# SHREE VENKATESHWARA HI-TECH ENGINEERING COLLEGE (Autonomous)
# Gobichettipalayam, Erode-638455



## Regulation 2023

## (Autonomous)

## Curriculum and Syllabus

## Choice Based Credit System (CBCS)

## BE-ELECTRONICS AND COMMUNICATION ENGINEERING

## I.  Program Educational Objective (PEO)

**PEO1: Foundational Concepts:** To provide the students with a strong foundation in the required sciences in order to pursue studies in Electronics and Communication Engineering.

**PEO2: Professional Innovations:** To gain adequate knowledge to become good professional in electronic and communication engineering associated industries, higher education and research.

**PEO3: Life Long Learning:** To develop attitude in lifelong learning, applying and adapting new ideas and technologies as their field evolves.

**PEO4: Analyze Methodology:** To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified.

**PEO5: Professionalism:** To inculcate in the students a professional and ethical attitude and an ability to visualize the engineering issues in a broader social context.

## II.  Program Outcomes (POs)

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**8. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**9. Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**10.Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**11. Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**12. Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## III. Program Specific Outcomes (PSOs)

**PSO1: Core skills:** Design, develop and analyze electronic systems through application of relevant electronics, mathematics and engineering principles.

**PSO2: Problem solving skills:** Design, develop and analyze communication systems through application of fundamentals from communication principles, signal processing, and RF System Design & Electromagnetics.

**PSO3: Professional career:** Adapt to emerging electronics and communication technologies and develop innovative solutions for existing and newer problems.

| Mapping of Course Outcome and Programme Outcome | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | Sem | Course name | PO | | | | | | | | | | | | PSO | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| I | I | Induction Programme | | | | | | | | | | | | | | | |
| | | Professional English - I | - | - | - | 2 | - | 1 | - | - | 3 | 3 | - | 2 | - | - | - |
| | | Matrices and Calculus | 3 | 3 | 1 | 1 | - | - | - | - | 2 | - | 2 | 3 | - | - | - |
| | | Engineering Physics | 3 | 3 | 2 | 1 | 2 | - | - | - | - | - | - | 1 | - | - | - |
| | | Engineering Chemistry | 3 | 2 | 2 | 1 | 2 | 2 | 3 | - | - | - | - | 1 | - | - | - |
| | | Problem Solving and Python Programming | 2 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | 2 | 3 | 3 | 3 |
| | | தமிழர் மரபு /Heritage of Tamils | | | | | | | | | | | | | | | |
| | | Problem Solving and Python Programming Laboratory | 2 | 3 | 3 | 3 | 2 | - | - | - | - | - | 2 | 2 | 3 | 3 | 3 |
| | | Physics and Chemistry Laboratory | 3 | 3 | 1 | 1 | - | - | - | - | - | - | - | | | | |
| | | | 3 | 2 | 1 | - | 1 | 3 | 2 | 1 | - | - | - | 1 | 3 | 2 | 1 |
| | | English Laboratory | - | - | - | - | - | - | - | 1 | 3 | 3 | - | 2 | - | - | - |
| II | II | Professional English - II | - | 1 | 1 | - | - | - | 1 | 1 | 2 | 3 | - | 2 | - | 1 | 1 |
| | | Numerical Methods and statistics | 3 | 3 | 1 | 1 | 1 | - | - | - | 2 | - | 2 | 3 | - | - | - |
| | | Physics for Electronics Engineering | 3 | 2 | 1 | - | - | - | - | - | 1 | - | - | - | | | |
| | | Electrical and Instrumentation Engineering | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | - | - | 3 | 3 | 2 |
| | | Engineering Graphics | 3 | 1 | 2 | - | 2 | - | - | - | - | 3 | - | 2 | 2 | 2 | - |
| | | Circuit Analysis | 3 | 3 | 2 | 2 | - | - | - | - | - | 1 | - | - | 3 | 2 | - |
| | | தமிழரும் தொழில்நுட்பமும் /Tamils and Technology | | | | | | | | | | | | | | | |
| | | Engineering Practices Laboratory | 3 | - | - | 3 | - | - | - | - | - | - | - | - | 2 | 1 | 1 |
| | | Circuits Analysis Laboratory | 3 | 3 | 2 | - | - | - | - | - | - | 1 | - | - | 2 | 2 | - |
| | | Communication Laboratory / Foreign Language $ | - | - | 2 | - | - | - | - | 1 | 3 | 3 | - | 3 | - | - | 2 |

