**SRI MANAKULA VINAYAGAR ENGINEERING COLLEGE**
**(An Autonomous Institution)**
(Approved by AICTE, New Delhi & Affiliated to Pondicherry University)
(Accredited by NBA-AICTE, New Delhi, ISO 9001:2000 Certified Institution & Accredited by NAAC with "A" Grade)
Madagadipet, Puducherry - 605 107

## Department of Computer and Communication Engineering
## Minutes of Board of Studies

The first Board of Studies meeting for B.Tech. Computer and Communication Engineering was held on 20th July 2020 at 9:30 A.M in the Seminar Hall, Department of CCE, Sri Manakula Vinayagar Engineering College with the Head of the Department in the Chair.

The following members were present for the BoS meeting

| Sl.No | Name of the Member with Designation and official Address | Responsibility in the BoS | Signature |
|---|---|---|---|
| 1 | **Dr. V.Bharathi**<br>Professor and Head<br>Department of CCE, SMVEC | Chairman | |
| **External Members** | | | |
| 2 | **Dr. G. Nagarajan**<br>Professor,<br>Department of Electronics and Communication Engineering<br>Pondicherry Engineering College | Member | |
| 3 | **Dr. G. Lakshmi Sutha**<br>Professor & Head,<br>Department of Electronics and Communication Engineering,<br>National Institute of Technology,<br>Karaikal | Member | |
| 4 | **Dr. T. T. Mirnalinee,**<br>Professor,<br>Department of Computer Science & Engineering,<br>SSN College of Engineering. | Member | |
| 5 | **Porseezhian Arumugugam**<br>Systems Engineer-II<br>GE Healthcare<br>Bengaluru | Member | |
| **Internal Members** | | | |
| 6 | **Dr. S. Premkumar**<br>Associate Professor /ECE<br>**Specialization:** Wireless | Member | |

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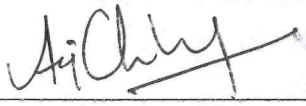
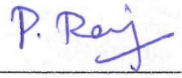
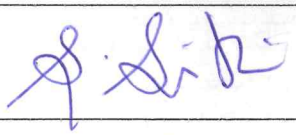
|---|---|---|---|
| | Communication | | |
| 7 | **Ms. V.Logisvary**<br>Assistant Professor /ECE<br>**Specialization:** Embedded Systems | Member |  |
| 8 | **Ms. M.Julie Therese**<br>Assistant Professor /ECE<br>**Specialization**: IOT amd Machine learning | Member |  |
| 9 | **Mr. C. Srithar**<br>Assistant Professor /ECE<br>**Specialization**: VLSI Design | Member |  |
| 10 | **Arokiaraj Christian St.Hubert**<br>Assistant Professor /CSE<br>**Specialization**: CSE | Member |  |
| 11 | **Ms.P.Rajeswari**<br>Assistant Professor /English<br>**Specialization**: English | Member |  |
| 12 | **Mr.S.Asokan**<br>Assistant Professor /physics<br>**Specialization**: Physics | Member |  |
| 13 | **Ms. S. Savithri**<br>Assistant Professor /Chemistry<br>**Specialization**: chemistry | Member |  |
| 14 | **D.Dheebia**<br>Assistant Professor /Chemistry<br>**Specialization**: Mathemtics | Member |  |
| **Co-opted Members** | | | |
| 16 | **V.Suresh**<br>Sr.Lead Engineer, Qualcom Chennai | Member (Alumni) |  |

**AGENDA OF THE MEETING**

| Item No. | Particulars |
|---|---|
| **BoS/UG/CCE 1.1** | Discuss about the curriculum Structure of B.Tech –Computer and Communication Engineering |
| **BoS/UG/CCE 1.2** | To discuss and approve the B.Tech. Degree Regulations 2020 (R-2020) and Curriculum from I to VIII semesters for the B.Tech – Computer and Communication Engineering and the students admitted in the Academic Year 2020-21(First Year).<br><br>To discuss and approve the syllabi for I to IV Semesters under R - 2020 Regulations for UG Programme: B.Tech. Computer and Communication Engineering from the AY 2020-21 for the students to be admitted in the year 2020-21 |

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| **BoS/UG/CCE 1.3** | To discuss about the uniqueness of the Curriculum (R-2020) |
| **BoS/UG/CCE 1.4** | To discuss and approve Evaluation Systems |
| **BoS/UG/CCE 1.5** | To discuss about the Innovative Teaching / Practices Methodology adopted to handle the emerging. / Advanced Technological concept courses |
| **BoS/UG/CCE 1.6** | To discuss and approve the panel of examiners |
| **BoS/UG/CCE 1.7** | To discuss and approve Vision, Mission, Programme Educational Objective and Programme specific outcome |
| **BoS/UG/CCE 1.8** | Any other item with the permission of chair |

**Minutes of the Meeting**

Dr. V.Bharathi Chairman, BoS initiated the meeting by a warm welcome and introduced the external members, the internal and co-opted members and thanked them for accepting to become the member of the Board of Studies.

The Chairman proceeded with the presentation about the institution accreditation, autonomous status, department details and intake, and the meeting thereafter deliberated on agenda items

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| **Item BoS/UG/CCE 1.1** | The BoS members reviewed the curriculum of B.Tech. Computer and Communication Engineering and appreciated the following points.<br>• The total credits for the B.Tech Programme is acceptable for the regulations R-2020<br>• Course structure is having an efficient flow on engineering knowledge<br>• Agreed that the curriculum will make student specialized in a domain by their elective subjects<br>The BoS members approved the curriculum and recommended to Academic Council. |
| **Item BoS/UG/CCE 1.2** | The BoS members reviewed B.Tech - Degree Regulations 2020 (R-2020), Curriculum and Syllabi from I to IV semesters and suggested the following points<br>**Semester – I**<br>• All the courses of first semester are approved by the BoS members with few suggestions<br>o Suggestions had been provided to replace Course title of Introduction to Engineering : Distinction, Principles and Applications as Elements of Engineering<br>o Suggestion had been provided to reduce content of Electrical in Basic Electrical and Electronics course<br>**Semester -II**<br>• All the courses of second semester are approved by the BoS members with few suggestion<br>o Suggestion has been provided to include DAC and ADC in |

| | |
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| | Electronic Circuits<br><br>**Semester -III**<br><br>• All the courses of third semester are approved by the BoS members with few suggestions<br>  o Suggestion had been provided to modify data and File Structure course name as Data Structures<br>  o Suggestion had been provided to improve the content of Discrete Mathematics and Graph theory course<br><br>**Semester 4**<br><br>• All the courses of third semester are approved by the BoS members with few suggestions<br>  o Suggested to reduce the credit of Design and Analysis of Algorithm from 4 to 3<br>  o Suggested to rearrange the unit order in Principle Data Communication course<br><br>The BoS members resolved the syllabi from I to IV semesters R-2020 with above mentioned changes and recommended to Academic Council. |
| **Item BoS/UG/CCE 1.3** | The BoS members reviewed and appreciated the uniqueness of the curriculum (R-2020) in the following areas<br>• Employability Enhancement Course was provided to the students to enhance the students' knowledge in the field of advanced technology and mould them as skill oriented personalities<br>• Agreed that the students will become multi-talented since they are being provided with skill oriented courses and multidisciplinary courses<br>• Appreciation was given by the BoS members for Internship programme which had been , included as a course in curriculum<br>• All the open elective syllabi were appreciated by the BoS members<br>• The BoS members appreciated the process of publishing papers by the students in the reputed Journals |
| **Item BoS/UG/CCE 1.4** | • The BoS Members approved the evaluation system followed in the regulations 2020 and recommended to the Academic Council |
| **Item BoS/UG/CCE 1.5** | Discussed and approved on various innovative Teaching practices, Methodology adopted to handle the emerging / Advanced Technological concept courses |
| **Item BoS/UG/CCE 1.6** | The BoS members approved the panel of Examiners and recommended to Academic Council |

| Item BoS/UG/CCE 1.7 | The Vision, Mission, Programme Educational Objective and Programme specific outcome were reviewed by the BoS members and the same was approved |
|---|---|

The Board of Studies resolved to approve the above suggestions for B.Tech. Computer and Communication Engineering brought forward by the Chairman incorporating the above changes.

