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 CYCLE

I Semester Scheme and Syllabus
(2025 Scheme)
Academic Year 2026-27

# 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: CSE, ISE, CSE(IC)**



**Dept: EEE**



**Common Courses**

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)

## I Semester — Physics Group: CSE, ISE — Academic Year: 2026-27

| Sl. No | Course Category and Course Code | | Course Title | TD / PSB | Teaching Hours / Semester | | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lecture | Tutorial | Practical | TW+SL | CIE Marks | SEE Duration Hrs | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1. | ASC | B25MCS101 | Calculus and Linear Algebra | Maths | **42** | **28** | **0** | **50** | **50** | **3** | **50** | **100** | **4** |
| 2. | ASC(IC) | B25PCS102 | Quantum Physics and Applications | PHY | **42** | **0** | **28** | **50** | **50** | **3** | **50** | **100** | **4** |
| 3. | ESC | B25EGK103 | Engineering Graphics | ME/CV | **28** | **0** | **28** | **34** | **50** | **3** | **50** | **100** | **3** |
| 4. | ESC | B25ESB104 | Introduction to Electrical Engineering | EE | **42** | **0** | **0** | **48** | **50** | **3** | **50** | **100** | **3** |
| 5. | PSC | B25PIC105 | Programming in C | CS | **42** | **0** | **0** | **48** | **50** | **3** | **50** | **100** | **3** |
| 6. | NCMC | B25SSK106 | Soft Skills | HSS | **14** | **0** | **0** | **16** | **100** | **--** | **--** | **100** | **pp** |
| 7. | PSC | B25CPL107 | C Programming Lab | CS | **0** | **0** | **28** | **2** | **50** | **3** | **50** | **100** | **1** |
| 8. | AEC/ SDC | B25IDL108 | Innovation and Design Thinking Lab (**Project-based learning**) | Any Dept. | **0** | **0** | **0** | **30** | **100** | **--** | **--** | **100** | **1** |
| 9. | HSMC | B25SKK109 / B25BKK109 | Samskrutika Kannada/ Balake Kannada | HSS | **14** | **0** | **0** | **16** | **50** | **1** | **50** | **100** | **1** |
| 10. | SEC | B25SKL100 | Skill Laboratory | Concerned Dept. | **0** | **0** | **30** | **0** | **100** | **-** | **-** | **100** | **1** |
| | | | | | | | | **TOTAL** | **650** | | **350** | **1000** | **21** |

**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, **HSMC -** Humanity, Social Science and management Course, **L**: Lecturer, **T:** Tutorial, **P:** Practical, **TW+SL**: Term Work + Self Learning, **CIE -** Continuous Internal Evaluation, **SEE -**Semester End Examination, **NCMC -** Non Credit Mandatory Course, **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)

## I Semester | Physics Group: CSE(IC) | Academic Year: 2026-27

| Sl. No | Course Category and Course Code | | Course Title | TD / PSB | Teaching Hours / Semester | | | | Examination | | | | credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lecture | Tutorial | Practical | TW+SL | CIE Marks | SEE Duration Hrs | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1. | ASC | B25MCS101 | Calculus and Linear Algebra | Maths | **42** | **28** | **0** | **50** | **50** | **3** | **50** | **100** | **4** |
| 2. | ASC(IC) | B25PCS102 | Quantum Physics and Applications | PHY | **42** | **0** | **28** | **50** | **50** | **3** | **50** | **100** | **4** |
| 3. | ESC | B25EGK103 | Engineering Graphics | ME / CV | **28** | **0** | **28** | **34** | **50** | **3** | **50** | **100** | **3** |
| 4. | ESC | B25ESC104 | Introduction to Electronics and Communication | EC | **42** | **0** | **0** | **48** | **50** | **3** | **50** | **100** | **3** |
| 5. | PSC | B25PIC105 | Programming in C | CS | **42** | **0** | **0** | **48** | **50** | **3** | **50** | **100** | **3** |
| 6. | AEC NCMC | B25SSK106 | Soft Skills | HSS | **14** | **0** | **0** | **16** | **100** | **--** | **--** | **100** | **pp** |
| 7. | PSC | B25CPL107 | C Programming Lab | CS | **0** | **0** | **28** | **2** | **50** | **3** | **50** | **100** | **1** |
| 8. | AEC/ SDC | B25IDL108 | Innovation and Design Thinking Lab(**Project-based learning**) | Any Dept. | **0** | **0** | **0** | **30** | **100** | **--** | **--** | **100** | **1** |
| 9. | HSMC | B25SKK109 / B25BKK109 | Samskrutika Kannada/ Balake Kannada | HSS | **14** | **0** | **0** | **16** | **50** | **1** | **50** | **100** | **1** |
| 10 | SEC | B25SKL100 | Skill Laboratory | Concerned Dept. | **0** | **0** | **30** | **0** | **100** | **-** | **-** | **100** | **1** |
| | | | | **TOTAL** | | | | | **650** | | **350** | **1000** | **21** |