**1 - low, 2 - medium, 3 - high, '-' - no correlation**

# SUMMARY OF CREDITS

| S.No | Course Category | Credits per Semester | | | | | | | | Total Credits | Credits in % | Credits as per AU Curriculum R-2021 | Credits as per AICTE Model Curriculum R-2022 |
|------|-----------------|------|------|------|------|------|------|------|------|---------------|--------------|--------------------------------------|----------------------------------------------|
| | | I | II | III | IV | V | VI | VII | VIII | | | | |
| 1. | HSS | 4 | 3 | | | | | 5 | | 12 | 7.31 | 12 | 15 |
| 2. | BS | 12 | 7 | 4 | 2 | | | | | 25 | 15.24 | 25 | 23 |
| 3. | ES | 5 | 9 | 3 | | | 4 | | | 21 | 12.8 | 21 | 17 |
| 4. | PC | | 5 | 17 | 20 | 12 | 4 | | | 58 | 35.36 | 58 | 61 |
| 5. | PE | | | | | 9 | 9 | | | 18 | 10.97 | 18 | 12 |
| 6. | OE | | | | | | 3 | 9 | | 12 | 7.31 | 12 | 12 |
| 7. | EEC | 1 | 2 | 1 | | | | 4 | 10 | 18 | 10.97 | 16 | 20 |
| 8. | MC | | √ | | | √ | √ √ | √ | | | | | - |
| **Total Credits / Semester** | | 22 | 26 | 25 | 22 | 21 | 20 | 18 | 10 | **164** | **100** | **162** | **160** |

## CATEGORIZATION OF COURSES

      i. Humanities and Social Sciences including Management Courses (HSS)
      ii. Basic Science Courses (BS)
      iii. Engineering Science Courses (ES)
      iv. Professional Core Courses (PC)
      v. Professional Elective Courses (PE)
      vi. Open Elective Courses (OE)
      vii. Mandatory Courses (MC)
      viii. Employability Enhancement Courses (EEC)
      ix. Other Courses (OC)

## ENROLLMENT FOR B.E. / B. TECH. (HONOURS) / MINOR DEGREE (OPTIONAL)

A student can also optionally register for additional courses (18 credits) and become eligible for the award of B.E. / B. Tech. (Honours) or Minor Degree.

For B.E. / B. Tech. (Honours), a student shall register for the additional courses (18 credits) from semester V onwards. These courses shall be from the same vertical or a combination of different verticals of the same programme of study only.

For minor degree, a student shall register for the additional courses (18 credits) from semester V onwards. All these courses have to be in a particular vertical from any one of the other programmes,

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**Regulation 2023 (UG)**
**Curriculum and Syllabus**
**BE-Electronics and Communication Engineering**

**SEMESTER I**

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---------|---------|----|----|----|
| | | | | L | T | P | | | CA | ES | TM |
| **Induction Program** | | | | | | | | | | | |
| 1. | 23IPA11 | Induction Programme | - | - | - | - | - | 0 | - | - | - |
| **Theory** | | | | | | | | | | | |
| 2. | 23ENT11 | Professional English - I | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23MAT11 | Matrices and Calculus | BS | 3 | 1 | 0 | 4 | 4 | 40 | 60 | 100 |
| 4. | 23PHT11 | Engineering Physics | BS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5. | 23CYT11 | Engineering Chemistry | BS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 6. | 23CST11 | Problem Solving and Python Programming | ES | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 7. | 23TAT11 | தமிழர் மரபு /Heritage of Tamils | HSS | 1 | 0 | 0 | 1 | 1 | 40 | 60 | 100 |
| **Practicals** | | | | | | | | | | | |
| 8. | 23CSL11 | Problem Solving and Python Programming Laboratory | ES | 0 | 0 | 4 | 4 | 2 | 60 | 40 | 100 |
| 9. | 23PCL11 | Physics and Chemistry Laboratory | BS | 0 | 0 | 4 | 4 | 2 | 60 | 40 | 100 |
| 10. | 23ENL11 | English Laboratory | EEC | 0 | 0 | 2 | 2 | 1 | 60 | 40 | 100 |
| | | **Total** | | **16** | **1** | **10** | **27** | **22** | | | |

