formation of steam, Properties of Steam. **Introduction to Internal Combustion engines:** Working principle of Four stroke engines (SI & CI Engines), No Numericals. **Electric vehicles and Hybrid vehicles:** Working principles, Electric and Hybrid vehicle components, Brief introduction to energy storage in Electric vehicles.	9
Module– 3	**No. of Hours**
Machine Tools: Lathe: Working principle, Specifications, Operations performed – Turning, Facing, Taper turning by swivelling the compound rest, Thread cutting and Knurling. **Drilling Machine:** Working principle, Specifications, Operations performed – Drilling, Reaming, Boring, Counterboring, Countersinking, Tapping. **Milling machine:** Working principle, Specifications, Operations performed – Plane milling, End milling, Slot milling, Angular milling. (Sketches of machine tools not required. Sketches to be used only for explaining the operations). **Joining Processes:** Introduction, Temporary and Permanent joining methods: Working principle of Soldering, Brazing and Electric Arc welding, Advantages, Limitations and Applications.	9
Module– 4	**No. of Hours**
Belt and GearDrives: Introduction, Open and Cross belt drives. (No derivations and numericals), Flat belts and V belts. Types of Gears, Velocity ratio, Gear Trains - Simple and Compound gear trains and Numericals. **Robotics:** Introduction, Generation of Robots, Asimov's laws of Robots, Robot anatomy - Links and Joints, Types of Robots, Configurations of Robots, Robot motion - Degrees of Freedom, Robot sensors: Tactile, Force, Proximity and Vision sensors, Definition of Work volume, Accuracy, Precision, Repeatability and Payload.	9
Module– 5	**No. of Hours**
Computer Numerical Control (CNC): Introduction, Definition of NC and CNC Components of CNC. Definition of CAD, CAM, CAE and CIM. **Automation:** Definition, Types of Automation, needs of automation. **Additive manufacturing:** Introduction, Basic principles (Steps in additive manufacturing), Additive manufacturing processes – Photopolymerization technique, Material extrusion technique and Powder based fusion technique, Automotive and Aerospace applications. **Applications of AI in Mechanical Engineering:** Automobile industry, manufacturing industry and Mechanical design.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand the concepts of various engineering materials and their classifications and applications.
CO2	Illustrate the basic concepts of thermodynamics, internal combustion engines and electric/hybrid vehicles.
CO3	Demonstrate the working and operations of machine tools and metal joining techniques.
CO4	Apply the concepts of belt and gear drives, and Outline the configuration, anatomy, and performance parameters of robots.
CO5	Discuss the role of computer systems in manufacturing, their contribution to automation, and the applications of 3D printing and AI in mechanical engineering.

Text Books	
1.	K R Gopala Krishna, Elements of Mechanical Engineering, Subhash Publications, 2018.
2.	S K Hajra Choudhury and Nirjhar Roy, Elements of Workshop Technology (Vol. I and II), Media Promoters and Publishers Pvt. Ltd., 2016.
3.	Ganeshan. V, Internal Combustion Engines, Tata McGraw Hill, 4thEdition, 2012.

Reference Text Books	
1.	SeropeKalpakjian and Steven R Schmid, Manufacturing Engineering and Technology, Fourth Edition, Pearson Education, Asia, 2000.
2.	Radha Krishna & S. Subramanian, CAD/CAM/CIM, New Age International Publishers, 2009
3.	F.L.Matthews and R.D.Rawlings, Composite materials: Engineering and Science, Woodhead Publishing Ltd. & CRC Press, 2003.

Web links and Video lectures (e-Resources)
• https://nptel.ac.in/courses/112104526 • https://nptel.ac.in/courses/112104616 • https://nptel.ac.in/courses/112104769 • https://venturebeat.com/ai/how-ai-is-impacting-the-automotive-world/ • https://www.vlcsolutions.com/blog/artificial-intelligence-in-manufacturing/

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EME205 (L:T:P:S 3:0:0:3)	Elements of Mechanical Engineering	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
ELEMENTS OF MECHANICAL ENGINEERING LAB **Category: PSC**					
Course Code	:	B25MEL207	CIE	:	50 Marks
Teaching Hours L : T : P	:	0:0:2	SEE	:	50 Marks
Total Hours	:	30(P)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	2Hrs

Course Objectives	
1.	To provide hands-on experience in performing basic operations using lathe and welding machines.
2.	To develop the ability to calibrate and use various measuring instruments for achieving accuracy in measurements.
3.	To enable students to demonstrate angular measurements of specimens using appropriate devices.
4.	To impart knowledge of determining the properties and characteristics of fuels and lubricating oils.
5.	To familiarize students with material testing by determining hardness using standard testing machines.

Part – A
Conventional Experiments

1. Performing facing, plain turning and step turning operations by using a lathe.
2. Performing facing, plain turning and knurling operations by using a lathe.
3. Preparation of welded joints using the arc welding process.
4. Calibration of vernier caliper and micrometer using slip gauges.
5. Determination of the angle of a specimen using a sine bar.
6. Determination of the hardness of materials using hardness testing machine.

Part – B
Typical Open-Ended Experiments

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

1. Comparative study of flash point and fire point of various fuels / oils using the open cup method
2. Comparative study of flash point and fire point of various fuels / oils using the closed cup method
3. Comparative study on viscosity of different base fuels.
4. Investigation of the effect of additives on the viscosity of base fuels.
5. Selection and justification of appropriate joining techniques for given applications
6. Fabrication of a sheet metal part with simple geometry and soldering.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Perform various operations using lathe and welding machine.
CO2	Calibrate various measuring devices to achieve accuracy of measurement.
CO3	Demonstrate angular measurement of a given specimen using appropriate device.
CO4	Determine the properties and characteristics of fuels and oils.
CO5	Determine the hardness of materials using hardness testing machine.

Text Books	
1.	Amitabh Ghosh and Amit Kumar Mallik, Manufacturing Science, Affiliated East West Press (p) Ltd, New Delhi, 2002
2.	Hajara and Choudhary, Workshop Technology Vol. I (2008) & II (2010), Median Promoters & publishers, Bombay.
3.	Khanna O. P, Workshop Practice, Vol. I, Dhanpat Rai & Co., 2000.
4.	Engineering Metrology, R.K. Jain, Khanna Publishers, Delhi, 2009.

Reference Text Books	
1.	SeropeKalpakjian and Steven R Schmid, Manufacturing Engineering and Technology, 4th Edition, Pearson Education, Asia, 2000.
2.	P.N. Rao, Manufacturing technology--Foundry, Forming and Welding, Tata McGraw Hill Education, 2001.
3.	I.C. Gupta, Engineering Metrology, Dhanpat Rai Publications, New Delhi, 2018.
4.	Ganeshan. V, Internal Combustion Engines, Tata McGraw Hill, 4th Edition, 2012.

Web links and Video lectures (e-Resources)

- https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-unit-1-the engine-lathe/
- https://www.millerwelds.com/resources/article-library/ - the-fundamentals-of-welding process-equipment-and-applications
- https://www.youtube.com/watch?v=sbbwJ5p6irc
- https://www.youtube.com/watch?v=TlhGTSDfQxc

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Laboratory	**Lab Conduction & Record**	**Evaluate each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25MEL207 (L:T:P:S 0:0:2:0)	Elements of Mechanical Engineering Lab	**00**	**00**	**30**	**00**	**30**	**1**

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Civil Engineering

(2025 Scheme)

SEMESTER-II					
INTEGRAL CALCULUS AND NUMERICAL METHODS **Category: ASC**					
Course Code	:	B25MME201	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:2:0	SEE	:	50 Marks
Total Hours	:	45(L)+30(T)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To Familiarize the importance of Integral calculus.
2.	To analyze the application of PDE's in various engineering fields such as heat transfer, fluid dynamics.
3.	To Familiarize the fundamentals of Vector calculus.
4.	To Develop the knowledge of numerical methods and apply them to solve algebraic and Transcendental equations.
5.	To Develop the knowledge of numerical methods and apply them to solve differential equations.

Module– 1: Integral Calculus	**No. of Hours**
Multiple Integrals: Definition, Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integration. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.	9
Module– 2: Partial Differential Equations (PDE)	**No. of Hours**
Formation of PDEs by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Method of Separation of variables. Application of PDE: Derivation of one-dimensional heat equation and wave equation.	9
Module– 3: Vector Calculus	**No. of Hours**
Scalar and vector fields. Gradient, directional derivative, divergence and curl - physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential. Vector Integration: Line integrals, work done by a force and flux. Statement of Green's theorem and Stoke's theorem and problems without verifications.	9
Module– 4:Numerical Methods - 1	**No. of Hours**
Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods. Interpolation: Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula. Numerical integration: Trapezoidal, Simpson's 1/3rd and 3/8th rules.	9
Module– 5: Numerical Methods – 2	**No. of Hours**
Numerical solution of ordinary differential equations of first order and first degree: Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor-corrector formula and Adams-Bashforth predictor-corrector method.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply the concepts of integral calculus, partial differential equations, and vector calculus to model and solve problems in engineering applications such as area, volume, heat conduction, and field analysis.
CO2	Apply appropriate numerical methods to find approximate solutions of algebraic, transcendental, and ordinary differential equations and to perform interpolation and numerical integration in engineering contexts.
CO3	Apply knowledge of numerical methods to solve differential equations.