**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, **HSMC** - Humanity, Social Science and management Course, **L**: Lecturer, **T:** Tutorial, **P:** Practical, **TW+SL**: Term Work + Self Learning, **CIE** - Continuous Internal Evaluation, **SEE** -Semester End Examination, **NCMC** - Non Credit Mandatory Course, **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)

## I Semester — Physics Group: EEE — Academic Year: 2026-27

| Sl. No | Course Category and Course Code | | Course Title | TD / PSB | Teaching Hours / Semester | | | | Examination | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Lecture | Tutorial | Practical | TW+SL | CIE Marks | SEE Duration Hrs | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1. | ASC | B25MEE101 | Differential Calculus and Linear Algebra | Maths | **42** | **28** | **0** | **50** | **50** | **3** | **50** | **100** | **4** |
| 2. | ASC(IC) | B25PEE102 | Electrical Engineering Materials | PHY | **42** | **0** | **28** | **50** | **50** | **3** | **50** | **100** | **4** |
| 3. | ESC | B25EGK103 | Engineering Graphics | ME/CV | **28** | **0** | **28** | **34** | **50** | **3** | **50** | **100** | **3** |
| 4. | ESC | B25ESE104 | Essentials of Information Technology | EE | **42** | **0** | **0** | **48** | **50** | **3** | **50** | **100** | **3** |
| 5. | PSC | B25EEE105 | Basics of Electrical Engineering | CS | **42** | **0** | **0** | **48** | **50** | **3** | **50** | **100** | **3** |
| 6. | NCMC | B25SSK106 | Soft Skills | HSS | **14** | **0** | **0** | **16** | **100** | **--** | **--** | **100** | **pp** |
| 7. | PSC | B25EEL107 | Basic Electrical Engineering Lab | CS | **0** | **0** | **28** | **2** | **50** | **3** | **50** | **100** | **1** |
| 8. | AEC/ SDC | B25IDL108 | Innovation and Design Thinking Lab (**Project-based learning**) | Any Dept. | **0** | **0** | **0** | **30** | **100** | **--** | **--** | **100** | **1** |
| 9. | HSMC | B25SKK109 / B25BKK109 | Samskrutika Kannada/ Balake Kannada | HSS | **14** | **0** | **0** | **16** | **50** | **1** | **50** | **100** | **1** |
| 10. | SEC | B25SKL100 | Skill Laboratory | Concerned Dept. | **0** | **0** | **30** | **0** | **100** | **-** | **-** | **100** | **1** |
| | | | | **TOTAL** | | | | | **650** | | **350** | **1000** | **21** |

**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, **HSMC -** Humanity, Social Science and management Course, **L**: Lecturer, **T:** Tutorial, **P:** Practical, **TW+SL**: Term Work + Self Learning, **CIE -** Continuous Internal Evaluation, **SEE -**Semester End Examination, **NCMC -** Non Credit Mandatory Course, **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)

| Applied Mathematics – I | | | | | Applied Physics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Code** | **Title** | **L** | **T** | **P** | **Code** | **Title** | **L** | **T** | **P** |
| B25MME101 | Multivariable Calculus: CV & ME Stream | 3 | 2 | 0 | B25PCV102/ 202 | Physics for Sustainable Structural System: CVStream | 3 | 0 | 2 |
| B25MEE101 | Differential Calculus and Linear Algebra: EEE Stream | 3 | 2 | 0 | B25PME102/ 202 | Physics for Materials ; ME Stream | 3 | 0 | 2 |
| B25MCS101 | Calculus and Linear Algebra : CSE Stream | 3 | 2 | 0 | B25PEC102/ 202 | Quantum Physics and Electronic Sensors :EC Stream | 3 | 0 | 2 |
| | | | | | B25PEE102/ 202 | Electrical Engineering Materials: EE Stream | 3 | 0 | 2 |
| | | | | | B25PCS102/202 | Quantum Physics and Applications :CS Stream | 3 | 0 | 2 |
| **Programme Specific Courses (PSC)** | | | | | **Engineering Science Course-I (ESC-I)** | | | | |
| B25CIV105/ 205 | Engineering Mechanics | 3 | 0 | 0 | B25ESA104/ 204 | Building Sciences and Mechanics | 3 | 0 | 0 |
| B25EME105/ 205 | Elements of Mechanical Engineering | 3 | 0 | 0 | B25ESB104/ 204 | Introduction to Electrical Engineering | 3 | 0 | 0 |
| B25EEE105/ 205 | Basics of Electrical Engineering | 3 | 0 | 0 | B25ESC104/ 204 | Introduction to Electronics and Communication | 3 | 0 | 0 |
| B25ECE105/ 205 | Basic Electronics | 3 | 0 | 0 | B25ESD104/ 204 | Introduction to Mechanical Engineering | 3 | 0 | 0 |
| B25PIC105/ 205 | Programming in C | 3 | 0 | 0 | B25ESE104/ 204 | Essentials of Information Technology | 3 | 0 | 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 | | | | | |