The meeting was concluded at 11:30AM with vote of thanks by **Dr. V. Bharathi**, Head of Department, Computer and Communication Engineering.

**Dr. V.Bharathi**
**Chairman-BOS/CCE**

**Dr. V. S. K. Venkatachalapathy**
**Chairman- Academic Council**

# SRI MANAKULA VINAYAGAR
# ENGINEERING COLLEGE
**(An Autonomous Institution)**

Puducherry

## B.TECH.

## COMPUTER AND COMMUNICATION ENGINEERING

## ACADEMIC REGULATIONS 2020
## (R-2020)

## CURRICULUM

20 years of ACADEMIC EXCELLENCE

V.

Dr. V. BHASKARAN

## VISION AND MISSION OF THE INSTITUTE

### Vision

To be globally recognized for excellence in quality education, innovation and research for the transformation of lives to serve the society

### Mission

| | |
|---|---|
| **M1 - Quality Education** | To provide comprehensive academic system that amalgamates the cutting edge technologies with best practices. |
| **M2 -Research and Innovation** | To foster value based research and innovation in collaboration with industries and institutions globally for creating intellectuals with new avenues. |
| **M3 - Employability and Entrepreneurship** | To inculcate the employability and entrepreneurial skills through value and skill based training |
| **M4:- Ethical values** | To instill deep sense of human values by blending societal righteousness with academic professionalism for growth of society |

## VISION AND MISSION OF THE DEPARTMENT

### Vision

To indoctrinate students with the latest technology by infusing scientific temper into advanced, research based and globally competent Computer and Communication Engineering to meet socio-economic needs

### Mission

| | |
|---|---|
| **M1: Technical Knowledge** | To Apply the prowess knowledge competently in the field of computer and communication engineering to meet the needs of the Society. |
| **M2 - Innovation and Creativity** | To maximize new ideas along with complementary technical skills and delve the students to do innovations through Industry- institute collaboration. |
| **M3: Research Exposure** | To conduct recognized research analytically in collective and multi-disciplinary areas of the framework at National and International levels |
| **M4 - Ethics** | To instruct integrity, ethical principles and interactive skills among the students |

## PROGRAMME OUTCOMES (POs)

**PO1: Engineering knowledge:**

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

**PO2: Problem analysis:**

Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3: 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.

**PO4: 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.

**PO5: 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.

**PO6: 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.

**PO7: 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.

**PO8: Ethics:**

Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and team work:**

Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: 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.

**PO11: 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.

**PO12: 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.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

| | |
|---|---|
| **PEO1: Technical Knowledge** | To satisfy the requirements of industry, Research and Development organizations by employing technological knowledge in Computer and Communication Engineering. |
| **PEO2: Leadership Skill** | To lead, contribute and innovate new technologies and systems in the key domains of Computer and Communication Engineering |
| **PEO3: Research and Development** | To get exposed to collaborative work that can be implemented for society's well-being through advance research expertise |
| **PEO4: Professional Behavior** | Gains code of conduct, etiquettes to establish boundaries in environment. |

## PROGRAMME SPECIFIC OUTCOMES (PSOs)

| | |
|---|---|
| **PSO1- Basic Knowledge in CCE** | Use the latest tools and technologies to apply the fundamental concepts of computer and communication engineering principles to software development, mobile communication and computing |
| **PSO 2-Network Design and Security** | Design and Interpret computer networks, Internet of Things with efficient data analytics and security. |
| **PSO 3- Algorithmic Thinking and Programming Skill** | Develop efficient algorithms to solve real time problems through powerful programming and problem solving skills |

## STRUCTURE FOR UNDERGRADUATE ENGINEERING PROGRAM

| Sl. No | Course Category | Breakdown of Credits |
|---|---|---|
| 1 | Humanities and Social Science (HS) | 7 |
| 2 | Basic Sciences(BS) | 16 |
| 3 | Engineering Sciences (ES) | 31 |
| 4 | Professional Core (PC) | 71 |
| 5 | Professional Electives (PE) | 18 |
| 6 | Open Electives (OE) | 9 |
| 7 | Project Work and Internship (PW) | 12 |
| 8 | Employability Enhancement Courses (EEC*) | - |
| 9 | Mandatory courses (MC*) | - |
| **Total** | | **164** |

## SCHEME OF CREDIT DISTRIBUTION – SUMMARY

| Sl.No | AICTE Suggested Course Category | Credits per Semester | | | | | | | | Total Credits |
|---|---|---|---|---|---|---|---|---|---|---|
| | | I | II | III | IV | V | VI | VII | VIII | |
| 1 | Humanities and Social Science (HS) | | - | 1 | 1 | 3 | | 1 | 1 | **7** |
| 2 | Basic Sciences(BS) | 3 | 3 | 3 | 3 | 4 | | | | **16** |
| 3 | Engineering Sciences (ES) | 15 | 4 | 8 | 4 | | | | | **31** |
| 4 | Professional Core (PC) | | 14 | 10 | 8 | 12 | 15 | 9 | 3 | **71** |
| 5 | Professional Electives (PE) | | | | 3 | 3 | 3 | 3 | 6 | **18** |
| 6 | Open Electives (OE) | | | | 3 | - | 3 | 3 | | **9** |
| 7 | Project Work (PW) | | | | | | | 2 | 8 | **10** |
| 8 | Internship (PW) | | | | | | | 2 | | **2** |
| 9 | Employability Enhancement Courses (EEC*) | - | - | - | - | - | - | - | - | **-** |
| 10 | Mandatory courses (MC*) | - | - | - | - | - | - | - | - | **-** |
| **Total** | | **18** | **21** | **22** | **22** | **22** | **21** | **20** | **18** | **164** |