Text Books	
1.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEdition, 2021.
2.	E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10thEdition, 2018.
3.	M.K. Jain, S.R.K. Iyengar and R.K. Jain: Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, 8thEdition, 2022.
Reference Text Books	
1.	B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11thEdition, 2017
2.	Srimanta Pal &SubodhC.Bhunia, Engineering Mathematics, Oxford University Press, 3rdEdition, 2016.
3.	N. P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications,10thEdition,2022

Web links and Video lectures (e-Resources)
• https://nptel.ac.in/courses/111105160 • https://nptel.ac.in/courses/127106019 • https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/ • https://ocw.mit.edu/courses/18-330-introduction-to-numerical-analysis-spring 2012/pages/syllabus/

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Not with standing the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments / Practicing the problems**	**10**	**05**	
	Lab activity	**10**	**05**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

- The Question paper for each course contains two parts, Part – A and Part – B.
- Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
- Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	1	2	1	-	-	-	-	-	2
CO2	3	2	1	2	1	-	-	-	-	-	2
CO3	3	2	1	2	1	-	-	-	-	-	2

Level 3 - High, Level 2 - Moderate, Level 1 – Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom instruction (CI) in hours / semester		Lab instruction (LI) in hours / semester	Term work (TW) and self learning (SL) in hours /sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25MCV201 (L:T:P:S 3:2:0:3)	Differential Calculus and Numerical Methods	**45**	**30**	**0**	**45**	**120**	**4**

SEMESTER-II					
PHYSICS FOR SUSTAINABLE STRUCTURAL SYSTEMS **Category: ASC(IC)**					
Course Code	:	B25PCV202	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:2	SEE	:	50 Marks
Total Hours	:	45(T)+26(P)	Total	:	100 Marks
Credits	:	4	SEE Duration	:	3Hrs

Course Objectives	
1.	To introduce the principles of oscillations (simple harmonic, damped, and forced) in both mechanical and electrical systems, and to relate them to engineering applications.
2.	To develop understanding of wave propagation and structural dynamics, including earthquake and tsunami physics, and modern mitigation techniques for sustainable structural systems.
3.	To apply acoustics, photometry, and radiometry concepts for the design and evaluation of systems involving soundproofing, lighting, and radiation measurement in engineering contexts.
4.	To provide knowledge of non-destructive testing (NDT) techniques, enabling students to assess structural and material integrity using ultrasonic, radiographic, and other advanced methods.
5.	To explore the role of smart materials and sensors in structural health monitoring, vibration control, and intelligent infrastructure, with emphasis on sustainability and real-world applications.

Module– 1	**No. of Hours**
Oscillations: Simple harmonic motion (SHM), Differential equation for SHM, Springs: Stiffness factor and its physical significance, Series and Parallel combination of springs (Derivation), Types of springs and their applications. Theory of damped oscillations(Qualitative), Types of damping (Graphical Approach). Engineering applications of damped oscillations, Theory of forced oscillations(Qualitative), Resonance, Sharpness of resonance, Resonance in LCR circuits (Qualitative), Numerical problems. ***Text Book : 1,2***	9
Module– 2	**No. of Hours**
Waves and their role in structural behavior: Types of waves, Wave propagation in beams, rods, and slabs, Boundary effects, Wave dispersion, Damping in structures, Energy dissipation techniques in structures, Introduction to earthquakes, General characteristics, P-waves, S-waves, Love waves, and Rayleigh waves, Ground motion and structural response, Site effects and soil-structure interaction, Physics of earthquakes, Richter scale of measurement and earthquake-resistant measures, Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineeringstructures to withstand tsunami), Seismometer and Seismograph, Accelerometer***Text Book : 3***	9
Module– 3	**No. of Hours**
Acoustics, Radiometry and Photometry: Acoustics: Introduction to Acoustics, Types of Acoustics, Reverberation and reverberation time, Absorption power and Absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), Measurement of absorption coefficient, Factors affecting the acoustics and remedial measures, Sound insulation and its measurements. Noise and its measurements, Impact of noise in multi-storied buildings. Radiometry and Photometry: Radiation quantities, Spectral quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law). ***Text Books :1,2***	9
Module– 4	**No. of Hours**
Non Destructive Testing: Introduction to NDT, Need for inspection, Types of inspection system, Benefits of NDT. Visual inspection, Liquid penetration test: Principles surface separation, Penetrant application and developments, Eddy present testing: Inspection probes, Display methods, Ultrasonic testing: Principle, Generation of Ultrasonic, Probes, Radiography: Radiation sources, Attenuation of radiation, Shadow formation and distortion, Identification Markers, Numerical Problems. ***Text Book : 4***	9
Module– 5	**No. of Hours**
Smart Materials for Sustainable Structures: Types of smart materials, Piezo, Magnetostrictive, Electrostrictive, Electro-rheological, Magneto-rheological, Shape memory alloys, Phase transformation in shape memory alloys, Overview of sensor technology, uses of sensors in intelligent structures, Classification of sensors, Temperature sensor, Vibration Sensor, Strain Gauge sensors, Basic concepts of structural health monitoring. ***Text Book : 5***	9

LABORATORY

Practical Component of IPCC (10 Experiments)

Sl. No	Name of the experiments
	PART-A: Fixed Set of Experiments
1.	Study of Forced Mechanical Oscillations and Resonance.
2.	Study of the frequency response of Series & Parallel LCR circuits.
3.	Determination of effective spring constant of the given springs in series and parallel combinations.
4.	Kundt's Dust Tube – Determination of Velocity of Sound.
5.	Verification of Inverse Square Law of Intensity of Light.
6.	Study on types of damping (Pendulum and Damper / PHET)
7.	Interpretation of graphs and images using XRD and SEM
8.	Determination of wavelength of Ultrasonic using Ultrasonic Interferometer IPCC (4 Credits) template
9.	Determination of Young's Modulus of the material of the given bar using Single Cantilever
10.	STEP Interactive Physical Simulations. (Relevant to Theory part)
11.	PHET Interactive Simulations (Relevant to Theory part)
12.	Simple case study on acoustics (Auditorium, Cinema Hall, Etc)
13.	Study of motion using spread Sheets
14.	Data Analysis using Spread Sheets
	Part – B: Open Ended Experiments
	Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyze the behavior of simple harmonic, damped, and forced oscillatory systems in mechanical and electrical contexts.
CO2	Evaluate wave propagation and structural response to dynamic loads such as earthquakes and blasts, incorporating modern mitigation strategies and smart materials.
CO3	Apply the principles of acoustics, radiometry, and photometry to design and evaluate systems for sound, light, and radiation measurements.
CO4	Demonstrate knowledge of non-destructive testing (NDT) techniques and select suitable methods for assessing material and structural integrity.
CO5	Assess the properties and applications of smart materials to enhance the performance and sustainability of engineering systems.

Text Books	
1.	Physics, Oscillations and Waves, Optics and Quantum Mechanics, H M Agarwal and R M Agarwal, Pearson, 2025
2.	Engineering Physics, Satyendra Sharma and Jyotsna Sharma, Pearson, 2018.
3.	Dynamics of Structures - Theory and Applications to Earthquake Engineering Anil K. Chopra, University of California at Berkeley, Fourth Edition. Prentice Hall
4.	Non Destructive Testing - Hull, J. B., & John, V. (2015). Macmillan International Higher Education.
5.	Smart Materials in Structural Health Monitoring, Control and Biomechanics, Suresh Bhalla (IIT Delhi), C. K. Soh, Yaowen Yang, Springer.

Reference Text Books	
1.	Vibrations and Waves, A P French, MIT introductory Physics, 2003.
2.	Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
3.	Engineering Physics, S L Kakani, Shubra Kakani, 3rd Edition, 2020, CBS Publishers and Distributers Pvt. Ltd., 2018.
4.	Introduction to Seismology, Earthquakes, and Earth Structure, Stein, Seth, and Michael Wysession. Blackwell Publishing, 2003.

Web links and Video lectures (e-Resources)
• https://www.youtube.com/watch?v=gnD8Se92hfk • https://www.youtube.com/playlist?list=PLyqSpQzTE6M9X7oRXliYM8t0aaR_N0Csd • https://www.youtube.com/watch?v=k2FvSzWeVxQ

ASSESSMENT STRUCTURE:
The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment1	50	40 (Average of Best two Assessments)	50/2 = 25
	Internal Assessment2	50		
	Internal Assessment3	50		
Self Learning	Two Assignments	10+10	10	
Laboratory	Lab Conduction & Record	Evaluating each expt. for 10 marks*12 expts.	10	25
	Lab Internal Test	50	15	
SEE	Semester End Examination	100	50	50
Grand Total				100

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions are not allowed.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 – Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25PCV202 (L:T:P:S 3:0:2:3)	Physics for Sustainable Structural Systems	**45**	**00**	**26**	**50**	**120**	**4**

SEMESTER-II					
ENGINEERING GRAPHICS **Category:ESC**					
Course Code	:	B25EGK203	CIE	:	50 Marks
Teaching Hours L : T : P	:	2:0:2	SEE	:	50 Marks
Total Hours	:	30(T)+30(P)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To construct orthographic projections of points, lines, planes, and solids using manual drafting methods and computer-aided tools.
2.	To construct orthographic projections of solids and apply them to real-world engineering applications
3.	To develop and construct the lateral surfaces of solids and apply them to real-world engineering applications.
4.	To draw isometric views of objects and convert isometric drawings into corresponding orthographic projections.
5.	To create basic 3D models of engineering components and parts using appropriate tools.