**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 Engineering

## Information Science and Engineering

## Computer Science and Engineering

## (IoT, Cybersecurity including Blockchain Technology)

(2025 Scheme)

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Calculus and Linear Algebra**<br>**Category: ASC(IC)** | | | | | |
| Course Code | : | **B25MCS101** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:28:0:50 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 120 | Total | : | 100 Marks |
| Credits | : | 4 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 1. | To analyze engineering problems by applying Partial derivatives. |
| 2. | To familiarize the fundamentals of Vector calculus. |
| 3. | To understanding the importance of linear algebra. |
| 4. | To provide unified framework for linear equations, vector spaces. |
| 5. | To ensure a comprehensive understanding of linear transformations fundamental properties and applications. |

| **Module– 1** | **No. of Hours** |
|---|---|
| **Calculus:** Partial differentiation, total derivative, differentiation of composite functions, Jacobian, Statement of Taylor's and Maclaurin's series expansion for two variables. Maxima and minima for the function of two variables. | 14 |
| **Module– 2** | **No. of Hours** |
| **Vector Calculus:** Scalar and vector fields, Gradient, directional derivatives, divergence and curl - physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential.<br>Introduction to polar coordinates and polar curves. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality. | 14 |
| **Module– 3** | **No. of Hours** |
| **System of Linear Equations, Eigenvalues and Eigenvectors:** Elementary row transformation of a matrix, Echelon form, rank of a matrix. Consistency, solution of system of linear equations: Gauss elimination method. Applications: Traffic flow. Eigenvalues and Eigenvectors, modal matrix, diagonalization of the matrix. | 14 |
| **Module– 4** | **No. of Hours** |
| **Vector Space:** Vector spaces: definition and examples, subspace: definition and examples. Linear Combinations, linear span, linearly independent and dependent sets, basis and dimension, row space and column space of a matrix, Coordinate vector, inner products and orthogonality. | 14 |
| **Module– 5** | **No. of Hours** |
| **Linear Transformation:** Definition and examples, algebra of linear transformations, matrix of a linear transformation. Singular, non singular linear transformations and invertible linear transformations. Rank and nullity of linear transformations, Rank-Nullity theorem. | 14 |

| **Course Outcomes**: At the end of the course, the students will be able to | |
|---|---|
| CO1 | Apply the concepts of multivariable calculus and vector calculus to compute derivatives, optimize functions, and analyze vector fields for applications in computer science engineering. |
| CO2 | Solve system of linear equations and determine eigenvalues and eigenvectors using direct and iterative methods. |
| CO3 | Apply the concepts of vector spaces and linear transformations to problems in computer science engineering. |
| CO4 | Demonstrate the applications of computer science and allied engineering Science using modern ICT tools. |

| **Text Books** | |
|---|---|
| 1. | B. S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2021. |
| 2. | Gilbert Strang, Linear Algebra and its Applications, Cengage Publications, 4th Edition, 2022. |
| 3. | Seymour Lipschutz and Marc Lipson, Linear Algebra, Schaum's outlines series, 4th Edition, 2008. |

| **Reference Text Books** | |
|---|---|
| 1. | V. Ramana, Higher Engineering Mathematics" McGraw-Hill Education, 11thEd., 2017 |
| 2. | James Stewart, Calculus, Cengage Publications, 7thEd., 2019. |
| 3. | David Poole, Linear Algebra, a modern introduction, Cengage publishers, 4thEd., 2014. |

| **Web links and Video lectures (e-Resources)** |
|---|
| • https://nptel.ac.in/courses/111106135<br>• https://nptel.ac.in/courses/111105160<br>• https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/ |

**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):**

| CIE | 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** | | |
| **AAT** | **Any Two Assessments as per Regulations** | **20** | **10** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **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 |
| CO4 | 3 | 2 | 1 | 2 | 1 | - | - | - | - | - | 2 |

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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Quantum Physics and Applications**<br>**Category: ASC(IC)** | | | | | |
| Course Code | : | **B25PCS102** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:0:28:50 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 120 | Total | : | 100 Marks |
| Credits | : | 4 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 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, 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 (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, quantum tunneling, Numerical Problems. | 9 |
| **Module– 2** | **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. | 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. | 8 |
| **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. | 8 |
| **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, | 8 |

| | |
|---|---|
| Predicting the outputs of various combinations of single and two-qubit gates, Numerical Problems. | |

## LABORATORY

| Sl. No | List 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. | 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, 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<br>• https://nptel.ac.in/courses/115106127<br>• https://www.youtube.com/watch?v=SHoGV-sezNI<br>• https://digimat.in/nptel/courses/video/115105131/L01.html<br>• https://nptel.ac.in/courses/108106135/03<br>• 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):**

| CIE | 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** | | |
| **AAT** | **One Assessment as per Regulations** | **20** | **10** | |
| **Laboratory** | **Lab Conduction & Record** | **Evaluating each expt. for 10 marks.** | **10** | **25** |
| | **Lab Internal Test** | **50** | **15** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **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.
4. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
5. The maximum marks from the practical component to be included in the SEE question paper is **16 marks.**
6. Question papers to be set as per the Blooms Taxonomy levels.