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**SEMESTER  II**

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | CA | ES | TM |
| **Theory** | | | | | | | | | | | |
| 1. | 23ENT21 | Professional English - II | HSS | 2 | 0 | 0 | 2 | 2 | 40 | 60 | 100 |
| 2. | 23MAT21 | Numerical Methods and Statistics | BS | 3 | 1 | 0 | 4 | 4 | 40 | 60 | 100 |
| 3. | 23PHT23 | Physics for Electronics Engineering | BS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4. | 23EET23 | Electrical and Instrumentation Engineering | ES | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5. | 23MET21 | Engineering Graphics | ES | 2 | 0 | 4 | 6 | 4 | 40 | 60 | 100 |
| 6. | 23ECT21 | Circuit Analysis | PC | 3 | 1 | 0 | 4 | 4 | 40 | 60 | 100 |
| 7. | 23TAT21 | தமிழரும் தொழில்நுட்பமும் /Tamils and Technology | HSS | 1 | 0 | 0 | 1 | 1 | 40 | 60 | 100 |
| **Practicals** | | | | | | | | | | | |
| 8. | 23MEL21 | Engineering Practices Laboratory | ES | 0 | 0 | 4 | 4 | 2 | 60 | 40 | 100 |
| 9. | 23ECL21 | Circuit  Analysis Laboratory | PC | 0 | 0 | 2 | 2 | 1 | 60 | 40 | 100 |
| 10. | 23ENL21 | Communication Laboratory | EEC | 0 | 0 | 4 | 4 | 2 | 60 | 40 | 100 |
| **Mandatory Courses** | | | | | | | | | | | |
| 11. | 23MCL21 | Mandatory Course - I **&** | MC | 0 | 0 | 1 | 1 | 0 | 100 | - | 100 |
| | | | **Total** | **17** | **2** | **15** | **34** | **26** | | | |

**& Mandatory Course-I**

| Yoga for Human Excellence | Non-credit Course |
|---|---|

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### BE-Electronics and Communication Engineering

### SEMESTER III

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | CA | ES | TM |
| **Theory** | | | | | | | | | | | |
| 1. | 23MAT34 | Random Processes and Linear Algebra | BS | 3 | 1 | 0 | 4 | 4 | 40 | 60 | 100 |
| 2. | 23CST34 | C Programming and Data Structures | ES | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECT31 | Signals and Systems | PC | 3 | 1 | 0 | 4 | 4 | 40 | 60 | 100 |
| 4. | 23ECT32 | Electronic Devices and Circuits | PC | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5. | 23ECT33 | Control Systems | PC | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 6. | 23ECI31 | Digital Systems Design | PC | 3 | 0 | 2 | 5 | 4 | 50 | 50 | 100 |
| **Practicals** | | | | | | | | | | | |
| 7. | 23ECL31 | Electronic Devices and Circuits Laboratory | PC | 0 | 0 | 3 | 3 | 1.5 | 60 | 40 | 100 |
| 8. | 23CSL34 | C Programming and Data Structures Laboratory | PC | 0 | 0 | 3 | 3 | 1.5 | 60 | 40 | 100 |
| 9. | 23PDL31 | Professional Development | EEC | 0 | 0 | 2 | 2 | 1 | 100 | - | 100 |
| | | | **Total** | 18 | 2 | 10 | 30 | 25 | | | |

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| SEMESTER IV | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
| | | | | L | T | P | | | CA | ES | TM |
| **Theory** | | | | | | | | | | | |
| 1. | 23ECT41 | Electromagnetic Fields | PC | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23ECT42 | Linear Integrated Circuits | PC | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECT43 | Communication Systems | PC | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4. | 23CYT41 | Environmental Sciences and Sustainability | BS | 2 | 0 | 0 | 2 | 2 | 40 | 60 | 100 |
| 5. | 23CSI44 | Networks and Security | PC | 3 | 0 | 2 | 5 | 4 | 50 | 50 | 100 |
| 6. | 23ECI41 | Digital Signal Processing | PC | 3 | 0 | 2 | 5 | 4 | 50 | 50 | 100 |
| **Practicals** | | | | | | | | | | | |
| 7. | 23ECL41 | Communication Systems Laboratory | PC | 0 | 0 | 3 | 3 | 1.5 | 60 | 40 | 100 |
| 8. | 23ECL42 | Linear Integrated Circuits Laboratory | PC | 0 | 0 | 3 | 3 | 1.5 | 60 | 40 | 100 |
| **Mandatory Courses** | | | | | | | | | | | |
| 9. | 23SAT41 | Soft and Analytical Skills-I[&] | MC | 1 | 0 | 0 | 1 | 0 | - | - | - |
| | | | **Total** | **18** | **0** | **10** | **28** | **22** | | | |

**[&] Soft and Analytical Skills-I is a Non-credit Course**

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## BE-Electronics and Communication Engineering

### SEMESTER V

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---|---|----|----|----|
| | | | | L | T | P | | | CA | ES | TM |
| **Theory** | | | | | | | | | | | |
| 1. | 23ECT51 | VLSI and Chip Design | PC | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23ECT52 | Transmission lines and RF Systems | PC | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECI51 | Wireless Communication | PC | 3 | 0 | 2 | 5 | 4 | 50 | 50 | 100 |
| 4. | | Professional Elective I* | PE | - | - | - | - | 3 | 40 | 60 | 100 |
| 5. | | Professional Elective II* | PE | - | - | - | - | 3 | 40 | 60 | 100 |
| 6. | | Professional Elective III* | PE | - | - | - | - | 3 | 40 | 60 | 100 |
| **Practicals** | | | | | | | | | | | |
| 7. | 23ECL51 | VLSI Laboratory | PC | 0 | 0 | 4 | 4 | 2 | 60 | 40 | 100 |
| **Mandatory Courses** | | | | | | | | | | | |
| 8. | | Mandatory Course - II& | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 9. | 23SAT51 | Soft and Analytical Skills-II&& | MC | 1 | 0 | 0 | 1 | 0 | - | - | - |
| | | | | | | **Total** | | **21** | | | |