**** EEC and MC are not included for CGPA calculation***

| SEMESTER – I | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20BST101 | Engineering Mathematics – I Calculus and Linear Algebra | BS | 2 | 2 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20EST122 | Elements of Engineering | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20EST110 | Programming in Python | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U20EST109 | Problem Solving Approach | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U20EST123 | Basics of Electronics Engineering | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 6 | U20ESP124 | Basic Electronics Engineering Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 7 | U20ESP111 | Programming in Python Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U20ESP112 | Engineering Graphics using AutoCAD | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Employability Enhancement Course** | | | | | | | | | | |
| 9 | U20CCC1XX | Certification Course – I** | EEC | 0 | 0 | 4 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 10 | U20CCM101 | Induction Program | MC | 3 Weeks | | | - | - | - | - |
| | | | | | | | 18 | 375 | 525 | 900 |

| SEMESTER – II | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20BST215 | Engineering Mathematics –II Multiple Integrals and Transforms | BS | 2 | 2 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20EST201 | Programming in C | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20CCT201 | Introduction to Web Technologies | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U20CCT202 | Electronic Circuits | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U20CCT203 | Digital Electronics | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U20CCT204 | Computer Organization | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U20ESP202 | Programming in C Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U20CCP201 | Electronic Circuits Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U20CCP202 | Digital Electronics Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Employability Enhancement Course** | | | | | | | | | | |
| 10 | U20CCC2XX | Certification Course – II** | EEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 11 | U20CCS201 | Skill Development Course 1: Demonstration of Workshop Practice | EEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 12 | U20CCM202 | Environmental Science | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | 21 | 600 | 600 | 1200 |

***** Certification Courses are to be selected from the list given in Annexure III***

| SEMESTER – III | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20BST325 | Discrete Mathematics and Graph Theory | BS | 2 | 2 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20EST359 | Programming in C++ | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20EST356 | Data Structures | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U20CCT305 | Communication System | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U20CCT306 | Signal Processing | PC | 2 | 2 | 0 | 3 | 25 | 75 | 100 |
| 6 | U20CCT307 | Software Engineering | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U20HSP301 | General Proficiency – I | HS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U20ESP360 | Programming in C++ Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U20ESP357 | Data Structures Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U20CCP303 | Communication Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Employability Enhancement Course** | | | | | | | | | | |
| 11 | U20CCC3XX | Certification Course –III** | EEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 12 | U20CCS302 | Skill Development Course 2* | EEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 13 | U20CCM303 | Physical Education | MC | 0 | 0 | 2 | - | 100 | - | 100 |
| | | | | | | | 22 | 650 | 650 | 1300 |

| SEMESTER – IV | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20BST436 | Probability and Stochastic Process | BS | 2 | 2 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20EST467 | Programming in Java | ES | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20CCT408 | Principles of Data Communication | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U20CCT409 | Design and Analysis of algorithm | PC | 2 | 2 | 0 | 3 | 25 | 75 | 100 |
| 5 | U20CCE4XX | Professional Elective - I# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U20XXO4XX | Open Elective-I$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U20HSP402 | General Proficiency – II | HS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U20ESP468 | Programming in Java Laboratory | ES | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U20CCP404 | Data Communication Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U20CCP405 | Design and Analysis of Algorithm Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Employability Enhancement Course** | | | | | | | | | | |
| 11 | U20CCC4XX | Certification Course –IV** | EEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 12 | U20CCS403 | Skill Development Course 3* | EEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 13 | U20CCM404 | NSS | MC | 0 | 0 | 2 | - | 100 | - | 100 |
| | | | | | | | 22 | 650 | 650 | 1300 |

***#Professional Electives are to be selected from the list given in Annexure I***

***$Open Electives are to be selected from the list given in Annexure II***

***** Certification Courses are to be selected from the list given in Annexure III***

**** Skill Development Courses ( 2 and 3) are to be selected from the list given in Annexure IV***

| SEMESTER – V | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20BST548 | Numerical Methods and Statistics | BS | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20CCT510 | Database Management Systems | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20CCT511 | Network Security and cryptography | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U20CCT512 | Microcontroller and Interfacing | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U20CCE5XX | Professional Elective - II# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U20XXO5XX | Open Elective-II$ | HS | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U20BSP550 | Numerical and Statistical Laboratory | BS | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U20CCP506 | Network Security and cryptography Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U20CCP507 | Microcontroller and Interfacing Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 10 | U20CCP508 | Database Management Systems Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Employability Enhancement Course** | | | | | | | | | | |
| 11 | U20CCC5XX | Certification Course – V** | EEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 12 | U20CCS504 | Skill Development Course 4: Foreign Language/ IELTS - I | EEC | 0 | 0 | 2 | - | 100 | - | 100 |
| 13 | U20CCS505 | Skill Development Course 5: Presentation Skill using ICT | EEC | 0 | 0 | 2 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 14 | U20CCM505 | Indian Constitution | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | 22 | 750 | 650 | 1400 |

| SEMESTER – VI | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20CCT613 | Internet of Things | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20CCT614 | Internet Programming | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20CCT615 | Wireless Communication | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U20CCT616 | Data Science | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 5 | U20CCE6XX | Professional Elective - III# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 6 | U20XXO6XX | Open Elective-III$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 7 | U20CCP609 | Internet of Things Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U20CCP610 | Internet Programming Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 9 | U20CCP611 | Wireless Communication Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Employability Enhancement Course** | | | | | | | | | | |
| 10 | U20CCC6XX | Certification Course – VI** | EEC | 0 | 0 | 4 | - | 100 | - | 100 |
| 11 | U20CCS606 | Skill Development Course 6: Foreign Language / IELTS - II | EEC | 0 | 0 | 2 | - | 100 | - | 100 |
| 12 | U20CCS607 | Skill Development Course 7: Technical Seminar | EEC | 0 | 0 | 2 | - | 100 | - | 100 |
| 13 | U20CCS608 | Skill Development Course 8: NPTEL / MOOC - I | EEC | 0 | 0 | 0 | - | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 14 | U20CCM606 | Essence of Indian Traditional Knowledge | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | 21 | 800 | 600 | 1400 |

***#Professional Electives are to be selected from the list given in Annexure I***

*$Open Electives are to be selected from the list given in Annexure II*
*** Certification Courses are to be selected from the list given in Annexure III*

| SEMESTER – VII | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20CCT717 | Machine Learning and Artificial Intelligence | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20CCT718 | Cloud Computing and Distributed System | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20CCE7XX | Professional Elective – IV# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 4 | U20XXO7XX | Open Elective –IV$ | OE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 5 | U20HSP703 | Business Basics for Entrepreneur | HS | 0 | 0 | 2 | 1 | 100 | - | 100 |
| 6 | U20CCP712 | Artificial Intelligence Laboratory | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 7 | U20CCP713 | Cloud Computing and Distributed System Lab | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| 8 | U20CCP714 | Comprehensive Viva Voce | PC | 0 | 0 | 2 | 1 | 50 | 50 | 100 |
| **Project Work** | | | | | | | | | | |
| 9 | U20CCW701 | Project Phase – I | PW | 0 | 0 | 4 | 2 | 50 | 50 | 100 |
| 10 | U20CCW702 | Internship / Inplant Training | PW | - | - | - | 2 | 100 | - | 100 |
| **Mandatory Course** | | | | | | | | | | |
| 11 | U20CCM707 | Professional Ethics | MC | 2 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | 20 | 600 | 500 | 1100 |

| SEMESTER – VIII | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Course Code | Course Title | Category | Periods | | | Credits | Max. Marks | | |
| | | | | L | T | P | | CAM | ESM | Total |
| **Theory** | | | | | | | | | | |
| 1 | U20CCT819 | Block Chain Technology | PC | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 2 | U20CCE8XX | Professional Elective – V# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| 3 | U20CCE8XX | Professional Elective – VI# | PE | 3 | 0 | 0 | 3 | 25 | 75 | 100 |
| **Practical** | | | | | | | | | | |
| 4 | U20HSP804 | Entrepreneurship Management | HS | 0 | 0 | 2 | 1 | 100 | - | 100 |
| **Project Work** | | | | | | | | | | |
| 5 | U20CCW803 | Project phase – II | PW | 0 | 0 | 16 | 8 | 40 | 60 | 100 |
| **Employability Enhancement Course** | | | | | | | | | | |
| 6 | U20CCS809 | Skill Development Course 9: NPTEL / MOOC-II | EEC | 0 | 0 | 0 | - | 100 | - | 100 |
| | | | | | | | 18 | 315 | 285 | 600 |