Module– 1	**No. of Hours**
Introduction: Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves. **Orthographic Projections of Points, Lines and Planes:** Introduction to Orthographic projections, Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only as per BIS) Orthographic projections of planes: triangular, square, rectangular, pentagonal, hexagonal and circular lamina (Placed in First quadrant only using change of position method).	10
Module– 2	**No. of Hours**
Orthographic Projection of Solids: Orthographic projection of right regular solids (Resting on HP only and inclined to both the planes); Prisms, Pyramids, Cylinders & Cones.	10
Module– 3	**No. of Hours**
Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice) **Development of Lateral Surfaces of Solids:** Development of lateral surfaces of right regular Prisms, Pyramids, Cylinders & Cones and their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays.	9
Module– 4	**No. of Hours**
Isometric Views: Introduction to Isometric views, Isometric projections, Isometric scale. Isometric view of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres, Isometric view of combination of two simple solids, step block. **Conversion of simple isometric drawings into orthographic views:** Problems on conversion of Isometric view of simple objects / engineering components into orthographic views.	9
Module– 5	**No. of Hours**
Building Components Drafting (For CIE Only): Modeling Basic Building Components: foundations, columns, beams, slabs, walls, doors windows, staircase, assigning materials and rendering building components. Drafting a 2D floor plan for a simple single-storey residential/commercial building, Converting the floor plan into 3D model with walls, openings, and roof structure. Concept of building drawing	7

Course Outcomes: At the end of the course, the students will be able to	
CO1	Generate orthographic projections of points, lines, planes, and solids manually and with computer aided tools.
CO2	Develop the lateral surfaces of solids for real-world applications.
CO3	Draw isometric views and convert isometric drawings to orthographic views.
CO4	Create 3D models of basic building components.

Text Books	
1.	K. R. Gopalakrishna, &SudhirGopalakrishna: A Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017
2.	Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd Edition, Charotar Publishing House Pvt. Limited, 2023.

Reference Text Books	
1.	S. N. Lal and T. Madhusudhan, Engineering Visualisation, engage Learning India Pvt. Ltd.; 1st Edition, 2022
2.	P.J. Shah, Computer Aided Engineering Drawing, S. Chand Publishing, 2021

Web links and Video lectures (e-Resources)
• https://nptel.ac.in/courses/112104172 • https://nptel.ac.in/courses/112102304 • https://nptel.ac.in/courses/112105294

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Self Learning	**Sketch Book**		**20**	**50**
Theory	**Internal Assessment1**	**50**	**15 (Average of two Assessments)**	
	Internal Assessment2	**50**		
Laboratory	**Laboratory Test**	**50**	**15**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. SEE shall be conducted in batches similar to practical's and evaluated for maximum of 100 Marks. Obtained marks shall be accounted for SEE, reducing it by 50%.Two full questions shall be set from Modules 1, 2, 3 and 4. Students need to answer one full question from each module.
2. Two full questions set from each Module shall cover the entire topic of the respective module. SEE shall be conducted by one Internal and one External Examiner. Evaluation shall be carried out jointly by both the examiners.

CO-PO Mapping

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours/sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25EGK203	**Engineering Graphics (L:T:P:S-2:0:2:2)**	**30**	**00**	**30**	**30**	**90**	**3**

SEMESTER-II					
ESSENTIALS OF INFORMATION TECHNOLOGY **Category: ESC**					
Course Code	:	B25ESE204	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To demonstrate different information representation and manipulation schemes.
2.	To study Information Technology (IT) infrastructure for information exchange.
3.	To understand basic software engineering concepts for Website and application development.
4.	To develop queries for quick insert, access and updating of structured information.
5.	To analyze role of cyber security and ethics issues in Information Technology (IT).

Module– 1	**No. of Hours**
Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions. **Data Manipulation:** Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices. ***Textbook 1: Chapter-1 (1.1-1.7), Chapter-2 (2.1-2.5)***	9
Module– 2	**No. of Hours**
Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security. **Algorithms:** The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery. ***Textbook 1: Chapter-3, Chapter-5 (5.1-5.3)***	9
Module– 3	**No. of Hours**
Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security. **Cybersecurity:** Overview—What is Cybersecurity?, Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity. Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content. ***Textbook 1: Chapter-4 Textbook 2: Chapter-16, Chapter-17***	9
Module– 4	**No. of Hours**
Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade. **Database Systems:** Database Fundamentals, The Relational Model. ***Textbook 1: Chapter-7 (7.1-7.5), Chapter-9 (9.1-9.2)***	9
Module– 5	**No. of Hours**
Introduction to HTML and Website Development: What is HTML?, Cascading Style Sheets (CSS), Website Design and Storyboarding, Structure of a Website. **Computer Graphics:** The Scope of Computer Graphics, Overview of 3D Graphics, Modeling, Rendering. ***Textbook 2: Chapter-12. Textbook 1: Chapter-10 (10.1-10.4)***	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Illustrate different information representation and manipulation schemes.
CO2	Make use of Information Technology (IT) infrastructure for information exchange.
CO3	Apply basic software engineering concepts for Website and application development.
CO4	Develop queries for quick insert, access and updating of structured information.
CO5	Identify role of cybersecurity and ethics issues in Information Technology (IT).

Text Books	
1.	J. Glenn Brookshear and Dennis Brylow, Computer Science: An Overview, 12th Edition, Pearson Education Limited, 2017.
2.	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manish, "Fundamentals of Information Technology", Digital Commons at The University of South Florida (2023). https://digitalcommons.usf.edu/dit_tb_eng/19

Reference Text Books	
1.	V. Rajaraman, "Introduction to Information Technology", 3rd Edition, PHI Learning, 2018.
2.	PelinAksoy, Information Technology in Theory, 1st Edition, Cengage.

Web links and Video lectures (e-Resources)

- Information Technology: https://onlinecourses.swayam2.ac.in/cec20_cs05/preview
- Computer Organization and Architecture: https://nptel.ac.in/courses/106103068
- Introduction To Internet: https://nptel.ac.in/courses/106105084

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage. To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40**	**50**
	Internal Assessment2	**50**	**(Average of Best two Assessments)**	
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

1. The Question paper for each course contains two parts, Part – A and Part – B.
2. Part – A consists of **Short Answer Questions** (2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. Multiple choice questions.
3. Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students shall answer five full questions, selecting one full question from each module.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25ESE204 (L:T:P:S 3:0:0:3)	Essentials of Information Technology	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
ENGINEERING MECHANICS					
Category: PSC					
Course Code	:	B25CIV205	CIE	:	50 Marks
Teaching Hours L : T : P	:	3:0:0	SEE	:	50 Marks
Total Hours	:	45(T)	Total	:	100 Marks
Credits	:	3	SEE Duration	:	3Hrs

Course Objectives	
1.	To get the knowledge about Civil engineering disciplines.
2.	To know thefundamentalsofforcesystems,freebodydiagrams,moments,couple.
3.	To analyzetheequilibriumofforcesystem, loading types and reactions for beams.
4.	To locatethecentroidoflaminasandcomputethesecondmomentofareaoflaminas.

Module– 1	**No. of Hours**
Civil Engineering Disciplines and Building Science **Branches of Civil Engineering:**Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning &Project management, Earth quake engineering, construction technology. **Construction Materials**: Bricks, Cement & mortars, Plain, Reinforced &Pre-stressed Concrete, Structural steel, Construction Chemicals. **Structural elements of a building:** foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.	9
Module– 2	**No. of Hours**
Coplanar force system: Basicdimensionsandunits,Idealization,Force,Classificationofforce system, principle of transmissibility of a force, Composition and resolution of forces, Free body diagrams, Resultant of coplanar concurrent and non-concurrent force system, Moment, Couple and Characteristics of couple, Varignon's theorem: Numerical Examples.	9
Module– 3	**No. of Hours**
Equilibrium: Conditions of static equilibrium, Equilibrium of coplanar concurrent force systems, Lami's theorem, Equilibrium of coplanar non-concurrent force system, Numerical examples. Typesofsupports,loadingsandbeams,Conceptofstaticallydeterminateandindeterminatebeams.Supportreactionsforstaticallydeterminatebeamssubjectedtovariousloadings: Numerical examples.	9
Module– 4	**No. of Hours**
Centroid: Introduction, definitions of centroid and centre of gravity. Axes of symmetry, Locating the centroid of square, rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, Centroid of composite areas and simple built up sections: Numerical examples.	9
Module– 5	**No. of Hours**
Moment of Inertia of plane Areas: Introduction, Moment of inertia about an axis, Parallel axes theorem, Perpendicular axes theorem, Polar moment of inertia, Radius of gyration. Moment of inertia of square, rectangular, triangular and circular areas from the method of Integration, Moment of inertia of composite areas and simple built-up sections: Numerical Examples.	9

Course Outcomes: At the end of the course, the students will be able to	
CO1	Understand the various disciplines of civil engineering, Basic Materials of Construction& Structural elements of a building.
CO2	Compute the resultant and equilibrium of force systems.
CO3	Locate the centroid of plane and built-up sections
CO4	Compute the moment of inertia of plane and built-up sections.