**\* Professional Elective – I to III shall be chosen from the list of Professional electives (Verticals) offered by same Programme.**

**& Mandatory Course-II is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-II)**

**&& Soft and Analytical Skills-II is a non credit course**

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**SEMESTER VI**

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | CA | ES | TM |
| **Theory** | | | | | | | | | | | |
| 1. | 23ECI61 | Embedded Systems and IOT Design | PC | 3 | 0 | 2 | 5 | 4 | 50 | 50 | 100 |
| 2. | 23CSI41 | Artificial Intelligence and Machine Learning | ES | 3 | 0 | 2 | 5 | 4 | 50 | 50 | 100 |
| 3. | | Professional Elective IV* | PE | - | - | - | - | 3 | 40 | 60 | 100 |
| 4. | | Professional Elective V* | PE | - | - | - | - | 3 | 40 | 60 | 100 |
| 5. | | Professional Elective VI* | PE | - | - | - | - | 3 | 40 | 60 | 100 |
| 6. | | Open Elective – I** | OE | - | - | - | - | 3 | 40 | 60 | 100 |
| **Mandatory Courses** | | | | | | | | | | | |
| 7. | | Mandatory Course - III& | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| | | | **Total** | - | - | - | - | **20** | | | |

**\*Professional Elective – IV to VI shall be chosen from the list of Professional electives (Verticals) offered by same Programme**

**\*\* Open Elective – I shall be chosen from the list of open electives offered by other Programmes**

**& Mandatory Course-III is a Non-credit Course (Student shall select one course from the list given under Mandatory Course-III)**

**@The students individually undergo training in reputed firms/ research institutes / laboratories for the specified duration (04 Weeks) during summer vacation. After completion of training, a detailed report should be submitted within ten days from the commencement of VII semester.**

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**SEMESTER VII**

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---------|---------|----|----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| **Theory** | | | | | | | | | | | |
| 1. | 23UHV71 | Human Values and Ethics | HSS | 2 | 0 | 0 | 2 | 2 | 40 | 60 | 100 |
| 2. | | Elective – Management# | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | | Open Elective – II** | OE | - | - | - | - | 3 | 40 | 60 | 100 |
| 4. | | Open Elective – III** | OE | - | - | - | - | 3 | 40 | 60 | 100 |
| 5. | | Open Elective – IV** | OE | - | - | - | - | 3 | 40 | 60 | 100 |
| **Practicals** | | | | | | | | | | | |
| 6. | 23ECL71 | Summer internship@ | EEC | 0 | 0 | 0 | 0 | 2 | 100 | - | 100 |
| 7. | 23ECL72 | Mini Project | EEC | 0 | 0 | 4 | 4 | 2 | | | 100 |
| | | | Total | - | - | - | - | **18** | | | |

# **Elective - Management shall be chosen from the Elective Management courses.**

** Open Elective – II to IV Shall be chosen from the list of open electives offered by other
 Programmes

@ The students undergone summer internship during VI semester summer vacation and same
 will be evaluated in VII semester.

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**SEMESTER VIII**

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---|---|----|----|----|
| | | | | L | T | P | | | CA | ES | TM |
| **Practicals** | | | | | | | | | | | |
| 1. | 23ECL81 | Project Work | EEC | 0 | 0 | 20 | 20 | 10 | 60 | 40 | 100 |
| | | | **Total** | **0** | **0** | **20** | **20** | **10** | | | |