*#Professional Electives are to be selected from the list given in Annexure I*

*[$]Open Electives are to be selected from the list given in Annexure II*

## Annexure – I

## PROFESSIONAL ELECTIVE COURSES

| **Professional Elective – I (Offered in Semester IV)** | | |
|---|---|---|
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U20CCE401 | Spread Spectrum Communication |
| 2 | U20CCE402 | Network Analysis and Management |
| 3 | U20CCE403 | Information Coding Theory |
| 4 | U20CCE404 | Computer Graphics |
| 5 | U20CCE405 | Operating System |
| **Professional Elective – II (Offered in Semester V)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U20CCE506 | Vehicular Communication |
| 2 | U20CCE507 | Wireless Adhoc and Sensor Networks |
| 3 | U20CCE508 | Data Warehousing and Data Mining |
| 4 | U20CCE509 | Computer Vision |
| 5 | U20CCE510 | Neural Networks and Fuzzy Logic |
| **Professional Elective – III (Offered in Semester VI)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U20CCE611 | Satellite Communication |
| 2 | U20CCE612 | Wireless Mobile Networking |
| 3 | U20CCE613 | Information Retrieval |
| 4 | U20CCE614 | Human Computer Interaction |
| 5 | U20CCE615 | Soft computing |
| **Professional Elective – IV (Offered in Semester VII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U20CCE716 | Orthogonal Frequency Division Multiplexing |
| 2 | U20CCE717 | Social Network |
| 3 | U20CCE718 | Big Data Analytics |
| 4 | U20CCE719 | Digital Image Processing |
| 5 | U20CCE720 | Green Computing |
| **Professional Elective – V (Offered in Semester VIII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U20CCE821 | Multiple Input Multiple Output Communication |
| 2 | U20CCE822 | Software Defined Networks |
| 3 | U20CCE823 | Information Security |
| 4 | U20CCE824 | Augmented and Virtual Reality |
| 5 | U20CCE825 | Deep Learning |
| **Professional Elective – VI (Offered in Semester VIII)** | | |
| **Sl. No.** | **Course Code** | **Course Title** |
| 1 | U20CCE826 | Millimeter Wave Personal Communication Systems |
| 2 | U20CCE827 | Next Generation Telecom Networks |
| 3 | U20CCE828 | MobileApp Development |

| | | |
|---|---|---|
| 4 | U20CCE829 | Pattern Recognition |
| 5 | U20CCE830 | Software Project Management |

## Annexure – II

## OPEN ELECTIVE COURSES

| S.No | Course Code | Course Title | Offering Department | Permitted Departments |
|---|---|---|---|---|
| **Open Elective – I (Offered in Semester IV)** | | | | |
| 1 | U20EEO401 | Solar Photovoltaic Fundamental and applications | EEE | ECE, ICE, MECH, CIVIL, Mechatronics, CCE |
| 2 | U20EEO402 | Electrical Safety | EEE | ECE, ICE, MECH, CIVIL, Mechatronics, CCE, BME, IT, CSE, FT |
| 3 | U20ECO401 | Engineering Computation with MATLAB | ECE | EEE, ICE, MECH, CIVIL, CCE, BME, AI&DS, Mechatronics |
| 4 | U20ECO402 | Consumer Electronics | ECE | EEE, ICE, CSE, MECH, IT, CIVIL, CCE, BME, Mechatronics, FT |
| 5 | U20CSO401 | Web Development | CSE | EEE, ECE, ICE, MECH, CIVIL, BME, Mechatronics |
| 6 | U20CSO402 | Analysis of Algorithms | CSE | EEE, ECE, ICE, MECH, CIVIL, BME, Mechatronics |
| 7 | U20ITO401 | Database System: Design & Development | IT | EEE, ECE, ICE, CCE, BME |
| 8 | U20ITO402 | R programming | IT | EEE, ECE, ICE, CCE, BME, MECH, Mechatronics |
| 9 | U20ICO401 | Sensors and Transducers | ICE | ECE, CSE, IT, MECH, CIVIL, CCE, AI&DS, FT |
| 10 | U20ICO402 | Control System Engineering | ICE | CSE, IT, MECH, CCE, AI&DS |
| 11 | U20MEO401 | Rapid Prototyping | MECH | EEE, ECE, ICE, CIVIL, BME, FT |
| 12 | U20MEO402 | Material Handling System | MECH | EEE, ICE, CIVIL, Mechatronics |
| 13 | U20MEO403 | Industrial Engineering for Textile | MECH | FT |
| 14 | U20CEO401 | Energy and Environment | CIVIL | EEE, ECE, MECH, BME, IT, Mechatronics, FT |
| 15 | U20CEO402 | Building Science and Engineering | CIVIL | EEE, MECH, BME |
| 16 | U20BMO401 | Medical Electronics | BME | EEE, ECE, CSE, IT, ICE, CCE, MECH, Mechatronics, AI&DS |
| 17 | U20BMO402 | Telemedicine | BME | EEE, ECE, CSE, IT, ICE, CCE, AI&DS |
| 18 | U20CCO401 | Basic DBMS | CCE | EEE, ECE, MECH, CIVIL, ICE, Mechatronics, BME |