Text Books	
1.	Bansal R. K., Rakesh RanjanBeohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 3rd edition, 2015, Laxmi Publications, ISBN: 9789380856674.
2.	Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 11th edition, 2018, Eastern Book Promoters Belgaum [EBPB], ISBN: 5551234003896.
3.	S.S Bhavikatti, Engineering Mechanics , Third Edition by S.S. Paperback, Published 2020 by New Age

	International ISBN-13: 978-93-88818-58-2, ISBN .
Reference Text Books	
1.	Beer F.P. and Johnston E. R., Mechanics for Engineers: Statics and Dynamics, 4th edition, 1987, McGraw Hill, ISBN: 9780070045842.
2.	Meriam J. L. and Kraige L. G, Engineering Mechanics-Statics, Vol I–6th Edition,2008, Wiley publication.
3.	Irving H. Shames, Engineering Mechanics-Statics and Dynamics, 4th edition, 2002, Prentice-Hall of India (PHI).
Web links and Video lectures (e-Resources)	
• https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8 PpwT • https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao 7q8PpwT&index=2 • https://www.youtube.com/watch?v=ljDIIMvxeg&list=PLOSWwFV98rfKXq2KBphJz95rao7q 8PpwT&index=5 • https://www.youtube.com/watch?v=3YBXteL-qY4	

ASSESSMENT STRUCTURE:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks. To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks. Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1**	**50**	**40 (Average of Best two Assessments)**	**50**
	Internal Assessment2	**50**		
	Internal Assessment3	**50**		
Self Learning	**Two Assignments**	**20**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

- The Question paper for each course contains two parts, Part – A and Part – B.
- Part – A consists of **Short Answer Questions**(2 Marks/1 mark) for 20 marks covering the complete syllabus and it is compulsory. There is no multiple choice questions.
- Part – B consists of 10 questions, two questions of 16 marks (with max. of 3 sub questions) from each module with internal choice. Students should answer five full questions, selecting one full question from each module. Total scored marks for 100 scaled down to 50 marks.

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 – Low

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / Semester	Term work (TW) and self learning (SL) in hours / sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25CIV205 (L:T:P:S 3:0:0:3)	Engineering Mechanics	**45**	**00**	**00**	**45**	**90**	**3**

SEMESTER-II					
MECHANICS AND MATERIALS LAB **Category: PSC**					
Course Code	:	B25MML207	CIE	:	50 Marks
Teaching Hours L : T : P	:	0:0:2	SEE	:	50 Marks
Total Hours	:	26(P)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	2 Hrs

Course Objectives	
1.	To analyze coplanar force systems by analytical and graphical methods and verifying Lami's theorem.
2.	To compute support reactions in simply supported beams experimentally and analytically.
3.	To identify and understand the properties of various construction materials.

Part – A
Conventional Experiments

1. Verification of Lami's Theorem.
2. Equilibrium of concurrent forces.
3. Parallel force system- Simply supported beam.
4. Verification of Varignon's theorem.
5. Specific Gravity of
   a) Fine aggregates.
   b) Coarse aggregates.
   c) Cement.
   d) Coarse grained Soil.
6. Sieve analysis of soil-Graphical representation of the gradation curve

   AND

   Visual identification of building materials:

   Bricks, Stones, Tiles, M-Sand, Bitumen, Fly-Ash, GGBS, Steel Bars of Various Sizes.

Part – B
Typical Open-Ended Experiments

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. It encourages creativity, critical thinking, and inquiry-based learning.

1. Reactions.
2. Field tests on cement.
3. Particle size distribution.
4. Soil Gap graded.
5. SoilUniformly graded.
6. SoilWell graded.

Course Outcomes: At the end of the course, the students will be able to	
CO1	Analyze coplanar force systems by analytical and graphical methods and verifying Lami's theorem.
CO2	Compute support reactions in simply supported beams experimentally and analytically.
CO3	Identify and understand the properties of various construction materials.

Text Books	
1.	M. L. Gambhir: Concrete Manual:Dhanpat Rai & sons New – Delhi, ISBN-135551234001965.
2.	Bansal R. K., Rakesh RanjanBeohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 3rd edition, 2015, Laxmi Publications, ISBN: 9789380856674

3.	S.S Bhavikatti, Engineering Mechanics , Third Edition by S.S. Paperback, Published 2020 by New Age International ISBN-13: 978-93-88818-58-2, ISBN .
4.	Soil Mechanics and foundation Engineering by B C Punmia, Ashok kumarjain, Arunkumarjain, 18th edition, 2023, Laxmi Publications New Delhi.

Reference Text Books	
1.	Meriam J. L. and Kraige L. G, Engineering Mechanics-Statics, Vol I–6th Edition,2008, Wiley publication.
2.	Rattan S.S., Strength of Materials, 3rd edition, 2017, McGraw Hill Education; New Delhi. ISBN 13978-9385965517.
3.	Bansal R K, Strength of Materials, Laxmi Publications. 2023, 4th Edition, ISBN: 978-8131808146.
4.	IS 4031 (Part 11):1988 – Specific gravity test for hydraulic cement.

Web links and Video lectures (e-Resources)
• https://www.nptel.ac.in/courses/122104015/ • https://nptel.ac.in/courses/112103109/ • http://vlab.co.in/

ASSESSMENT STRUCTURE FOR LABORATORY:

- The assessment for each course is equally divided between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each component carrying 50% weightage.
- For both CIE and SEE, the student is required to conduct one experiment each from both Part A and Part B.
- To qualify and become eligible to appear for SEE, in the CIE component, a student must secure a minimum of 40% of 50 marks, i.e., 20 marks.
- In SEE component, Part A must be evaluating as 40% and Part B will be evaluating as 60%.
- To pass the SEE component, a student must secure a minimum of 35% of 50 marks, i.e., 18 marks. A student is deemed to have successfully completed the course if the combined total of CIE and SEE is at least 40 out of 100 marks.

Component	**Type of Assessment**	**Max. Marks**	**Max. Marks Scaling Down to**	**Total Marks**
Laboratory	**Lab Conduction & Record**	**Evaluate each expt. for 10 marks*12 expts.**	**15**	**50**
	Laboratory Test 1: After 6 expts.	**50**	**15**	
	Laboratory Test 2: After 12 expts.	**50**	**20**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

CO-PO Mapping:

PO / CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	1	1	2	1	-	-	1	-	1	-
CO2	3	1	1	2	-	1	1	1	-	1	-
CO3	3	1	1	2	-	1	-	1	-	1	-

Level 3 - High, Level 2 - Moderate, Level 1 – Low

Course Code	Course Title	**Teaching and Learning Structure**					
		Classroom Instruction (CI) in hours per semester		Lab Instruction (LI) in hours per semester	Term work (TW) and self learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25MML207	Mechanics and Materials Lab	**00**	**00**	**26**	**00**	**30**	**1**

	(L:T:P:S 0:0:2:0)						

MOOGAMBIGAI CHARITABLE AND EDUCATIONAL TRUST

Rajarajeswari College of Engineering

(An Autonomous Institution under Visvesvaraya Technological University, Belagavi)
#14, Ramohalli Cross, Kumbalagodu, Mysore Road, Bengaluru–560074

Common Courses

Physics Group-II

Bachelor of Engineering

(2025 Scheme)

SEMESTER-II					
SOFT SKILLS					
Category: AEC					
Course Code	:	B25SSK206	CIE	:	100 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	--
Total Hours	:	15	Total	:	100 Marks
Credits	:	PP	SEE Duration	:	--

Module– 1: Social Skills	**No. of Hours**
Communication: Principles of clear and effective exchange of ideas in professional and social contexts. **Persuasion:** Techniques to influence and convince through logical, emotional, and ethical appeals. **Self-Awareness:** Identifying personal strengths, weaknesses, opportunities, and challenges. **Active Listening:** Paraphrasing, questioning techniques, and demonstrating attentiveness.	3
Module– 2: Emotional Skills I	**No. of Hours**
Emotional Intelligence (EI): Recognizing and managing emotions, empathy, relationship management, and conflict resolution. **Stress Management:** Identifying stress triggers, relaxation techniques, work-life balance strategies, and mindfulness practices. **Time Management:** Prioritization (Eisenhower Matrix), setting SMART goals, avoiding procrastination, and effective scheduling. **Adaptability & Resilience:** Handling change, bouncing back from setbacks, and developing a growth mindset.	3
Module– 3: Emotional Skills II	**No. of Hours**
Ambition & Goal Setting: Defining personal and professional aspirations, creating SMART goals, and aligning actions with long-term vision. **Sympathy & Empathy:** Understanding emotional perspectives, differentiating between the two, and applying them in workplace and social interactions. **Creativity & Innovation:** Generating original ideas, problem-solving, and applying creative thinking techniques (mind-mapping, SCAMPER).	3
Module– 4: Professional Skills I	**No. of Hours**
Problem Solving: Identifying root causes, analyzing options, and implementing solutions using methods like 5 Whys and Fishbone Diagram. **Discipline:** Building consistency, accountability, and professional habits. **Time Management:** Prioritizing tasks (Eisenhower Matrix), scheduling, avoiding procrastination.	3
Module– 5: Professional Skills II	**No. of Hours**
Collaboration & Teamwork: Working effectively in diverse teams, fostering trust, and achieving shared goals. **Negotiation & Conflict Resolution:** Strategies to resolve differences and reach win win outcomes. **Critical Thinking:** The ability to analyze, evaluate, and synthesize information to make well-reasoned decisions.	3

Course Outcomes: At the end of the course, the students will be able to	
CO1	Apply social skills for clear communication, persuasion, self-awareness, and active listening.
CO2	Use emotional skills to build confidence, manage stress, and adapt to change.
CO3	Set ambitious goals, practice empathy, and apply creativity for problem-solving
CO4	Demonstrate discipline, time management, and structured problem-solving.
CO5	Work in teams, negotiate, resolve conflicts, and think critically.