**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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Engineering Graphics**<br>**Category: ESC** | | | | | |
| Course Code | : | **B25EGK103** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 28:0:28:34 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 90 | Total | : | 100 Marks |
| Credits | : | 3 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 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.<br>**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). | 12 |
| **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. | 12 |
| **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)<br>**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. | 12 |
| **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.<br>Conversion of simple isometric drawings into orthographic views: Problems on conversion of Isometric view of simple objects / engineering components into orthographic views. | 12 |
| **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 | 8 |

| **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, 39thEdition, Subash Stores, Bangalore, 2017 |
| 2. | Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rdEdition, 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):**

| CIE | Type of Assessment | Max. Marks | weightage | Total Marks |
|---|---|---|---|---|
| Activity | Sketch Book | | 20 | 50 |
| Theory | Internal Assessment1 | 50 | Average of two assessments scale down to 15 | |
| | Internal Assessment2 | 50 | | |
| Laboratory | Internal Test | 100 | 15 | |
| SEE | Semester End Examination | 100 | 50 | 50 |
| Total Marks | | | | 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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Introduction to Electrical Engineering**<br>**Category: ESC** | | | | | |
| Course Code | : | **B25ESB104** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:0:0:48 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 90 | Total | : | 100 Marks |
| Credits | : | 3 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 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.<br>**Power Generation:** Hydel, Nuclear, Solar & Wind power generation (Block Diagram approach).<br>**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.<br>**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<br>**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 | 8 |
| **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<br>**Introduction to EV:** History, General block diagram, Application and Benefits | 8 |
| **Module– 5** | **No. of Hours** |
| **Domestic Wiring:** Requirements, Types of wiring: casing, capping. Two way and three way control of load.<br>**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<br>**Electricity bill:** Power consumption of electrical energy, Two-part electricity tariff, Case study on calculation of electricity bill for domestic consumers. | 8 |

| **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):**

| **CIE** | **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** | | |
| **AAT** | **Any Two Assessments as per Regulations** | **20** | **10** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **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 | 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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Introduction to Electronics and Communication**<br>**Category: ESC** | | | | | |
| Course Code | : | **B25ESC104** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:0:0:48 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 90 | Total | : | 100 Marks |
| Credits | : | 3 | SEE Duration | : | 3Hrs |

| **Course learning Objective is** | |
|---|---|
| 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. | 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. | 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. | 8 |
| **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. | 8 |
| **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. | 8 |

| **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<br>2. https://nptel.ac.in/courses/108105132<br>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):**

| CIE | 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** | | |
| **AAT** | **Any Two Assessments as per Regulations** | **20** | **10** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Programming In C**<br>**Category: PSC** | | | | | |
| Course Code | : | **B25PIC105** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:0:0:48 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 90 | Total | : | 100 Marks |
| Credits | : | 3 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 1. | To learn fundamental concepts of C programming. |
| 2. | To learn concepts of decision statements and basic data structure. |
| 3. | To able to implement programs by user define statements. |
| 4. | To able to design a model by using structures and unions. |
| 5. | To 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.<br>**Overview of C:** Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs.<br>**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.<br>**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.<br>**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. | 8 |
| **Module– 4** | **No. of Hours** |
| **Strings:** Declaration and Initialization, String Input / Output functions, String manipulation functions.<br>**Pointers:** Introduction to pointers, Declaration of pointer variables, Types of pointers, passing arguments to functions using pointers. | 8 |
| **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.<br>**File management in C:** File Operations-open, close, read, write, append, simple program on reading and writing data files. | 8 |

| **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, 2ndEdition, 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<br>• Introduction to Programming in C [https://onlinecourses.nptel.ac.in/noc23_cs02/preview]<br>• C for Everyone: Programming Fundamentals [https://www.coursera.org/learn/c-for-everyone]<br>• 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):**

| CIE | 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** | | |
| **AAT** | **Any Two Assessments as per regulations** | **20** | **10** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **C Programming Lab**<br>**Category: PSC** | | | | | |
| Course Code | : | **B25CPL107** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 0:0:28:2 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 30 | Total | : | 100 Marks |
| Credits | : | 1 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 1. | To able to write programs in C using basic constructs. |
| 2. | To 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**<br>**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<br>a) Pay Calculation.<br>b) To find if a number is negative, positive or zero.<br>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<br>1<br>121<br>12321<br>123432 1<br>…… $n^{th}$ 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<br>• https://cse02-iiith.vlabs.ac.in/exp/pointers/<br>• https://www.pdfdrive.com/c-programming-the-ultimate-way-to-learn-the-fundamentals-of-the-c language-e187584209.htm<br>• 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.