| | | | | |
|---|---|---|---|---|
| 19 | U20CCO402 | Introduction to Communication Systems | CCE | EEE, CSE, IT, MECH, CIVIL, ICE, Mechatronics |
| 20 | U20ADO401 | Knowledge Representation and Reasoning | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics |
| 21 | U20ADO402 | Introduction to Data Science | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics |
| **Open Elective – II / Open Elective – III** | | | | |
| 1 | U20HSO501/ U20HSO601 | Product Development and Design | MBA | **Common to B. Tech**<br>(Offered in Semester V for **EEE, ECE, ICE, CIVIL, BME, CCE, FT**)<br>(Offered in Semester VI for **CSE, IT, MECH, Mechatronics, AI&DS**) |
| 2 | U20HSO502/ U20HSO602 | Intellectual Property and Rights | MBA | |
| 3 | U20HSO503/ U20HSO603 | Marketing Management and Research | MBA | |
| 4 | U20HSO504/ U20HSO604 | Project Management for Engineers | MBA | |
| 5 | U20HSO505/ U20HSO605 | Finance for Engineers | MBA | |
| **Open Elective – II / Open Elective – III**<br>(Offered in Semester V for **CSE, IT, MECH, Mechatronics, AI&DS**)<br>(Offered in Semester VI for **EEE, ECE, ICE, CIVIL, BME, CCE, FT**) | | | | |
| 1 | U20EEO503/ U20EEO603 | Conventional and Non-Conventional Energy Sources | EEE | ECE, ICE, MECH, CIVIL, BME, Mechatronics, CCE, AI&DS, FT |
| 2 | U20EEO504/ U20EEO604 | Industrial Drives and Control | EEE | ECE, ICE, MECH, Mechatronics, AI&DS |
| 3 | U20ECO503/ U20ECO603 | Electronic Product Design and Packaging | ECE | EEE, CSE, IT, ICE, MECH, CCE, BME, Mechatronics |
| 4 | U20ECO504/ U20ECO604 | Automotive Electronics | ECE | EEE, ECE, ICE, MECH |
| 5 | U20CSO503/ U20CSO603 | Platform Technology | CSE | EEE, ECE, ICE, MECH, CIVIL, CCE, BME, AI&DS |
| 6 | U20CSO504/ U20CSO604 | Graphics Designing | CSE | EEE, ECE, ICE, MECH, CIVIL, BME, FT |
| 7 | U20ITO503/ U20ITO603 | Essentials of Data Science | IT | EEE, ECE, ICE, MECH, CIVIL, BME |
| 8 | U20ITO504/ U20ITO604 | Mobile App Development | IT | EEE, ECE, ICE, MECH, CIVIL, BME, Mechatronics, AI&DS |
| 9 | U20ICO503/ U20ICO603 | Fuzzy logic and neural networks | ICE | CSE, IT, CIVIL, BME, AI&DS |
| 10 | U20ICO504/ U20ICO604 | Measurement and Instrumentation | ICE | ECE, Mechatronics |
| 11 | U20MEO504/ U20MEO604 | Heating, ventilation and air conditioning system (HVAC) | MECH | EEE, ECE, ICE, CIVIL |
| 12 | U20MEO505/ U20MEO605 | Creativity Innovation and New Product Development | MECH | EEE, ECE, ICE, CIVIL, BME, Mechatronics |

| | | | | |
|---|---|---|---|---|
| 13 | U20CEO503/ U20CEO603 | Disaster Management | CIVIL | EEE, ECE, CSE, IT, ICE, MECH, BME, CCE, AI&DS, FT |
| 14 | U20CEO504/ U20CEO604 | Air Pollution and Solid Waste Management | CIVIL | EEE, ECE, CSE, IT, ICE, MECH, BME, CCE, AI&DS, FT |
| 15 | U20BMO503/ U20BMO603 | Biometric Systems | BME | EEE, ECE, CSE, IT, ICE, CCE, MECH, Mechatronics |
| 16 | U20BMO504/ U20BMO604 | Medical Robotics | BME | EEE, ECE, CSE, IT, ICE, CCE, MECH, CIVIL , Mechatronics |
| 17 | U20CCO503/ U20CCO603 | Network Essentials | CCE | EEE, MECH, CIVIL, ICE, Mechatronics, BME |
| 18 | U20CCO504/ U20CCO604 | Web Programming | CCE | EEE, ECE, MECH, CIVIL, ICE, Mechatronics, BME |
| 19 | U20ADO503/ U20ADO603 | Principle of Artificial Intelligence and Machine Learning | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE |
| 20 | U20ADO504/ U20ADO604 | Data science Application of Vision | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics |
| 21 | U20MCO501/ U20MCO601 | Industrial Automation for Textile | Mechatronics | FT |
| **Open Elective – IV (Offered in Semester VII)** | | | | |
| 1 | U20EEO705 | Hybrid and Electrical Vehicle | EEE | ECE, Mechatronics , MECH |
| 2 | U20EEO706 | Electrical Energy Conservation and auditing | EEE | ECE, ICE, MECH, CIVIL, BME, Mechatronics, CCE, AI&DS |
| 3 | U20ECO705 | IoT and its Applications | ECE | EEE, ICE, CSE, MECH, IT, CIVIL, CCE, FT |
| 4 | U20ECO706 | Cellular and Mobile Communications | ECE | EEE, ICE, CSE, MECH, IT, CIVIL, CCE, BME, Mechatronics |
| 5 | U20CSO705 | Artificial Intelligence | CSE | EEE, ICE, CIVIL, CCE, MECH, FT |
| 6 | U20CSO706 | Cloud Technology and its Applications | CSE | EEE, ICE, MECH, CIVIL, CCE, BME, Mechatronics |
| 7 | U20ITO705 | Automation Techniques & Tools- DevOps | IT | EEE, ECE, ICE, CSE, MECH, CIVIL, CCE, BME, Mechatronics, AI&DS |
| 8 | U20ITO706 | Augmented and Virtual Reality | IT | EEE, ICE, MECH, CIVIL, CCE, BME, AI&DS |
| 9 | U20ICO705 | Process Automation | ICE | EEE, ECE, CSE, MECH, IT, CIVIL, CCE, BME, Mechatronics |
| 10 | U20ICO706 | Virtual Instrumentation | ICE | EEE, ECE, MECH, Mechatronics |
| 11 | U20MEO706 | Principles of Hydraulic and Pneumatic System | MECH | EEE, ECE, ICE, CIVIL |

| | | | | |
|---|---|---|---|---|
| 12 | U20MEO707 | Supply Chain Management | MECH | EEE, ECE, CIVIL, Mechatronics |
| 13 | U20CEO705 | Energy Efficient Buildings | CIVIL | EEE, ECE, MECH |
| 14 | U20CEO706 | Global Warming and Climate Change | CIVIL | EEE, ECE, CSE, IT, ICE, MECH, BME, CCE, AI&DS, FT |
| 15 | U20MCO702 | Building Automation | Mechatronics | MECH, CIVIL |
| 16 | U20MCO703 | Automation in Manufacturing Systems | Mechatronics | MECH, CIVIL |
| 17 | U20BMO705 | Internet of Things for Healthcare | BME | EEE, ECE, ICE, CCE |
| 18 | U20BMO706 | Telehealth Technology | BME | EEE, ECE, ICE, CCE |
| 19 | U20CCO705 | Data Science using python | CCE | EEE, ECE, MECH, CIVIL, ICE, Mechatronics, BME |
| 20 | U20CCO706 | Mobile Applications Development using Android | CCE | EEE, ECE, MECH, CIVIL, ICE, Mechatronics, BME |
| 21 | U20ADO705 | Data Science Application of NLP | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME, Mechatronics. |
| 22 | U20ADO706 | Artificial Intelligence Applications | AI&DS | EEE, ECE, CSE, IT, ICE, MECH, CIVIL, CCE, BME |
| 23 | U20HSO706 | Industrial Safety and Human Resource Management | MBA | FT |
| 24 | U20HSO707 | Operation Research in Textile Industry | MBA | FT |
| 25 | U20HSO708 | Global marketing and Sourcing Strategies | MBA | FT |
| 26 | U20HSO709 | Fashion Advertising and sales promotions | MBA | FT |
| 27 | U20HSO710 | Luxury Brand management | MBA | FT |
| 28 | U20HSO711 | Fashion Retail Store Operations | MBA | FT |