**TOTAL CREDITS: 164**
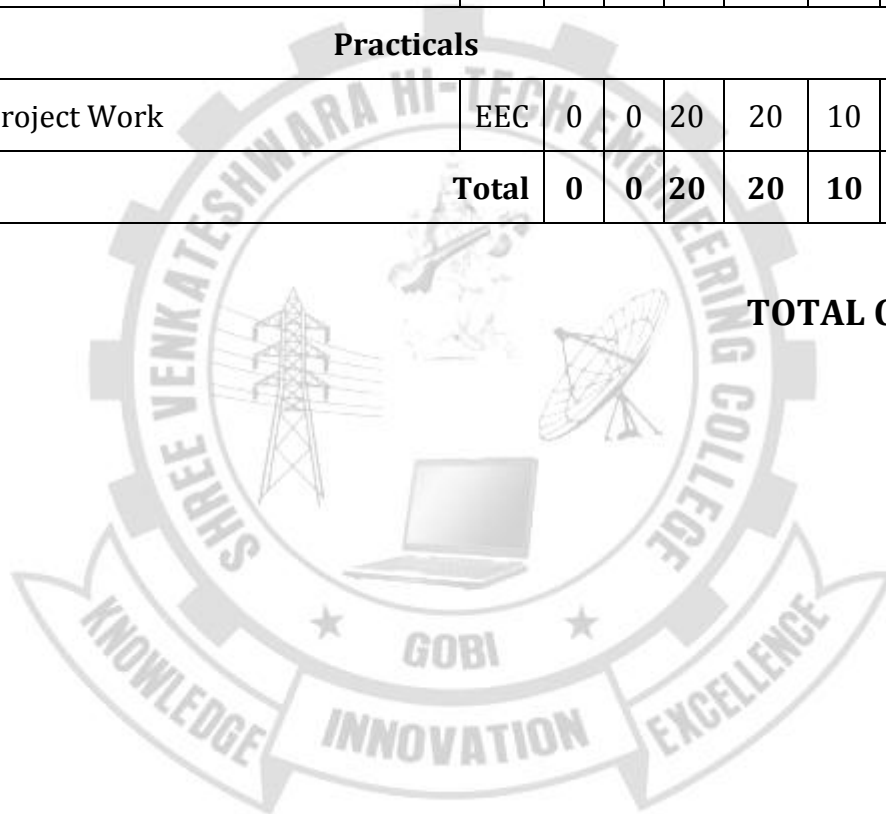
## MANDATORY COURSES II

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|------|---------|-----|-----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23MCT51 | Introduction to Women and Gender Studies | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 2. | 23MCT52 | Elements of Literature | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 3. | 23MCT53 | Film Appreciation | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 4. | 23MCT54 | Disaster Risk Reduction and Management | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |

## MANDATORY COURSES III

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|------|---------|-----|-----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23MCT61 | Well Being with Traditional Practices -Yoga, Ayurveda and Siddha | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 2. | 23MCT62 | History of Science and Technology in India | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 3. | 23MCT63 | Political and EconomicThought for a Humane Society | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 4. | 23MCT64 | State, Nation Building and Politics in India | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |
| 5. | 23MCT65 | Industrial Safety | MC | 3 | 0 | 0 | 3 | 0 | 100 | - | 100 |

## ELECTIVE – MANAGEMENT COURSES

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|------|---------|-----|-----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23MSE71 | Principles of Management | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23MSE72 | Total Quality Management | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23MSE73 | Engineering Economics and Financial Accounting | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4. | 23MSE74 | Human Resource Management | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5. | 23MSE75 | Knowledge Management | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 6. | 23MSE76 | Industrial Management | HSS | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |

## PROFESSIONAL ELECTIVE COURSES: VERTICALS

| Vertical I<br>Semiconductor Chip Design and Testing | Vertical II<br>Signal Processing | Vertical III<br>RF Technologies | Vertical IV<br>Bio Medical Technologies | Vertical V<br>Underwater Technologies | Vertical VI<br>Sensor Technologies and IoT | Vertical VII<br>Space Technologies | Vertical VIII<br>High Speed Communications |
|---|---|---|---|---|---|---|---|
| Wide Bandgap Devices | Advanced Digital Signal Processing | RF Transceivers | Wearable Devices | Underwater Instrumentation System | IoT Processors | Radar Technologies | Optical Communication & Networks |
| Validation and Testing Technology | Image Processing | Signal Integrity | Human Assist Devices | Underwater Imaging Systems and Image Processing | IoT Based System Design | Avionics Systems | Wireless BroadBand Networks |
| Low Power IC Design | Speech Processing | Antenna Design | Therapeutic Equipment | Underwater Communication | Wireless Sensor Network Design | Positioning and Navigation Systems | 4G/5G Communication Networks |
| VLSI Testing and Design For Testability | Software Defined Radio | MICs and RF System Design | Medical Imaging Systems | Ocean Observation Systems | Industrial IoT and Industry 4.0 | Satellite Communication | Software Defined Networks |
| Mixed Signal IC Design Testing | DSP Architecture and Programming | EMI/EMC Pre Compliance Testing | Brain Computer Interface and Applications | Underwater Navigation Systems | MEMS Design | Remote Sensing | Massive MIMO Networks |
| Analog IC Design | Computer Vision | RF ID System Design & Testing | Body Area Networks | Ocean Acoustics | Fundamentals of Nanoelectronics | Rocketry and Space Mechanics | Advanced Wireless Communication Techniques |

## **Registration of Professional Elective Courses from Verticals:**

Professional Elective Courses will be registered in Semesters V and VI. These courses are listed in groups called verticals that represent a particular area of specialization / diversified group. Students are permitted to choose all the Professional Electives from a particular vertical or from different verticals. Further, only one Professional Elective course shall be chosen in a semester horizontally (row-wise). However, two courses are permitted from the same row, provided one course is enrolled in Semester V and another in semester VI.