| CIE | Type of Assessment | Max. Marks | Max. Marks Scaling Down to | Total Marks |
|---|---|---|---|---|
| **Laboratory** | **Lab Conduction & Record** | **Evaluate each Expt. for 10 marks.** | **15** | **50** |
| | **Laboratory Test 1** | **50** | **15** | |
| | **Laboratory Test 2** | **50** | **20** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **100** |

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-I** | | | | | |
|---|---|---|---|---|---|
| **Differential Calculus and Linear Algebra** **Category: ASC** | | | | | |
| Course Code | : | **B25MEE101** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:28:0:50 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 120 | Total | : | 100 Marks |
| Credits | : | 4 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 1. | To understand the angle of intersection between two curves and the radius of curvature. |
| 2. | To familiarize the importance of calculus associated with one variable and multivariables. |
| 3. | To analyze engineering problems applying Ordinary Differential Equations. |
| 4. | To develop the knowledge of Linear Algebra referring to matrices. |

| **Module– 1** | **No. of Hours** |
|---|---|
| **Differential Calculus:** Polar curves, angle between the radius vector and the tangent, angle between the polar curves, pedal equations. Curvature and radius of curvature in cartesian, polar, parametric and pedal forms. | 14 |
| **Module– 2** | **No. of Hours** |
| **Power Series Expansions, Indeterminate Forms and Multivariable Calculus:** Statement and problems on Taylor's and Maclaurin's series expansion for one variable. Indeterminate forms - L'Hospital's rule. Partial Differentiation: Partial differentiation, total derivative - differentiation of composite functions. Jacobian. Maxima and minima for a function of two variables. | 14 |
| **Module– 3** | **No. of Hours** |
| **Ordinary Differential Equations (ODE) of First Order and First Degree and Nonlinear ODE:** Exact and reducible to exact differential equations- Integrating factors $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{-1}{M}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$on only Linear and Bernoulli's differential equations. Orthogonal trajectories, L-R and C-R circuits.. Non-linear differential equations: Introduction to general and singular solutions, solvable for p only, Clairaut's equations, reducible to Clairaut's equations. | 14 |
| **Module– 4** | **No. of Hours** |
| **Ordinary Differential Equations of Higher Order:** Higher-order linear ODEs with constant coefficients, homogeneous and non-homogeneous equations $-e^{ax}, \sin(ax+b), \cos(ax+b), x^n$only. Method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations. L-C-R circuits. | 14 |
| **Module– 5** | **No. of Hours** |
| **Linear Algebra:** Elementary transformations on a matrix, Echelon form, rank of a matrix, consistency of system of linear equations. Gauss elimination, Gauss –Seidel method to solve system of linear equations. Eigen values and eigen vectors of a matrix, Rayleigh power method to determine the dominant eigen value of a matrix. | 14 |

| **Course Outcomes:** At the end of the course, the students will be able to | |
|---|---|
| CO1 | Apply foundational concepts of calculus and differential equations to analyze geometric properties of curves, solve first and higher-order ordinary differential equations, and model physical phenomena in science and engineering. |
| CO2 | Apply the principles of linear algebra to solve systems of linear equations, determine eigenvalues and eigenvectors, and analyze real-world problems such as traffic flow. |
| CO3 | Demonstrate the applications of electrical engineering and allied engineering science using modern ICT tools. |
| CO4 | Apply the knowledge of Linear Algebra referring to matrices. |

| **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. | Gilbert Strang, Linear Algebra and its Applications, Cengage Publications, 4$^{th}$ Edition, 2022. |
| **Reference Text Books** | |
| 1. | B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11$^{th}$Edition, 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/111106135<br>• https://nptel.ac.in/courses/111105160<br>• https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/<br>• https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/ | |

**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):**

| CIE | 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** | | |
| **AAT** | **Two Assessments as per Regulations** | **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 | 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 |