Text Books	
1.	Oxford Advance Learners Dictionary
2.	Cambridge English Skills Real Listening and Speaking by Miles Craven
3.	Communicative English for Professionals by Nitin Bhatnagar and MamtaBhatnagar

Web links and Video lectures (e-Resources)

- Google Docs + Voice Typing - https://docs.google.com
- LearnEnglish – https://learnenglish.britishcouncil.org/
- TakeIELTS - https://www.britishcouncil.in/exam/ielts

ASSESSMENT STRUCTURE (CIE only):

Type of Assessment	Max. Marks	Total Marks
Theory / Practical / Activity held on every week and performance of the student is evaluated for 10 marks.	**100**	**100**
CIE Total		**100**

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25SSK206 **(L:T:P:S 1:0:0:1)**	Soft Skills	**15**	**00**	**00**	**15**	**30**	**PP**

CO-PO Mapping:

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

Level 3 - High, Level 2 - Moderate, Level 1 - Low

SEMESTER-II					
INTERDISCIPLINARY PROJECT BASED LEARNING **Category: AEC/SDC**					
Course Code	:	B25PRJ208	CIE	:	100 Marks
Teaching Hours L:T: P	:	0 : 0 : 1	SEE	:	--
Total Hours	:	15 (P)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	--
Semester running periods : 15-16 weeks					
Examination type (Only CIE– Internals) divided into 4 reviews (R1 to R4) in a semester with each review of 25 marks, which is equivalent to doing continuous evaluation every month. Components : Practical Field Work /PPT Presentation/Seminar/Demonstration/Poster Presentation/ Project Exhibition/Project Report/Project Exhibition/ Project Reviews/Observation - activity book/Case-Study/Simulation Study/Prototype Development/Model Making / Developing Patent / Hackathon					

Course Objectives :	
1.	To help students explore & understand real-world problems that require knowledge from more than 1 engineering discipline, enabling them to identify an innovative project topic, apply suitable design strategies. (*Aligned with CO1*)
2.	To guide students in performing a meaningful literature review, so that they learn to frame problem correctly, propose appropriate solution approaches using basic science, engineering, and technology concepts. (*Aligned with CO2*)
3.	To enable students to practice system-level thinking while designing or analyzing solutions, including ability to apply reverse-engg. concepts, work collaboratively with clear roles &responsibilities within team. (*Aligned with CO3*)
4.	To train students in converting ideas into practical working models or simulations, while also developing their technical drawing& effective demonstration skills using project management tools. (*Aligned with CO4*)
5.	To develop students' ability to prepare a structured interdisciplinary project report and present project outcomes with strong communication, leadership, teamwork, and social responsibility through sustainable and innovative project execution. (*Aligned with CO5*)

CO - Course Outcomes (Course Skill Sets) : At the end of the IDPW course, first year students will be able to	
CO1	Demonstrate a sound technical knowledge of their selected project topic& develop various types of design procedures by identifying and defining practical problems which requires interdisciplinary knowledge.
CO2	Use literature survey for problem identification, formulation and solution, generate and develop design ideas / simple solutions through different techniques by applying the basic concepts of science, engineering, and concerned branch's technological ideas.
CO3	Analyze, design and develop engineering solutions to problems utilizing a systems approach& identify the significance of reverse engineering to understand products by working effectively in teams with defined roles and responsibilities.
CO4	Prepare the working model/ simulation for the project and demonstrate the same& draw technical drawing for design ideas by using project management, documentation, and presentation skills.
CO5	Effectively write an interdisciplinary project report on the project topic with obtained results& to inculcate project management, team building, communication, interpersonal and team management skills by developing socially relevant, sustainable, and innovative prototypes/solutions.

Teaching-Learning Process(Constructive Delivery Methods)
Activity based /Practical based / Hands on Based Learning – *Project can be an extension of 1st semester work also*

1. Hands-on Activity Based Learning
2. Group discussion & time to time Presentations.
3. One faculty member shall be assigned to group of 60 students or one division, the same faculty member

shall also be assigned to another group of 60 students or another division as the project work is interdisciplinary in nature, i.e., one faculty has to handle two different sections, i.e., 1 section of CSE & 1 section of ECE (but, not mandatory).

4. Each project group batch shall contain Min. of 2 and Max. of 4 students.
5. Nature of the group shall be multidisciplinary (Group shall be formed by selecting students from all branches).
6. Use sample strategies, which teachers can use to accelerate the attainment of the various course outcomes.
7. Encourage collaborative (Group Learning), (Collaborative Learning), group learning in the class/practical/lab by designing group-based projects in any domain.
8. Show video /animation films to explain concepts of practicality in solving the designed problems or the students can be taken to industry visits to show case some of the practical orientations and do some industry-based case study.
9. Practical based-hands on methodologies, may be hardware or software oriented in the class.
10. Case-study oriented, Survey based orientations, Review based orientations.
11. Adopt Problem Based Learning (PBL), which fosters students' analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
12. Discuss how every concept can be applied to the real world –and when that's possible, it helps improve the students' understanding by doing case study or solving using simulations or doing some real time implementation in hardware.
13. Conducting creative workshops, to empathize, design, ideate, prototype and test the products in the form of hands on or hackathons.
14. Model building, Prototype building thro' creative conceptual developments.
15. Learn different types of simulation tools for solving real world problems such as multisym, pspice, labview, matlab, ansys, pro-e, catia, proteas, etc…

Week - 1, 2 & 3: Introduction, Orientation, Team Formation and Literature Survey(related to only interdisciplinary-project development – resulting in a prototype with either s/w or h/w or both)

Week -1: Introduction to project-based learning & interdisciplinarity activity. Motivational talk / case studies of successful student projects. Ice-breaking and team-building activities, briefing about 5 stages: Empathize – Define – Ideate – Prototype – Testing ….. (*give a brief orientation*)

Week -2: Formation of groups (*2 to 4 students from same branch or different branch*). Selection of broad theme areas. Brainstorming techniques {*mind mapping*, *5W1H* (*what*, *who*, *when*, *where*, *why*, *and how*)}. Identifying problems. Discuss feasibility & Inter-disciplinarity. Mentor or project guide's approval of project problem.

Week-3: How to search for prior work (*journals*, *patents*, *research project*, *case studies*, *search engines*, *google*, *yahoo*, ChatGPT, *etc*…). Understanding student needs. Role of each engineering branch in solving the problem.

Deliverables - Team list + chosen theme area of the interdisciplinary project work and literature survey report.

Week- 4, 5 & 6: Problem Statement by selection of field or domain area, Multiple Solution Ideas and Selection of Best Idea Consideration (related to only interdisciplinary-project development)

Week-4: Refining the problem statement& defining it. Identifying constraints and scope. Framing objectives & expected outcomes. Generating multiple solution ideas. Discussing feasibility (*technical*, *economic*, *social*).

Week-5: Project team roles assigned (*design*, *research*, *coding*, *documentation*, *testing*). Criteria-based selection of best idea (decision matrix). Documentation, categorization and Group discussion on interactions and problems / challenges

Week-6: Rough sketches, block diagrams, flowcharts. Resource planning (*materials*, *software*, *tools*).

Deliverables - Finalized Problem definition with objectives, List of solution concepts (*sketches*) and Design document (*line diagrams*, *flow-charts*, *algorithms*, *DFDs*, *pictures*, block-*diagrams*)

Week -7, 8 and 9: Selection of Best IDEA and Prototyping by trying to develop a project model (related to only interdisciplinary-project development) …. Prototyping stage 1 using s/w or h/w or using any labspace

Week-7: Work breakdown structure (task division). Timeline for development. Safety & ethical considerations.

Week-8: Development of subsystems / modules of the project

Week-9: Application of classroom knowledge (electrical circuits, software coding, mechanics, CAD, debugging, reverse engineering, etc.), Peer & mentor review sessions.

Deliverables - Prototype development plan, Subsystem demos (partial working models).
Week 10, 11&12 : Prototyping stage 2 using Atal Idea Lab / Makers Space / Virtual Labs (related to only interdisciplinary-project development)…. Prototyping stage 2 using s/w or h/w or using any labspace
Week-10: Integration of subsystems. Debugging & troubleshooting, building low-fidelity and working models using tools like Arduino, 3D printers, Digital fabrication, electronics kits and recycled materials (*may be drones or home automation models*) **Week-11:** Improvement in project based on test results, User testing, Feedback collection, Iterations doing to build the product (may be h/w or s/w oriented), Testing against objectives & user requirements. **Week-12:** Experimentation results (tables, graphs). Analyzing failures/limitations & Designing / Structuring of Prototype model in partial stage (say, three-fourth completed project).
Deliverables – Prototype/working model development, Testing Results, Limitations/challenges
Week 13 &14: Refinement & Pre-Final Interdisciplinary Project Review
Week 13: Refining prototype for efficiency, cost, sustainability. Internal review & peer feedback. **Week 14:** Preparing visuals for final presentation (posters, PPT, demo video).
Deliverables – Final Results of Experimentation or Testing & Working / Prototype Model
Week 15 &16: Final Project Demo and Social Pitch& Project Exhibition / Poster Presentation / PPT presentation of stage / Seminar(related to only project development)
Showcased Projects, Poster display, Project pitching to jury, Presentation of the project (ppt) with impact with assessment, prototype, and sustainability plan, report making, video making ending with an project expo. ***Weeks 1 to 16 to be converted into a project with case study or software oriented or hardware oriented or both having 4-stage reviews.*** Final phase review (on/off line) with project demo, poster presentation & project presentation, hackathon participation, coding contest participation, working module explanation, power point presentation by the project group in the project exhibition.