## Annexure – III

## EMPLOYABILITY ENHANCEMENT COURSES – (A). CERTIFICATION COURSES

| Sl. No. | Course Code | Course Title |
|---|---|---|
| 1 | U20XXCX01 | 3ds Max |
| 2 | U20XXCX02 | Advance Structural Analysis of Building using Etabs |
| 3 | U20XXCX03 | Advanced Java Programming |
| 4 | U20XXCX04 | Advanced Python Programming |
| 5 | U20XXCX05 | Analog System Lab Kit |
| 6 | U20XXCX06 | Android Medical app development |
| 7 | U20XXCX07 | Android Programming |
| 8 | U20XXCX08 | Ansys -Multiphysics |
| 9 | U20XXCX09 | Artificial Intelligence |
| 10 | U20XXCX10 | Artificial Intelligence And Edge Computing |
| 11 | U20XXCX11 | Artificial Intelligence in Medicines |
| 12 | U20XXCX12 | AutoCAD For Architecture |
| 13 | U20XXCX13 | AutoCAD for Civil |
| 14 | U20XXCX14 | AutoCAD for Electrical |
| 15 | U20XXCX15 | AutoCAD for Mechanical |
| 16 | U20XXCX16 | Azure DevOps |
| 17 | U20XXCX17 | Basic Course on EPlan |
| 18 | U20XXCX18 | Basic Electro Pneumatics |
| 19 | U20XXCX19 | Basic Hydraulics |
| 20 | U20XXCX20 | Bio signal and Image processing development system |
| 21 | U20XXCX21 | Blockchain |
| 22 | U20XXCX22 | Bridge Analysis |
| 23 | U20XXCX23 | Building Analysis and construction Management |
| 24 | U20XXCX24 | Building Design & Analysis Using AECO sim Building Designer |
| 25 | U20XXCX25 | CATIA |
| 26 | U20XXCX26 | CCNA (Routing and Switching) |
| 27 | U20XXCX27 | CCNA (Wireless) |
| 28 | U20XXCX28 | Cloud Computing |
| 29 | U20XXCX29 | Computer Programming for Medical Equipments |
| 30 | U20XXCX30 | Corel Draw |
| 31 | U20XXCX31 | Creo (Modeling and Simulation) |
| 32 | U20XXCX32 | Cyber Security |
| 33 | U20XXCX33 | Data Science and Data Analytics |
| 34 | U20XXCX34 | Data Science using Python |
| 35 | U20XXCX35 | Data Science Using R |
| 36 | U20XXCX36 | Deep Learning |

| | | |
|---|---|---|
| 37 | U20XXCX37 | Design & Documentation Using Eplan Electric P8 |
| 38 | U20XXCX38 | Design of Biomedical Devices and systems |
| 39 | U20XXCX39 | Digital Marketing |
| 40 | U20XXCX40 | Digital Signal Processing Development System |
| 41 | U20XXCX41 | Digsilent Power Factory |
| 42 | U20XXCX42 | Electro Hydraulic Automation With PLC |
| 43 | U20XXCX43 | Embedded System Using Arduino |
| 44 | U20XXCX44 | Embedded System Using C |
| 45 | U20XXCX45 | Embedded System With IoT |
| 46 | U20XXCX46 | Eplan Data Portal |
| 47 | U20XXCX47 | E-Plan Electric P8 |
| 48 | U20XXCX48 | Eplan Fluid |
| 49 | U20XXCX49 | Eplan PPE |
| 50 | U20XXCX50 | Fusion 360 |
| 51 | U20XXCX51 | Fuzzy logic and neural networks |
| 52 | U20XXCX52 | Google Analytics |
| 53 | U20XXCX53 | Hydraulic Automation |
| 54 | U20XXCX54 | Industrial Automation |
| 55 | U20XXCX55 | Industry 4.0 |
| 56 | U20XXCX56 | Internet of Things |
| 57 | U20XXCX57 | Introduction to C Programming |
| 58 | U20XXCX58 | Introduction to C++ Programming |
| 59 | U20XXCX59 | IoT using Python |
| 60 | U20XXCX60 | Java Programming |
| 61 | U20XXCX61 | Machine Learning |
| 62 | U20XXCX62 | Machine Learning and Deep Learning |
| 63 | U20XXCX63 | Machine Learning for Medical Diagnosis |
| 64 | U20XXCX64 | Mechatronics |
| 65 | U20XXCX65 | Medical Robotics |
| 66 | U20XXCX66 | Microsoft Dynamics 365 ERP for HR , Marketing and Finance |
| 67 | U20XXCX67 | Mobile Edge Computing |
| 68 | U20XXCX68 | Modeling and Visualization Using Micro station |
| 69 | U20XXCX69 | MX Road |
| 70 | U20XXCX70 | Photoshop |
| 71 | U20XXCX71 | PLC |
| 72 | U20XXCX72 | Pneumatics Automation |
| 73 | U20XXCX73 | Project Management |
| 74 | U20XXCX74 | Python Programming |
| 75 | U20XXCX75 | Revit Architecture |
| 76 | U20XXCX76 | Revit Inventor |
| 77 | U20XXCX77 | Revit MEP |
| 78 | U20XXCX78 | Robotics |
| 79 | U20XXCX79 | Search Engine Optimization |
| 80 | U20XXCX80 | Software Testing |
| 81 | U20XXCX81 | Solar and Smart Energy System with IOT |
| 82 | U20XXCX82 | Solid Works |

| | | |
|---|---|---|
| 83 | U20XXCX83 | Solid works with Electrical Schematics |
| 84 | U20XXCX84 | Speech Processing |
| 85 | U20XXCX85 | STAAD PRO V8i |
| 86 | U20XXCX86 | Structural Design & Analysis using Bentley |
| 87 | U20XXCX87 | Total Station |
| 88 | U20XXCX88 | Video and Image Processing Development System |
| 89 | U20XXCX89 | VLSI Design |
| 90 | U20XXCX90 | Web Programming -I |
| 91 | U20XXCX91 | Web Programming-II |

## Annexure – IV

## EMPLOYABILITY ENHANCEMENT COURSES – (B). SKILL DEVELOPMENT COURSES

| Sl. No | Course Code | Course Title |
|---|---|---|
| 1 | U20CCS201 | Skill Development Course 1 : Demonstration of Workshop |
| 2 | U20CCS302 | Skill Development Course 2 * |
| | | 1)Computer on Office Automation |
| | | 2)Computer Graphics |
| 3 | U20CCS403 | Skill Development Course 3 * |
| | | 1)Computer Hardware Trouble Shooting |
| | | 2)Mobile Servicing |
| 4 | U20CCS504 | Skill Development Course 4 : Foreign Language/ IELTS -I |
| 5 | U20CCS505 | Skill Development Course 5 : Presentation Skills using ICT |
| 6 | U20CCS606 | Skill Development Course 6 : Foreign Language/ IELTS - II |
| 7 | U20CCS607 | Skill Development Course 7 : Technical Seminar |
| 8 | U20CCS608 | Skill Development Course 8 : NPTEL / MOOC - I |
| 9 | U20CCS809 | Skill Development Course 9 : NPTEL / MOOC-II |

**** Any one course to be selected from the list***

| | | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| U20BST101 | **ENGINEERING MATHEMATICS-I CALCULUS AND LINEAR ALGEBRA** (Common to all branches except CSBS) | 2 | 2 | 0 | 3 | 60 |

## Course Objectives

- To familiarize the concept of matrices.
- To introduce mathematical tools to solve first order differential equations.
- To learn linear differential equations of higher order with constant coefficients.
- To understand the concept of partial differentiation.
- To introduce the concepts of curl, divergence and integration of vectors in vector calculus.