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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Electrical Engineering Materials**<br>**Category: ASC(IC)** | | | | | |
| Course Code | : | **B25PEE102** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:0:28:50 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 120 | Total | : | 100 Marks |
| Credits | : | 4 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 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.<br>**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. | 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. | 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. | 8 |
| **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. | 8 |

| 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. | 8 |

## LABORATORY

| Sl. No | List of 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<br>• https://www.youtube.com/watch?v=etjZmdmrjSU<br>• 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):**

| CIE | 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 | | |
| AAT | One Assessment as per Regulations | 20 | 10 | |
| Laboratory | Lab Conduction & Record | Evaluating each expt. for 10 marks. | 10 | 25 |
| | Lab Internal Test | 50 | 15 | |
| SEE | Semester End Examination | 100 | 50 | 50 |
| Total Marks | | | | 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.
4. The laboratory component of the **integrated course** shall be CIE only. However, in SEE, the questions from the practical component shall be included.
5. The maximum marks from the practical component to be included in the SEE question paper is **16 marks.**
6. Question papers to be set as per the Blooms Taxonomy levels

**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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Engineering Graphics**<br>**Category: ESC** | | | | | |
| Course Code | : | **B25EGK103** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 28:0:28:34 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 90 | Total | : | 100 Marks |
| Credits | : | 3 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 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.<br>**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). | 12 |
| **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. | 12 |
| **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)<br>**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. | 12 |
| **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.<br>Conversion of simple isometric drawings into orthographic views: Problems on conversion of Isometric view of simple objects / engineering components into orthographic views. | 12 |
| **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 | 8 |

| **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, 39thEdition, Subash Stores, Bangalore, 2017 |
| 2. | Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rdEdition, 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<br>• https://nptel.ac.in/courses/112102304<br>• 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):**

| CIE | Type of Assessment | Max. Marks | weightage | Total Marks |
|---|---|---|---|---|
| Activity | Sketch Book | | 20 | 50 |
| Theory | Internal Assessment1 | 50 | Average of two assessments scale down to 15 | |
| | Internal Assessment2 | 50 | | |
| Laboratory | Internal Test | 100 | 15 | |
| SEE | Semester End Examination | 100 | 50 | 50 |
| Total Marks | | | | 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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Essentials of Information Technology** **Category: ESC** | | | | | |
| Course Code | : | **B25ESE104** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:0:0:48 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 90 | Total | : | 100 Marks |
| Credits | : | 3 | SEE Duration | : | 3Hrs |

| **Course learning Objective is** | |
|---|---|
| 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. | 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. | 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. | 8 |
| **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. | 8 |
| **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. | 8 |

| **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<br>• Computer Organization and Architecture: https://nptel.ac.in/courses/106103068<br>• 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):**

| CIE | 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** | | |
| **AAT** | **Any Two Assessments as per regulations** | **20** | **10** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **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 | 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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Basics of Electrical Engineering**<br>**Category: PSC** | | | | | |
| Course Code | : | **B25EEE105** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 42:0:0:48 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 90 | Total | : | 100 Marks |
| Credits | : | 3 | SEE Duration | : | 3Hrs |

| **Course Learning Objective is** | |
|---|---|
| 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.<br>**Electrostatics:** Coulombs law, definitions of absolute and relative permittivity, electric field, electric flux, electric field strength, flux density.<br>**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.<br>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. | 8 |
| **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)<br>**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 | 8 |
| **Module– 5** | **No. of Hours** |
| **Measuring instruments:** Classification, Deflecting, control and damping torques, Ammeters and Voltmeters, PMMC and PMMI type instruments<br>**Domestic Wiring:** Requirements, Types of wiring: casing, capping, Two way and three-way control of load.<br>**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).<br>**Electricity bill:** Power consumption of electrical energy, Two-part electricity tariff, Case study on calculation of electricity bill for domestic consumers. | 8 |

| **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):**

| CIE | 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 | | |
| AAT | Two Assessments as per Regulations | 20 | 10 | |
| SEE | Semester End Examination | 100 | 50 | 50 |
| Total Marks | | | | 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 |
| CO4 | 3 | 2 | 1 | 2 | 1 | - | - | - | - | - | 2 |

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

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Basic Electrical Engineering Lab**<br>**Category: PSC** | | | | | |
| Course Code | : | **B25EEL107** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 0:0:28:2 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 30 | Total | : | 100 Marks |
| Credits | : | 1 | SEE Duration | : | 3Hrs |

| **Course learning Objective is** | |
|---|---|
| 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.** | **15** | **50** |
| | **Laboratory Test 1** | **50** | **15** | |
| | **Laboratory Test 2** | **50** | **20** | |
| **SEE** | **Semester End Examination** | **100** | **50** | **50** |
| **Total Marks** | | | | **100** |

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 Cycle – I Sem

(2025 Scheme)

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **Soft Skills**<br>**Category: AEC** | | | | | |
| Course Code | : | **B25SSK106** | CIE | : | 100 Marks |
| Teaching Hours L : T : P : S | : | 14:0:0:16 | SEE | : | -- |
| Total Hours/Semester | : | 30 | Total | : | 100 Marks |
| Credits | : | PP | SEE Duration | : | -- |