List of Interdisciplinary-Projects (*samples & not restricted to these, but can be from other topics also, but should be related to the particular department & course undertaken*)

1. Case – study projects
2. Design projects (app, circuit, web-site, system, etc…)
3. Survey projects
4. Pure software-oriented projects
5. Pure hardware-oriented projects
6. Both software & hardware-oriented projects
7. Combination of the previous 5 types of works related to a hybrid interdisciplinary project

4 Reviews Rubrics→

No.	Stage/Activity/ Component per week	Weigh -tage	Marks Out of 100	Description
1.	Weeks 1–4: Problem Identification & Literature Survey	10	10	Focus on forming teams, identifying problems, understanding user needs, and reviewing prior work through journals, patents, etc.
2.	Weeks 5–7: Concept Development & Design	20	20	Defining problem statements, framing objectives, generating ideas, preparing diagrams, flowcharts, and resource planning.
3.	Weeks 8–11: Prototype Development	30	30	Creating subsystems, applying theoretical knowledge, peer and mentor review sessions, debugging, and troubleshooting.
4.	Week 12: Testing & Validation	10	10	Evaluating the prototype's performance, user requirements, experiments, and analysis of failures.
5.	Weeks 13–16: Documentation & Presentation, Exhibition, Project Report, Demo	30	30	Finalizing the prototype, improving based on feedback, preparing presentations, reports, and demonstration materials.
6.	Total CIE marks	100%	100	Final CIE marks to be considered

Minimum marks to qualify for CIE& to get eligible to clear the subject:

40 Out of 100 in CIE (4 Reviews) based on project report, presentation, Q & A, Demo, Model making, Awards-Prizes obtained @ various project exhibitions, poster design, conference paper presentation, journal paper publication & weekly progress (in a observation activating booklet).

CIE – 1	First Phase Review – Batch formation, Topic Selection, Synopsis/Problem formulation – 25% completed (*immediately after the 1st internals is over*)	25 Marks
CIE – 2	Second Phase Review – 50% of the project to be completed, Ideation sprint s/w (*immediately after the 1st internals is over*)	25 Marks
CIE – 3	Third Phase Review – 100% of the project to be completed with poster design, Rapid prototyping (*immediately after the 1st internals is over*)	25 Marks
	Fourth Phase Review – Project exhibition, Video of working, Project report, Demo, PPT (h/w or s/w) (*End of the semester*)	25 Marks
	Total CIE-1 + CIE-2 + CIE-3 + Final	100 M

Fourth Phase Review – Project exhibition / expo, Video of working, Project report, Demo, PPT (h/w or s/w) rubrics

Component for	Weightage (%) approx	Marks (outof 25)	Description
Final Presentation &Demonstration	15%	4	Clear articulation of the problem, solution approach, prototype, and team contribution. Delivery, engagement, and response to questions are evaluated.
Prototype Quality & Functionality	15%	4	Working model evaluation, application of engineering principles, problem-solving effectiveness, debugging, and system integration.
Documentation Report	15%	4	Completeness, structure, accuracy, clarity in diagrams, data analysis, testing results, and conclusions.
Social Impact &Sustainability	15%	4	Relevance to society, cost-effectiveness, ethical considerations, environmental impact, and scalability.
Innovation & Originality	15%	4	Creativity, uniqueness, feasibility, and application of interdisciplinary concepts.
Viva– voce	25%	5	Final presentation on stage & project demo in project exhibition.
Total Marks for R-4	**100%**	**25 Marks**	

Assessment Structure: CIE Marks allocation Parameters for Social Entrepreneurship, Product development using Atal Idea/Tinkering Lab or Maker Space / Virtual Labs / Project lab shall depend on the 4 reviews performance by the project batches.

- The CIE marks shall be awarded by the project guide or the class handling faculty or who is guiding the IDPW course.
- The CIE marks awarded for the interdisciplinary-project work, shall be based on the evaluation of project report, project presentation skill, and question and answer session in the respective ratios and as per the standard rubrics.
- The CIE marks awarded for the project report shall be the same for all the batch mates or may be varying depending on how they answer in the reviews.
- CIE marks are awarded for the project, poster, demo, exhibition, paper, app, prizes, patent, etc…

Assessment Details& its Structure (only CIE)

The weightage of Continuous Internal Evaluation (CIE) is 100%. The minimum passing mark for the CIE is 40% of the maximum marks of 100 (40 marks out of 100). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject / course if the student secures morethan or equal to 40% (40 Marks out of 100) in the (CIE) and would be eligible for the next semester. To quality & pass or become eligible for completing this interdisciplinary project based learning work course, a student must score at least 40% of the total 100 marks, i.e., 40

marks.

Continuous Internal Evaluation (CIE): Monthly, Group Reviews can be conducted (*project evaluation as per rubrics*), where the students in groups have to give a demo of their work status in front of the project guide, the average of the 4 reviews shall be taken, i.e., initial review, mid review, the final review (similar to 3 internals) along with the final pitching demo of their work idea (may be h/w or s/w or both). There are no assignments or quiz for this course as it is project-based learning, except 4 reviews with Poster Design, Power Point Presentation, Report making& Project Demo (Project Exhibition).

Total Marks scored (Sum of all the 4 reviews) out of 100maximum is min of 40 Marks to be obtained.

Blooms level in developing the project / proposal / design :

Bloom's Category	Preparation of Project Report/ Product (h/w or s/w)
Marks (Out of 100)	100
Remember	10
Understand	10
Apply	10
Analyze	10
Evaluate	10
Create	50

Submission Requirements:

- Hand written activity book with CIE marks and Final project report (Typed or Handwritten), number of reports to the submitted being no. of students + 1 to the guide/department.
- Observation booklet to be maintained with weekly progress & signed regularly by the guide (activity report).
- Observation booklet to be signed by teacher every week.
- Final presentation ppt / pdf (hard and soft copy).
- Prototype or working model [physical or conceptual (shall be drawn / sketched clearly on card sheet paper)].
- Peer / team feedback and day-to-day entries (if applicable).
- End outcome – Reflection notes what they learnt from the project work.

Useful&student-friendly list of websites where students can explore ideas, gather information, and access tutorials for doing interdisciplinary software + hardware project works.

Some reference materials

1. https://www.electronicshub.org/electronics-mini-project-circuits/
2. https://nevonprojects.com/project-ideas/communication-project-ideas/
3. https://www.electronicsforu.com/
4. https://www.elprocus.com/

Electronics, Robotics & Embedded Systems

- Electronics Hub – https://www.electronicshub.org(Robotics, wireless communication projects)
- EEWeb – https://www.eeweb.com(Electronic design news & tutorials)
- Microchip Developer Help – https://developerhelp.microchip.com(PIC, dsPIC, ARM MCU development resources)
- ARM Developer – https://developer.arm.com(Embedded programming & MCU architecture)
- OpenHardware.io – https://www.openhardware.io(Community hardware designs)
- Robotics Every Day – https://robocraze.com/blogs(Hands-on robotics articles & DIY learning)
- DFRobot Community – https://community.dfrobot.com(Sensors, automation & STEM project ideas)

Project Ideas & Documentation Resources

- Instructables – https://www.instructables.com(Large variety of DIY electronics & mechanical projects)
- Hackster.io – https://www.hackster.io(IoT, robotics, embedded systems projects with tutorials)
- Hackaday – https://hackaday.io(Innovative hardware hacking and maker projects)
- All About Circuits – https://www.allaboutcircuits.com(Circuit ideas, discussions, and project support)
- Electronics For You (EFY) – https://www.electronicsforu.com(Indian electronics project magazines and tutorials)
- Circuit Digest – https://circuitdigest.com(Circuit implementation, Arduino, and PCB design guides)

Mechanical, 3D Printing & Industrial Design
- Autodesk Design Academy – https://academy.autodesk.com(Fusion 360, AutoCAD training)
- GrabCAD – https://grabcad.com/library(3D CAD models for robotics/mechanics)
- PrusaPrinters – https://www.printables.com(3D printable models, maker ideas)
- MyMiniFactory – https://www.myminifactory.com(3D prototypes inspiration)

Power Electronics, Control & Industrial Automation
- Power Electronics News – https://www.powerelectronicsnews.com(Converters, EV power systems)
- PLC Academy – https://www.plcacademy.com(PLC programming & automation)
- Control.com – https://control.com(Industrial automation discussions)
- EETimes – https://www.eetimes.com(Electronics technology trends)

Networking, Cybersecurity & Cloud
- Cisco Networking Academy – https://www.netacad.com(Networking & IoT skills)
- OWASP – https://owasp.org(Cybersecurity project references)
- DigitalOcean Tutorials – https://www.digitalocean.com/community(Cloud & DevOps learning)
- GNS3 Community – https://www.gns3.com(Network simulation and lab setups)