## Course Outcomes

*After completion of the course, the students will be able to*

**CO1** – Able to Understand the Eigen values and Eigen vectors, diagonalization of a matrix.**(K2)**

**CO2** - Solve differential equations.**(K3)**

**CO3** - Solve higher order differential equations. **(K3)**

**CO4** - Solve different types of partial differential equation. **(K3)**

**CO5** - Understand the use of vector calculus.**(K2)**

## UNIT-I MATRICES (12 Hrs)

Rank of a Matrix- Consistency of system of equations. Eigen values and Eigen vectors of a real matrix - Characteristic equation - Properties of Eigen values and Eigen vectors. Cayley-Hamilton Theorem - Diagonalization of matrices.

## UNIT – II DIFFERENTIAL EQUATIONS (12 Hrs)

Exact equations, First order linear equations, Bernoulli's equation, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

## UNIT – III DIFFERENTIAL EQUATIONS (HIGHER ORDER) (12 Hrs)

Linear differential equations of higher order with constant coefficients, the operator D, Euler's linear equation of higher order with variable coefficients, Solution by variation of parameter method.

## UNIT – IV PARTIAL DIFFERENTIAL EQUATIONS (12 Hrs)

Partial derivatives, Total derivatives, Differentiation of implicit functions, Maxima and Minima of two variables. Partial differential equations of higher order with constant coefficients.

## UNIT – V VECTOR CALCULUS (12 Hrs)

Gradient, divergence and curl - Directional derivative- Irrotational and Solenoidal vector fields - Gauss Divergence Theorem and Stoke's Theorem.

## Text Books


1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, Tenth edition, 2019
2. B.V.Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi, Sixth edition 2018.
3. N.P. Bali and Manish Goyal, "A Text Book of Engineering Mathematics", Lakshmi Publications, New Delhi, Ninth Edition, 2018


## Reference Books


1. C W. Evans, "Engineering Mathematics", A Programmed Approach, 3th Edition, 2019
2. Singaravelu. A., "Engineering Mathematics - I", Meenakshi publications, Tamil Nadu, 2019
3. M.K. Venkataraman, "Engineering Mathematics (Third Year-Part A)", The National Publishing Company, Madras, 2016.
4. S. Narayanan," Differential Equations and Its Applications", Viswanathan, S., Printers & Publishers Pvt Ltd , 2009
5. Dr.G Balaji., " Engineering Mathematics-I", G.Balaji publishers, 2017

## Web References

1. http://www.yorku.ca/yaoguo/math1025/slides/chapter/kuttler-linearalgebra–slides-systemsofquation-handout.pdf
2. http://www.math.cum.edu/~wn0g/2ch6a.pdf
3. https://nptel.ac.in/courses/122/104/122104017/
4. .https://nptel.ac.in/courses/111/106/111106051/
5. https://nptel.ac.in/courses/111/108/111108081/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **1** | 2 | 1 | - | - | - | 1 | 1 | - | - | - | - | 1 | 3 | 2 | 2 |
| **2** | 3 | 2 | 1 | 1 | -- | 1 | 1 | - | - | - | - | 1 | 3 | 2 | 2 |
| **3** | 3 | 2 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 3 | 2 | 2 |
| **4** | 3 | 2 | 1 | 1 | - | 1 | 1 | - | - | - | - | 1 | 3 | 2 | 2 |
| **5** | 2 | 1 | - | - | - | - | 1 | - | - | - | - | 1 | 3 | 2 | 2 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20EST122 | ELEMENTS OF ENGINEERING | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

**Course Objectives**

- To understand the basics of Engineering Disciplines and Design concepts
- To understand the various strategies used in solution design.
- To understand about the testing, product evaluation and report writing
- To know about the project management skills ethics in project development
- To understand about ethics in project development

**Course Outcomes**

*After completion of the course, the students will be able to*

**CO1** - Explain technological and engineering development, change and impacts of engineering(**K2**)
**CO2** - Define a problem, list criteria and constraints, brainstorm potential solutions and document the ideas. (**K1, K3**)
**CO3** - Communicate possible solutions through drawings, testing and prepare project report(**K3**)
**CO4** - Use project management skills and ethics in doing projects(**K3**)
**CO5** - Explore ethics in engineering. (**K3**)

**UNITIINTRODUCTION TO ENGINEERING** **(9 Hrs)**

Engineering: Engineering Defined - Careers in Engineering Fields - Engineering Disciplines Engineering as a Profession: Functions of Engineers – Teamwork - Engineering Profession - Engineering Impacts- Future of Engineering
Engineering Design: Engineering Design - Engineering Design Process - Engineering Notebooks

**UNIT II PROBLEMS AND BRAINSTORMING** **(9 Hrs)**

Defining Problems and Brainstorming: Defining the Problem – Brainstorming - Initial Outcomes Researching Designs: Sketches - Researching Ideas -Trade-offs - Selecting the Best Approach

**UNIT III COMMUNICATION SOLUTONS** **(9 Hrs)**

Communicating Solutions: Engineering Drawings - Working Drawings - Drawing Classifications - Drawing Guidelines - and Industry Guidelines. Modeling -Testing and Final Outputs : Modeling - Testing - Predictive Analysis – Testing - Engineering Economics - Final Outputs - Design Improvement - final Project Report

**UNIT IV PROJECT MANAGEMENT** **(9 Hrs)**

Project Management: Introduction to Agile Practices - Significance of team work - Importance of communication in engineering profession - project Management tools: Checklist – timeline - Gantt chart - Significance of Documentation

**UNIT V ENGINEERING ETHICS** **(9 Hrs)**

Engineering Ethics: Introduction to ethics – Identifying engineering as a profession - code of conduct for engineers – Risk - safety and Accidents - Rights and Responsibilities of Engineers - Ethical Issues in Engineering Practice.

## Text Books

1. Ryan A.Brown, Joshua W.Brown and Michael Berkihiser: "Engineering Fundamentals: Design, Principles, and Careers", Goodheart-Willcox Publisher, Second Edition, 2018.
2. Charles D.Fleddermann, "Engineering Ethics",Fourth Edition, Pearson, education New Mexico, 2014.
3. Brian Tracy, " Creativity & Problem Solving ", Manjul Publishing House, 2018

## Reference Books

1. Saeed Moaveni ,"Engineering Fundamentals: An Introduction to Engineering", Cengage learning, Fourth Edition, 2011.
2. Mike W. Martin, Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2005
3. Joep Cornelissen, " Corporate Communication, A Guide to theory and Practice", 3rd edition, SAGE Publications Ltd., 2011
4. Clifford F.Gray, Erik W.Larson, Gautam V.Desai, "Project Management: The Managerial Process", 6th edition, McGraw Hill Education, 2017
5. P. Gopalakrishnan & V E Ramamoorthy, " Textbook of Project Management", Laxmi Publications, 2014

## Web References

1. https://nptel.ac.in/courses/110106124/
2. https://www.open.edu/openlearn/science-maths-technology/introducing-engineering/content-section-0?active-tab=description-tab
3. https://www.edx.org/micromasters/ritx-project-management
4. https://pdhonline.com/courses/r102/r102_new.htm
5. https://www.coursera.org/learn/ethics-technology-engineering