The registration of courses for B.E./B.Tech (Honours) or Minor degree shall be done from Semester V to VIII. The procedure for registration of courses explained above shall be followed for the courses of B.E/B.Tech (Honours) or Minor degree also. For more details on B.E./B.Tech (Honours) or Minor degree refer to the Regulations 2023(Clause 12).

## PROFESSIONAL ELECTIVE COURSES: VERTICALS

### VERTICAL 1: SEMICONDUCTOR CHIP DESIGN AND TESTING

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE11 | Wide Band gap Devices | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 2. | 23ECE12 | Validation and Testing Technology | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 3. | 23ECE13 | Low Power IC Design | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4. | 23ECE14 | VLSI Testing and Design For Testability | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5. | 23ECE15 | Mixed Signal IC Design Testing | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 6. | 23ECE16 | Analog IC Design | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |

### VERTICAL 2:  SIGNAL PROCESSING

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE21 | Advanced Digital Signal Processing | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 2. | 23ECE22 | Image Processing | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECE23 | Speech Processing | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4. | 23ECE24 | Software Defined Radio | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5. | 23ECE25 | DSP Architecture and Programming | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 6. | 23ECE26 | Computer Vision | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |

## VERTICAL 3: RF TECHNOLOGIES

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---------|---------|-----|-----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE31 | RF Transceivers | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 2. | 23ECE32 | Signal Integrity | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 3. | 23ECE33 | Antenna Design | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4. | 23ECE34 | MICs and RF System Design | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5. | 23ECE35 | EMI/EMC Pre Compliance Testing | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 6. | 23ECE36 | RFID System Design and Testing | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |

## VERTICAL 4: BIO MEDICAL TECHNOLOGIES

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---------|---------|-----|-----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE41 | Wearable Devices | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23ECE42 | Human Assist Devices | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECE43 | Therapeutic Equipment | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4. | 23ECE44 | Medical Imaging Systems | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5. | 23ECE45 | Brain ComputerInterface and Applications | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 6. | 23ECE46 | Body Area Networks | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |

## VERTICAL 5: UNDERWATER TECHNOLOGIES

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|--------|---------|----|----|----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE51 | Underwater Instrumentation System | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23ECE52 | Underwater Imaging Systems and Image Processing | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 3. | 23ECE53 | Underwater Communication | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4. | 23ECE54 | Ocean Observation Systems | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5. | 23ECE55 | Underwater Navigation Systems | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 6. | 23ECE56 | Ocean Acoustics | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |

## VERTICAL 6: SENSOR TECHNOLOGIES AND IOT

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|--------|---------|----|----|----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE61 | IoT Processors | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 2. | 23ECE62 | IoT Based Systems Design | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECE63 | Wireless Sensor Network Design | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4. | 23ECE64 | Industrial IoT and Industry 4.0 | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5. | 23ECE65 | MEMS Design | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 6. | 23ECE66 | Fundamentals of Nanoelectronics | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |

## VERTICAL 7: SPACE TECHNOLOGIES

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---|---|-----|-----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE71 | Radar Technologies | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23ECE72 | Avionics Systems | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECE73 | Positioning and Navigation Systems | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4. | 23ECE74 | Satellite Communication | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5. | 23ECE75 | Remote Sensing | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 6. | 23ECE76 | Rocketry and Space Mechanics | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |

## VERTICAL 8: HIGH SPEED COMMUNICATIONS

| S.No | Course Code | Course Title | Category | Periods / Week | | | Total Contact Period | Credits | Max.Marks | | |
|------|-------------|--------------|----------|---|---|---|---|---|-----|-----|-----|
| | | | | L | T | P | | | CA | ES | TM |
| 1. | 23ECE81 | Optical Communication & Networks | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23ECE82 | Wireless Broad Band Networks | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23ECE83 | 4G/5G Communication Networks | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4. | 23ECE84 | Software Defined Networks | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5. | 23ECE85 | Massive MIMO Networks | PE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 6. | 23ECE86 | Advanced Wireless Communication Techniques | PE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |