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

**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-I | | | | | |
|---|---|---|---|---|---|
| **Innovation and Design Thinking**<br>**Category: AEC/SDC** | | | | | |
| Course Code | : | **B25IDL108** | CIE | : | 100 Marks |
| Teaching Hours L : T : P : S | : | 0:0:0:30 | SEE | : | -- |
| Total Hours/Semester | : | 30 | Total | : | 100 Marks |
| Credits | : | 1 | SEE Duration | : | -- |
| Semester running period : 15-16 weeks | | | | | |
| Examination type (Only CIE - Internals) divided into 4 reviews with each of 25 marks: Practical/ PPT Presentation/Seminar/Demonstration/Poster Presentation/Exhibition/Weekly/Project Report/Project Exhibition/Reviews/Observation/Case-Study/Simulation Study/Prototype Development/Model Making. | | | | | |

| **Course Learning Objective is** | |
|---|---|
| 1. | To explain the concept of design thinking for product and service development in a practical way. |
| 2. | To explain the fundamental concept of innovation and design thinking& to develop hands-on skill and knowledge about various engineering components and devices. |
| 3. | To discuss the methods of implementing design thinking in the real world & learn modern tools and techniques to develop the proposed designed models, may be on paper, soft or hard-oriented. |
| 4. | To improve interpersonal skills, enhance team work, written and oral communication skills. & examine the various components of a project plan, viz., literature survey, modern tools, methodologies and execution of the plan. |
| 5. | To continuously evaluate the developed works through guide/supervisor. |

| **Course Outcomes : At the end of the IDT course, the students will be able to** | |
|---|---|
| CO1 | Demonstrate a sound technical knowledge of their selected project topic& develop various types of design procedures. |
| CO2 | Use literature survey for problem identification, formulation and solution& generate and develop design ideas through different techniques. |
| CO3 | Analyze, design and develop engineering solutions to problems utilizing a systems approach& identify the significance of reverse Engineering to Understand products. |
| CO4 | Prepare the working model/ simulation for the project and demonstrate the same& draw technical drawing for design ideas. |
| CO5 | Effectively write a report on the project topic with obtained results& to inculcate project management, team building, communication, interpersonal and team management skills. |

| **Week 1, 2 & 3: Orientation and Team Formation (related to only mini-project development – resulting in a prototype with either s/w or h/w or both)** |
|---|
| **Week -1&2:** Introduction to Social Entrepreneurship, Innovation and Design Thinking Group discussion on What is Innovation v/s Invention. Why Design Thinking is important. Brief about 5 stages: Empathize – Define – Ideate – Prototype – Test.<br>**Week -3:** Innovation warm-up activities, forming interdisciplinary teams, Instructions about Next week activities |
| **Week 4–5: Empathy and Field Exploration(related to only mini-project development)** |
| **Week-4&5:** Field (any public places of student's interest e.g. - Village, Government Office, Industry. R&D institute, NGO etc) visits, stakeholder interviews and interaction. Recording all interaction through handwritten in activity book prescribed by the University. |
| **Week 6, 7 and 8: Problem Definition(related to only mini-project development)** |
| **Week-6:** Documentation, categorization and Group discussion on interactions and problems/challenges.<br>**Week-7&8:** Problem framing using "How Might We" approach, Identification of social problems and user insights through affinity Clustering and Problem Tree. Mention of clearly defined challenge statements. |
| **Week 9, 10 &11: Ideation Sprint(related to only mini-project development)** |
| **Week-9&10:** Presentation by teams on Defined Problems, Brainstorming interactions and Mind Mapping.<br>**Week-11:** Idea Filtering - Shortlist of creative, eco -friendly and feasible ideas. Selection of one Suitable IDEA for next process, Designing/Structuring of Prototype model. |

| **Week 12, 13 &14: Rapid Prototyping using Atal Idea Lab/Makers Space(related to only mini-project development)** |
|---|
| **Week-12&13:** Building low-fidelity and working models using tools like Arduino, 3D printers,: Digital fabrication, electronics kits and recycled materials.<br>**Week-14:** User testing, Feedback collection, Iteration - Observation Notes, Feedback Forms (Designing a business model for impact and scalability, if possible) Preparation of Draft of social venture plan |
| **Week 15 &16: Final Demo and Social Pitch& Project Exhibition / Poster Presentation / Seminar(related to only mini-project development)** |
| ***Innovation showcase, Poster display, Project pitching to jury, Presentation of the project (ppt) with impact with assessment, prototype, and sustainability plan, report making, video making.***<br>***Weeks 1 to 16 to be converted into a project with case study or software oriented or hardware oriented or both.***<br>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. |

**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/

**ASSESSMENT DETAILS (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 morethanor equal to 40% (40 Marks out of 100) in the (CIE) and would be eligible for the next semester.