Embedded, Robotics & IoT Platforms
- Arduino Project Hub – https://create.arduino.cc/projecthub
- Raspberry Pi Projects – https://projects.raspberrypi.org
- ESP32/IoT Tutorials – https://randomnerdtutorials.com
- Adafruit Learning System – https://learn.adafruit.com
- SparkFun Tutorials & Projects – https://learn.sparkfun.com
- NVIDIA Jetson Projects – https://developer.nvidia.com/embedded/community

Software Development & ML/AI Resources
- w3schools – https://www.w3schools.com(Web & programming basics)
- GeeksforGeeks – https://www.geeksforgeeks.org(Programming, placements, and algorithms)
- Kaggle – https://www.kaggle.com(Datasets & machine learning projects)
- Google Developers – https://developers.google.com(ML models, APIs, Cloud platform)
- PyImageSearch – https://pyimagesearch.com(Computer vision projects using Python)
- MIT OpenCourseWare – https://ocw.mit.edu(Free engineering & CS courses)

AI/ML, IoT & Software Development
- Towards Data Science – https://towardsdatascience.com(AI & ML concepts explained practically)
- TutorialsPoint – https://www.tutorialspoint.com(Programming, OS, networking basics)
- FreeCodeCamp – https://www.freecodecamp.org(Complete software & web development courses)
- EdX – https://www.edx.org(Engineering MOOCs from top universities)
- Coursera – https://www.coursera.org(ML & embedded specialization programs)
- MDN Web Docs – https://developer.mozilla.org(Web development, protocols, APIs)
- IBM Developer – https://developer.ibm.com(Cloud & AI tools, IoT real-time coding guides)

Circuit Design, Simulation & PCB Tools (Online)
- Tinkercad Circuits – https://www.tinkercad.com/circuits(Beginner-friendly simulation & Arduino support)
- EasyEDA – https://easyeda.com(PCB & circuit design online)
- KiCad EDA – https://www.kicad.org(Open-source PCB design)
- Proteus info & resources – https://labcenter.com(Simulation of microcontrollers and electronics)
- LTspice – https://www.analog.com/en/design-center/design-tools-and-calculators/ltspice-simulator.html (Power/analog circuit simulation)

Hardware, Sensors & 3D Printing Information

- Arduino Store – https://store.arduino.cc
- OEMs like Texas Instruments – https://www.ti.com/design-resources/design-tools-simulation.html
- Thingiverse – https://www.thingiverse.com(3D printing models for robotics/mechanics)
- Make Magazine – https://makezine.com(Maker community and engineering prototypes)

Research Papers & Technical References

- IEEE Xplore – https://ieeexplore.ieee.org
- ScienceDirect – https://www.sciencedirect.com
- Google Scholar – https://scholar.google.com
- ResearchGate – https://www.researchgate.net
- SpringerLink – https://link.springer.com
- arXiv – https://arxiv.org(Free latest papers in CS, EE, robotics)
- Academia.edu – https://www.academia.edu(Research project references)
- DOAJ – https://doaj.org(Free access scientific journals)

Bonus — Competitions & Innovation Platforms

- Smart India Hackathon – https://www.sih.gov.in
- AICTE Idea Lab & Projects – https://www.aicte-india.org
- NASA Open Innovation Projects – https://solve.mit.edu/challenges

Alternate Assessment Tool (AAT) in Developing IDPW Hands-On Designing Projects

1. **Project-Based Assessment - Capstone Projects -** Long-term, often team-based, real-world problems that require designing and implementing solutions - **Projects -** Short-term individual or group projects based on course content - **Design Challenges -** Students design and prototype a solution to a specific engineering problem.
2. **Problem-Based Learning (PBL) -** Students are given complex, open-ended engineering problems to solve using learned concepts, Encourages critical thinking, teamwork, and research.
3. **Presentations and Seminars - Technical Presentations -** Individual or group presentations on engineering topics, case studies, or projects – **Seminars -** Students present findings from independent or guided research.
4. **Simulations Studies -** Simulations using tools like MATLAB, Simulink, or ANSYS, LABVIEW, Multisim, Proteas, ProE, pSPICE, etc…
5. **Portfolios -** A collection of a student's work over time: reports, projects, designs, reflections, Useful for design, CAD, architecture, and software engineering courses.
6. **Case Studies and Technical Reports -** Students analyze real-world engineering problems, disasters, or innovations, Write a report with analysis, proposed solutions, and conclusions.
7. **Coding or Simulation Assignments -** For courses like software engineering, control systems, or mechanical design, Students are assessed on the design, logic, efficiency, and functionality of code or CAD models.
8. **Concept Mapping / Mind Mapping -** Students create visual representations of interrelated concepts, Helps assess conceptual understanding, Website design, App design.
9. **Annotated Bibliographies / Literature Reviews Study -** Useful in research-based or under-graduate courses, Students analyze and summarize existing research in a structured format.
10. **Reflective Journals / Learning Logs -** Students regularly write reflections on what they've learned, challenges, and how they overcame them.
11. **Rubric-Based Design Reviews -** Used during the design stages of projects (mid-review, final review), Evaluated using predefined rubrics for innovation, feasibility, teamwork, etc.
12. **Service Learning or Community-Based Projects -** Applying engineering skills to benefit a local community, Example: Designing water filters, low-cost housing solutions, etc.

Different stages in 15 weeks for Developing Interdisciplinary Projects : Hands-On Designing & Developing of Projects

1. **Problem Identification & Survey -** Define the problem statement, collect background information through surveys, literature review, and case studies, identify user requirements, constraints, and feasibility, conduct field or market survey to understand practical needs.
2. **Requirement Analysis -** Document functional and non-functional requirements, specify performance targets, cost limits, and timelines, decide hardware and software platforms to be used, Perform risk assessment and resource planning.

3. **Conceptual & Preliminary Design -** Develop block diagrams and flowcharts, propose multiple solution approaches, Select the best feasible design through evaluation, Prepare preliminary specifications for hardware and software.
4. **Detailed Design -** Circuit/system design for hardware modules, Algorithm and architecture design for software, Interface design between hardware and software, Simulation and modeling (using MATLAB, CAD, NS2, C, Python, Multisim, etc.).
5. **Development & Implementation -** Hardware prototyping (PCB design, fabrication, testing), Software coding, database creation, and UI development, Integration of hardware and software modules, Implement communication interfaces, protocols, and controllers.
6. **Testing & Validation -** Unit testing of each hardware and software component, System-level testing for functionality, performance, and safety, Debugging and fault rectification, Validation against initial requirements and survey outcomes.
7. **Deployment & Demonstration -** Assemble the complete project prototype/system, Demonstrate the working to stakeholders/end users, collect feedback and refine the system, Ensure reliability under different operating conditions.
8. **Documentation -** Prepare detailed technical report (survey results, design steps, methodology, results, conclusions), Create user manuals, flow diagrams, and circuit diagrams, Record test results, simulations, and comparisons, publish a paper, do a poster, create a video of full project working.
9. **Conclusion & Future Work -** Summarize achievements of the project, identify limitations of the current design, Suggest improvements, scalability, or new features for future work.

Mapping of Course Outcomes (CO) to Program Outcomes (PO)

Course Outcomes CO / Program Outcomes PO	PO1 Engineering Knowledge	PO2 Problem Analysis	PO3 Design & Development of Solutions	PO4 Investigations of Complex Problems	PO5 Modern Tool Usage	PO6 Engineer & Society	PO7 Environment & Sustainability	PO8 Ethics	PO9 Individual & Team Work	PO10 Communication Skills	PO11 Project Management & Finance	PO12 Life-long Learning

CO1 Demonstrate technical knowledge & design procedures	3	2	2	1	1	1	–	–	1	1	2	–
CO2 Literature survey & simple engineering solutions	2	3	2	2	1	–	–	–	1	1	1	1
CO3 Systems approach, reverse engineering & teamwork	2	2	3	2	2	1	1	1	3	2	2	1
CO4 Working model/simulation & project management skills	2	2	3	2	3	1	1	–	2	3	3	1
CO5 Report writing, team building & social relevance	1	1	2	1	2	2	2	2	3	3	3	2

L = Low (**1**), M = Medium (**2**), H = High (**3**) - Blank = No significant mapping correlation levels
CO1 & CO2 directly build technical foundation → aligns to PO1, PO2
CO3 & CO4 involve design, tools, team work & applied engineering → strong mapping with PO3, PO5, PO9
CO5 adds professional, social & sustainability skills → aligns to PO6, PO7, PO10, and PO11

SEMESTER-II					
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ **Category: HSMC**					
Course Code	:	B25SKK209	CIE	:	50 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	50 Marks
Total Hours	:	15 (T)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	1Hrs

Course Objectives	
1.	ವೃತ್ತಿಪರಪದವಿವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದಕನ್ನಡಭಾಷೆ, ಸಾಹಿತ್ಯಮತ್ತುಕನ್ನಡದಸಂಸ್ಕೃತಿಯಪರಿಚಯಮಾಡಿಕೊಡುವುದು
2.	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು.
3.	ಕನ್ನಡಸಾಹಿತ್ಯದಪ್ರಧಾನಭಾಗವಾದಆಧುನಿಕಪೂರ್ವಮತ್ತುಆಧುನಿಕಕಾವ್ಯಗಳನ್ನುಸಾಂಕೇತಿಕವಾಗಿಪರಿಚಯಿಸುವುದು.
4.	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ
5.	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದಹಾಗೂಪ್ರವಾಸಕಥನಗಳಪರಿಚಯ ಪರಿಚಯಿಸುವುದು.