**OPEN ELECTIVES**

| S. NO. | COURSE CODE | COURSE TITLE | Category | L | T | P | Total Contact Period | Credits | CA | ES | TM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | **PERIODS PER WEEK** | | | | | **Max.Marks** | | |
| | | | | | | | | | | | |

| S. NO. | COURSE CODE | COURSE TITLE | Category | L | T | P | Total Contact Period | Credits | CA | ES | TM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **OFFERED BY DEPARTMENT OF CIVIL ENGINEERING** | | | | | | | | | | |
| 1 | 23CEO11 | Civil and Infrastructure Engineering | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2 | 23CEO12 | Environmental Pollution and waste management | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3 | 23CEO13 | Environmental Impact Assessment | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4 | 23CEO14 | Building Services | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5 | 23CEO15 | Water, Sanitation and Health | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| **OFFERED BY DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING** | | | | | | | | | | |
| 1 | 23CSO11 | Foundation of AR/VR | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 2 | 23CSO12 | Web Designing | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 3 | 23CSO13 | Block Chain fundamentals | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4 | 23CSO14 | Knowledge Management | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5 | 23CSO15 | Cloud Computing Essentials | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| **OFFERED BY DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING** | | | | | | | | | | |
| 1 | 23ECO11 | Basics of electronics in automation | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2 | 23ECO12 | Optical engineering | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3 | 23ECO13 | E-waste management | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4 | 23ECO14 | Consumer electronics | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5 | 23ECO15 | Principles of communication engineering | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| **OFFERED BY DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING** | | | | | | | | | | |
| 1. | 23EEO11 | Renewable Energy Sources | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2. | 23EEO12 | Electrical Vehicle | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3. | 23EEO13 | Energy Auditing and Conservation | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4. | 23EEO14 | Domestic and Industrial Electrical Installations | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5. | 23EEO15 | Microcontroller Based System Design | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| **OFFERED BY DEPARTMENT OF MECHANICAL ENGINEERING** | | | | | | | | | | |
| 1 | 23MEO11 | Industrial Instrumentation | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |

| 2 | 23MEO12 | Energy Technology | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3 | 23MEO13 | Reverse Engineering | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4 | 23MEO14 | Fire Safety Engineering | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5 | 23MEO15 | Nano Technology | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 6 | 23MEO16 | Entrepreneurship Development | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| **OFFERED BY DEPARTMENT ARTIFICIAL INTELLIGENCE AND DATA SCIENCE** | | | | | | | | | | | |
| 1 | 23AD011 | Introduction to Big Data | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 2 | 23AD012 | Principles of Data Science | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 3 | 23AD013 | Data Visualization and its Applications | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4 | 23AD014 | Data Warehousing and Mining | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5 | 23AD015 | Principles of Cyber Security | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| **OFFERED BY DEPARTMENT INFORMATION TECHNOLOGY** | | | | | | | | | | | |
| 1 | 23IT011 | Basics of Java Programming | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 2 | 23IT012 | Ethical Hacking | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 3 | 23IT013 | E-Commerce and Applications | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 4 | 23IT014 | Basics of Android Application Development | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| 5 | 23IT015 | Introduction to Web Design | OE | 2 | 0 | 2 | 4 | 3 | 50 | 50 | 100 |
| **OFFERED BY DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY** | | | | | | | | | | | |
| 1 | 23PTO11 | Nutraceuticals | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2 | 23PTO12 | IPR for Pharma Industry | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3 | 23PTO13 | Pharmaceutical Nanotechnology | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4 | 23PTO14 | Basics of Human Anatomy and physiology | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| **OFFERED BY DEPARTMENT BIOMEDICAL ENGINEERING** | | | | | | | | | | | |
| 1 | 23BMO11 | Biomedical Instrumentation | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 2 | 23BMO12 | Medical Optics | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 3 | 23BMO13 | Biometric systems and their applications | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 4 | 23BMO14 | Healthcare Management systems | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |
| 5 | 23BMO15 | IOT in Medicine | OE | 3 | 0 | 0 | 3 | 3 | 40 | 60 | 100 |

| | | | L | T | P | C |
|---|---|---|---|---|---|---|
| **23ECT21** | **CIRCUIT ANALYSIS** | | 3 | 1 | 0 | 4 |

## COURSE OBJECTIVES:
- To learn the basic concepts and behaviour of DC circuits.
- To apply the network theorems concepts in DC circuits.
- To understand the sinusoidal steady state analysis of electric circuits.
- To analyze the transient and steady state response of RL, RC, RLC circuits.
- To analyze the concept of Resonance and coupling circuits.

### UNIT-I      DC CIRCUIT ANALYSIS      12

Basic components of electric circuits, Charge, Current, Voltage and Power, Voltage and Current sources, Ohms law, Kirchhoff's laws, Series and Parallel connected Independent sources, Resistors in series and parallel, Voltage division and Current division rule, Mesh current and Node voltage methods of analysis DC circuits.

### UNIT-II      NETWORK REDUCTION AND THEOREMS      10

Network Reduction: Source transformation, Star delta conversion. Theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem to DC circuits.

### UNIT-III      SINUSOIDAL STEADY STATE ANALYSIS      12

Sinusoidal Steady state analysis, Characteristics of Sinusoids, Mesh current and node voltage methods of analysis AC circuit. AC Circuit Power Analysis: Instantaneous Power, Average Power, Apparent power and Power factor, Complex power.