**CONTINUOUS INTERNAL EVALUATION (CIE):**

Weekly 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. 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.

| | | |
|---|---|---|
| CIE – 1 | First Phase Review – Batch formation, Topic Selection, Synopsis/Problem formulation | 25 Marks |
| CIE – 2 | Second Phase Review – 50% of the project to be completed, Ideation sprint s/w | 25 Marks |
| CIE – 3 | Third Phase Review– 100% of the project to be completed with poster design, Rapid prototyping | 25 Marks |
| | Fourth Phase Review – Project exhibition, Video of working, Project report, Demo, PPT (H/W) | 25 Marks |
| | **Total CIE-1 + CIE-2 + CIE-3 + Final** | **100** |

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

**CO-PO Mapping**

| PO / CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 2 | - | - | - | - | - | - | - | - |
| CO2 | 3 | 1 | 1 | - | 1 | 1 | 1 | - | 1 | - | - |
| CO3 | 3 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | - |
| CO4 | 2 | 3 | 3 | 1 | 2 | 1 | 1 | - | 1 | - | - |
| CO5 | 2 | 1 | 1 | - | - | - | - | - | 1 | 2 | 1 |
| CO6 | - | - | - | - | - | 2 | 2 | 2 | 3 | 3 | 3 |

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| **ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**<br>**Category: HSMC** | | | | | |
| Course Code | : | **B25SKK109** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 14:0:0:16 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 30 | Total | : | 100 Marks |
| Credits | : | 1 | SEE Duration | : | 1Hr |

| **Course Learning Objective is** | |
|---|---|
| 1. | ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು. |
| 2. | ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು. |
| 3. | ಕನ್ನಡಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಪರಿಚಯಿಸುವುದು. |
| 4. | ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ<br>ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ |
| 5. | ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸಕಥನಗಳ ಪರಿಚಯ 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 ಚಾರ್ಟ್ಸ್‌ಗಳನ್ನು 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<br>2.ಕರ್ನಾಟಕದ ಏಕೀಕರಣ ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ-ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ<br>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<br>2.ಕೀರ್ತನೆಗಳು-ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ -ಪುರಂದರದಾಸರು,<br>ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳುಮನವೇ -ಕನಕದಾಸರು<br>3.ತತ್ವಪದಗಳು –ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು -ಶಿಶುನಾಳಷರೀಫ | 3 |
| **ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ** | **No. of Hours** |
| 1.ಡಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು<br>2.ಕುರುಡು ಕಾಂಚಾಣ -ದ. ರಾ. ಬೇಂದ್ರೆ<br>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<br>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 | ಕನ್ನಡಸಾಹಿತ್ಯದಪ್ರಧಾನಭಾಗವಾದಸಾಂಕೇತಿಕವಾಗಿಕಲಿತುಹೆಚ್ಚಿನಓದಿಗೆಮತ್ತುಜ್ಞಾನಕ್ಕೆಸೂಪರ್ತಿ ಮೂಡಿರುತ್ತದೆ |
| 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 ಇವರನ್ನುಸಂಪರ್ಕಿಸಿ.
2. ಮಾದರಿಪ್ರಶ್ನೆಪತ್ರಿಕೆಮಾಹಿತಿಮಧ್ಯಾಹ್ನಸಾಮಗ್ರಿಮತ್ತುಬಹುಬಹುಆಯ್ಕೆಮಾದರಿಯಪ್ರಶ್ನೆಗಳಕೈಪಿಡಿ ಗಾಗಿವಿಶ್ವವಿದ್ಯಾಲಯದವೆಬ್ಸೈಟ್ನೋಡುವುದು

**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):**

| CIE | 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 | | |
| AAT | One Assessment | 10 | 10 | |
| SEE | Semester End Examination | 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.

| **Semester-I** | | | | | |
|---|---|---|---|---|---|
| ಬಳಕೆ ಕನ್ನಡ/<br>**Balake Kannada (Kannada for Usage)**<br>**Category: HSMC** | | | | | |
| Course Code | : | **B25BKK109** | CIE | : | 50 Marks |
| Teaching Hours L : T : P : S | : | 14:0:0:16 | SEE | : | 50 Marks |
| Total Hours/Semester | : | 30 | Total | : | 100 Marks |
| Credits | : | 1 | SEE Duration | : | 1 Hr |

| **Course Learning Objective is/**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.<br>2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities, Key to Transcription<br>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<br>2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣ ಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು-Qualitative, Quantitative and Color Adjectives, Numerals<br>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<br>2. ಸಂಖ್ಯಾ ಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮ ರೂಪಗಳು-Ordinal numerals and Plural markers<br>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)<br>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<br>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: ಪುಸಾರಾಂಗ,ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ:
1. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ 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):**

| CIE | 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** | | |
| **AAT** | **One Assessment as per Regulations** | **10** | **10** | |
| **SEE** | **Semester End Examination** | **50** | | **50** |
| **Total Marks** | | | | **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.