ಬೋಧನೆಮತ್ತುಕಲಿಕಾವ್ಯವಸ್ಥೆ/(Teaching–Learning Process-General Instructions) :

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

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನುಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು -ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ,ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಪಿ. ಪಿ. ಟಿ, ಡಿಜಿಟಲ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು

ಘಟಕ-1 ಕನ್ನಡಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು	**No. of Hours**
1.ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ – ಹಂಪಾ ನಾಗರಾಜಯ್ಯ 2.ಕರ್ನಾಟಕದ ಏಕೀಕರಣ ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ-ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ 3.ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ- ಡಾ.L.ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೋವಿ. ಕೇಶವಮೂರ್ತಿ	**3**
ಘಟಕ-2ಆಧುನಿಕ ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯಭಾಗ	**No. of Hours**
1.ವಚನಗಳು-ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ 2.ಕೀರ್ತನೆಗಳು-ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ -ಪುರಂದರದಾಸರು, ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳುಮನವೇ -ಕನಕದಾಸರು 3.ತತ್ವಪದಗಳು –ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು -ಶಿಶುನಾಳಷರೀಫ	**3**
ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ	**No. of Hours**
1.ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು 2.ಕುರುಡು ಕಾಂಚಾಣ -ದ. ರಾ. ಬೇಂದ್ರೆ 3.ಹೊಸಬಾಳಿನ ಗೀತೆ-ಕುವೆಂಪು	**3**

ಘಟಕ-4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ	No. of Hours
ಡಾ. ಸರ್. ಎಂವಿಶ್ವೇಶ್ವರಯ್ಯ :ವ್ಯಕ್ತಿಮತ್ತುಐತಿಹ್ಯ A.N ಮೂರ್ತಿರಾವ್ ಕರಕುಶಲಕಲೆಗಳುಮತ್ತುಪರಂಪರೆಯವಿಜ್ಞಾನಕರೀಗೌಡಬೀಚನಹಳ್ಳಿ	3
ಘಟಕ-5 ಸಾಂಸ್ಕೃತಿಕಜನಪದಕಥೆಮತ್ತುಪ್ರವಾಸಕಥೆ	**No. of Hours**
1.ಯುಗಾದಿ -ವಸುಧೇಂದ್ರ 2.ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ -ಹಿ.ಚಿಬೋರಲಿಂಗಯ್ಯ	3

ಸಾಂಸ್ಕೃತಿಕಕನ್ನಡ(1BKSK109)ಪಠ್ಯಕಲಿಕೆಯನಂತರವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ

Course Outcomes: At the end of the course, the students will be able to	
CO1	ಕನ್ನಡ ಭಾಷೆ ,ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡಸಾಹಿತ್ಯದಪ್ರಧಾನಭಾಗವಾದಸಾಂಕೇತಿಕವಾಗಿಕಲಿತುಹೆಚ್ಚಿನಓದಿಗೆಮತ್ತುಜ್ಞಾನಕ್ಕೆಸ್ಫೂರ್ತಿಮೂಡಿರುತ್ತದೆ
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯು ಹೆಚ್ಚಾಗುತ್ತದೆ
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದಹಾಗೂಪ್ರವಾಸಕಥನಗಳಪರಿಚಯಮಾಡಿಕೊಡುವುದು

Text Books

University prescribed Text Books:

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ.ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ.ಎಲ್‌ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ:ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ:

1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ **(9900832331)** ಇವರನ್ನುಸಂಪರ್ಕಿಸಿ.
2. ಮಾದರಿಪ್ರಶ್ನೆಪತ್ರಿಕೆಮಾಹಿತಿಮಧ್ಯಾಹ್ನಸಾಮಗ್ರಿಮತ್ತುಬಹುಬಹುಆಯ್ಕೆಮಾದರಿಯಪ್ರಶ್ನೆಗಳಕೈಪಿಡಿಗಾಗಿವಿಶ್ವವಿದ್ಯಾಲಯದವೆಬ್ಸೈಟ್ನೋಡುವುದು

ASSESSMENT STRUCTURE:

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 secure a minimum of 40% (40 marks out of 100) in the total of CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	Internal Assessment1 (MCQs)	50	40 (Average of Best Two Assessments)	50
	Internal Assessment2 (MCQs)	50		
	Internal Assessment3 (MCQs)	50		
Self Learning	Two Assignments	10+10	10	
SEE	Semester End Examination	100	50	50
Grand Total				100

SEMESTER END EXAMINATION (SEE):

SEE paper shall be set for 50 questions, each question carries 01 mark. The pattern of the question paper is MCQ (Multiple Choice Questions). The time allotted for SEE is 01 hour.

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25BKK209 **(L:T:P:S 1:0:0:1)**	Samskruthika Kannada	**15**	**00**	**00**	**15**	**30**	**1**

SEMESTER-II					
ಬಳಕೆ ಕನ್ನಡ/ BALAKE KANNADA (KANNADA FOR USAGE) **Category: HSMC**					
Course Code	:	B25BKK209	CIE	:	50 Marks
Teaching Hours L : T : P	:	1:0:0	SEE	:	50 Marks
Total Hours	:	15 (T)	Total	:	100 Marks
Credits	:	1	SEE Duration	:	1 Hr

Course Objectives/ಬಳಕೆ ಕನ್ನಡ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು	
1.	To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2.	To enable learners to Listen and understand the Kannada language properly.
3.	To speak, read and write Kannada language as per requirement.
4.	To train the learners for correct and polite conservation.
5.	To know about Karnataka state and its language, literature and General information about this state.

Teaching-Learning Process/**ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ**
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. **ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯ ಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.**
2. **ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ಗಳನ್ನು ತಯಾರಿಸಲು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.**
3. **ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.**
4. **ಡಿಜಿಟಲ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮ ಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.**
5. **ಭಾಷಾ ಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯ ಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.**

Module– 1	**No. of Hours**
1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language. 2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities, Key to Transcription 3. **ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ /ಸಂಬಂಧಿತ ಸರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು**- Personal Pronouns, Possessive Forms, Interrogative words	3
Module– 2	**No. of Hours**
1. **ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳನ್ನು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು**-Possessive forms of nouns, dubitive question and Relative nouns 2. **ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣ ಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು**-Qualitative, Quantitative and Color Adjectives, Numerals 3. **ಕಾರಕ ರುಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು-ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಆ, ಅದು, ಅವು, ಅಲ್ಲಿ**)Predictive Forms, Locative Case	3
Module– 3	**No. of Hours**
1. **ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು**-Dative Cases, and Numerals 2. **ಸಂಖ್ಯಾ ಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮ ರೂಪಗಳು**-Ordinal numerals and Plural markers 3. **ನ್ಯೂನ ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ವರ್ಣ ಗುಣವಾಚಕಗಳು**-Defective/Negative Verbs & Color Adjectives.	3

Module– 4	No. of Hours
1. ಅಪ್ಪಣೆ ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು-Permission, Commands, encouraging and Urging words (Imperative words and sentences) 2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು-Accusative Cases and Potential Forms used in General Communication	3
Module– 5	**No. of Hours**
1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು-Different types of Tense, Time and Verbs 2. ದ್,-ತ್,- ತ,- ಇತ,- ಆಗಿ ಅಲ್ಲ,-,ಗ-, ಕ್- ತ್ತು, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯರಚನೆ-Formation of Past, Future and Present Tense Sentences with Verb Forms	3

Course Outcomes: At the end of the course, the students will be able to	
CO1	To understand the necessity of learning of local language for comfortable life.
CO2	To speak, read and write Kannada language as per requirement.
CO3	To communicate (converse) in Kannada language in their daily life with kannada speakers.
CO4	To Listen and understand the Kannada language properly.
CO5	To speak in polite conservation.

ಬಳಕೆ ಕನ್ನಡ

ಡಾ.ಎಲ್ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ: ಪ್ರಸಾರಾಂಗ,ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ:

1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ (9900832331) ಇವರನ್ನುಸಂಪರ್ಕಿಸಿ.
2. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ಆಯ್ಕೆಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ ಮತ್ತು ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವ ವಿದ್ಯಾಲಯದ ವೆಬ್ಸೈಟ ನೋಡುವುದು.

ASSESSMENT STRUCTURE:
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 secure a minimum of 40% (40 marks out of 100) in the total of CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CONTINUOUS INTERNAL EVALUATION (CIE):

Component	Type of Assessment	Max. Marks	Max. Marks Scaling Down to	Total Marks
Theory	**Internal Assessment1 (MCQs)**	**50**	**40 (Average of Best Two Assessments)**	**50**
	Internal Assessment2 (MCQs)	**50**		
	Internal Assessment3 (MCQs)	**50**		
Self Learning	**Two Assignments**	**10+10**	**10**	
SEE	**Semester End Examination**	**100**	**50**	**50**
Grand Total				**100**

SEMESTER END EXAMINATION (SEE):

SEE paper shall be set for 50 questions, each question carries 01 mark. The pattern of the question paper is MCQ (Multiple Choice Questions). The time allotted for SEE is 01 hour.

Course Code	Course Title	Teaching and Learning Structure					
		Classroom Instruction (CI) in hours / Semester		Lab Instruction (LI) in hours / semester	Term Work (TW) and Self Learning (SL) in hours / Sem	Total no. of hours/sem	Total Credits
		L	**T**	**P**	**SAAE**		
B25BKK209 **(L:T:P:S 1:0:0:1)**	Balake Kannada	**15**	**00**	**00**	**15**	**30**	**1**