### UNIT-IV      TRANSIENT RESPONSE ANALYSIS      14

Laplace transforms and inverse laplace transforms, Standard test signals, Transient response of RL, RC and RLC circuits using laplace transform for source free, Step input and Sinusoidal input.

### UNIT-V      RESONANCE AND COUPLED CIRCUITS      12

Series and parallel resonance, Frequency response, Quality factor and Bandwidth, Self and mutual inductance, Coefficient of coupling, Dot rule, Analysis of coupled circuits, Single tuned circuits.

**TOTAL: 60 PERIODS**

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**COURSE OUTCOMES:**

At the end of the course, the students will be able to

**CO1:** Explain circuit's behavior using circuit laws and analyze the mesh analysis and nodal analysis.

**CO2:** Apply the network theorems to determine the behavior of the given DC circuits.

**CO3:** Analyze the sinusoidal steady state analysis of electric circuits.

**CO4:** Analyze steady state response and transient response for any RC, RL and RLC circuits.

**CO5:** Analyze the frequency response of series and parallel resonance circuits and coupled circuits.

**TEXT BOOKS:**

1. William H. HaytJr, Jack E. Kemmerly and Steven M. Durbin, "Engineering Circuits Analysis", McGraw Hill publishers, 9thedition, New Delhi, 2020.
2. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", McGraw- Hill, 7th Edition, 2022.

**REFERENCE BOOKS:**

1. Robert.L. Boylestead, "Introductory Circuit Analysis", Pearson Education India, 12th Edition, 2014.
2. David Bell, "Fundamentals of Electric Circuits", Oxford University press, 7thEdition, 2009.
3. John O Mallay, Schaum's Outlines "Basic Circuit Analysis", The McGraw Hill companies, 2nd Edition, 2011.
4. Allan H.Robbins, Wilhelm C.Miller, "Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 2013.

**E-RESOURCES:**

1. NPTEL-Online Courses and Video lectures: https://nptel.ac.in/

## CO's – PO's & PSO's MAPPING

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

**1 - low, 2 - medium, 3 - high, '-' - no correlation**

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| | | | **L** | **T** | **P** | **C** |
|---|---|---|---|---|---|---|

**23ECL21**       **CIRCUIT ANALYSIS LABORATORY**       **0    0    2    1**

## COURSE OBJECTIVES:

➢ To gain hands- on experience in Thevenin & Norton theorem, KVL & KCL and Superposition Theorems.
➢ To understand the working of RL, RC and RLC circuits.

### LIST OF EXPERIMENTS

1. Verifications of KVL and KCL laws.
2. Verifications of Thevenin & Norton theorem.
3. Verification of Superposition Theorem.
4. Verification of maximum power transfer Theorem
5. Determination of Resonance Frequency of Series & Parallel RLC Circuits.
6. Transient analysis of RL and RC circuits.

**TOTAL: 30 PERIODS**

## COURSE OUTCOMES:

**At the end of the Course, the students will be able to**

**CO1:** Verify the electric circuits using fundamental laws.
**CO2:** Verify the electric circuits using Thevenin's and Norton theorem.
**CO3:** Verify the electric circuits using Superposition and Maximum power transfer theorem.
**CO4:** Verify the transient response of RL and RC circuits.
**CO5:** Verify the frequency response of series and parallel resonance circuits.

## TEXT BOOKS:

1. Hayt Jack Kemmerly, Steven Durbin, "Engineering Circuit Analysis",McGraw Hill education, 9th Edition, 2020.
2. Charles K. Alexander & Mathew N.O.Sadiku, "Fundamentals of Electric Circuits", McGraw-Hill, 7th Edition, 2022.

## REFERENCE BOOKS:

1. SVHEC- Circuit Analysis Laboratory Manual.
2. David Bell, "Fundamentals of Electric Circuits", Oxford University press, 7th Edition, 2009.
3. John O Mallay, Schaum's Outlines "Basic Circuit Analysis", The McGraw Hill companies, 2nd Edition, 2011.
4. Joseph Edminister and MahmoodNahvi, ―Electric Circuits, Schaum's Outline Series, Tata McGraw Hill Publishing Company, New Delhi, Fifth Edition Reprint 2016.
5. Allan H.Robbins, Wilhelm C.Miller, "Circuit Analysis Theory and Practice", Cengage Learning, Fifth Edition, 1st Indian Reprint 2013.

## E-RESOURCES:

1. NPTEL-Online Courses and Video lectures: https://nptel.ac.in/
2. http://vlabs.iitkgp.ernet.in/

Chairman
BoS / ECE

**CO's – PO's & PSO's MAPPING**

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

**1 - low, 2 - medium, 3 - high, '-' - no correlation**

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