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | - | 1 | - | - | 1 | - | - | 1 | - | - | 1 | 1 | - | - |
| 2 | 2 | 2 | 1 | - | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 3 | 2 | - | 1 | - | - | 1 | - | - | - | 2 | - | 1 | 1 | - | - |
| 4 | 2 | - | 1 | - | - | 1 | - | - | 2 | 1 | 2 | 1 | 1 | - | - |
| 5 | 2 | - | 1 | - | - | 1 | - | 2 | - | - | - | 2 | 1 | - | - |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20EST110 | PROGRAMMING IN PYTHON<br>(Common to CSE, IT, CCE and FT) | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

**Course Objectives**

- To acquire programming skill in core python.
- To learn the basic Syntax and Semantics of Python Programming.
- To learn how to design python program and applications.
- To acquire object oriented skills in python.
- To develop the skill of designing applications using modules and packages

**Course Outcomes**

*After completion of the course, the students will be able to*

**CO1** - Define the structure and components of a python program. **(K1)**

**CO2** - Illustrate the concepts of Python decision statements.**(K3)**

**CO3** - Interpret the use of loops and functions to facilitate code reuse.**(K3)**

**CO4** - Use list, tuple, Set and dictionary in python program.**(K3)**

**CO5** - Read/ write data from/to files and structure a program using Exceptions and Modules.**(K3)**

**UNIT I INTRODUCTION TO PYTHON PROGRAMMINGLANGUAGE (9 Hrs)**

Introduction to Python Language- Strengths and Weaknesses- IDLE- Visual Source Code - Arithmetic Operators – Arithmetic Expressions - Dynamic Types- Naming Conventions- String Values- String Operations- String Slices - String Operators -Numeric Data Types-Conversions.

**UNIT II DECISION MAKING (9 Hrs)**

Control Flow: Introduction - Control Flow and Syntax – Indenting - Relational Operators – Relational Expressions - Logical – Operators – Logical Expressions - The if Statement – if else – elif – Nested.

**UNIT III LOOPING (9 Hrs)**

Loop: The while Loop -break and continue – nested while Loop - the for Loop – Nested for Loop. Functions: parameters - return values - local and global scope - function composition – recursion and lambda functions

**UNITIV LIST, TUPLE,SETS, DICTIONARY, ARRAYS (9 Hrs)**

Lists: list operations - list slices - list methods - list loop – mutability –aliasing - cloning lists - list parameters - Tuples: tuple assignment - tuple as return value - advanced list processing – list comprehension – sets-Dictionaries: operations and methods - Arrays.

**UNIT V FILES, EXCEPTIONS, MODULES,ANDPACKAGE (9 Hrs)**

Built In Functions -Files and exception: text files - reading and writing files - format operator - command line arguments -errors and exceptions -handling exceptions -modules-standard modules - packages- Bit Wise Operators.

**Text Books**

1. Martin C Brown, Python The Complete Reference, McGraw-Hill Education – Europe, 4th Edition,2018
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016(http://greenteapress.com/wp/thinkpython/).
3. Reema Thareja, "Python Programming Using Problem Solving Approach", ISBN: 9780199480173, Publisher: Oxford University Press; First edition,2017.

**Reference Books**

1. Ben Stephenson, The Python Workbook A Brief Introduction with Exercises and Solutions, Springer International Publishing Switzerland 2014
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter- disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015

4. John V Guttag, "Introduction to Computation and Programming Using Python", MIT Press, Revised and expanded Edition,2013.
5. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2013.

## Web References

1. https://www.learnpython.org/
2. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
3. https://www.codecademy.com/learn/learn-python
4. https://nptel.ac.in/courses/106/106/106106182/
5. https://www.coursera.org/learn/python-programming-introduction

## COs/POs/PSOs Mapping

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 2 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 3 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 4 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 5 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20EST109 | PROBLEM SOLVING APPROACH<br>(Common to CSE, IT and CCE) | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

**Course Objectives**

- To identify the key concepts of computational thinking and problem solving.
- To know the basics of algorithm and data organization.
- To understand the fundamental algorithms and factoring methods.
- To know the basic concepts of array and problem solving techniques.
- To familiarize the concepts of text processing, pattern searching and recursive algorithms.

**Course Outcome**

*After completion of the course, the students will be able to*

**CO1** - Explain the basic concepts of computational thinking and problem solving.**(K2)**
**CO2** - Explain basic concepts of algorithm and data organization.**(K2)**
**CO3** - Illustrate algorithmic solution to problem solving.**(K3)**
**CO4** - Explain the concepts of array, merging, sorting & searching.**(K2)**
**CO5** - Implement recursive algorithm to solve problems.**(K3)**

**UNIT I INTRODUCTION** **(9 Hrs)**

Computational Thinking - Information and Data - Converting Information into Data -Data Capacity - Data Types & Encoding - Logic-Solving Problems- Limits of Computation- pseudocode & flow chart

**UNIT II ALGORITHMIC THINKING AND DATA ORGANIZATION** **(9 Hrs)**

Algorithmic thinking: Algorithms – Software and Programming Languages - Actions. Data organization: Name list, Graph hierarchies - spread sheets -text processing – patterns-solutions in pseudocode & flow chart.

**UNIT III FUNDAMENTAL ALGORITHMS AND FACTORING METHOD** **(9 Hrs)**

Fundamental Algorithms: Exchanging - Counting – Summing - Factorial computation – Fibonacci sequence - Reversing the digit-base conversion - character to number conversion. Factoring Methods: Finding square root - greatest common divisor - prime number - prime factor - pseudo random number - raising to large power - computing nth Fibonacci number-solutions in pseudocode & flow chart.

**UNIT IV ARRAY, MERGING, SORTING AND SEARCHING** **(9 Hrs)**

Array Techniques: Introduction - array order reversal - array counting or histogramming – maximum and minimum of a set - removal of duplicate – partitioning - longest monotone. Merging Sorting and Searching: Two way merge - sorting by selection, insertion, exchanging, diminishing, increment, partitioning. Searching: binary – hashing-solutions in pseudocode & flow chart.

**UNIT V TEXT PROCESSING, PATTERN SEARCHING AND RECURSIVE ALGORITHM** **(9 Hrs)**

Key word searching - Text line adjustment - Linear pattern search - Sub linear pattern search. Recursion: Binary tree traversal - Recursive quick sort - Towers of Hanoi - Sample generation - Combination generation - Permutation generation-Solutions in pseudocode & flow chart.

**Text Books**

1. David Riley and Kenny Hunt, "Computational Thinking for Modern Problem Solver", Chapman & Hall / CRC Textbooks in Computing, 2014
2. R. G.Dromey, "How to solve it by Computer", PHI, 2008.

3. Vickers Paul, "How to Think like a Programmer: Problem Solving for the Bewildered", Cengage Learning EMEA, 2008.

## Reference Books

1. Kathryn Rentz, Paula Lentz, "A Problem-solving Approach ", McGraw-Hill Education, 2018.
2. Don McAdam, Roger Winn," A Problem-Solving Approach", Prentice Hall Canada; 2nd Edition, 2017.
3. V. Anton Spraul, "Think Like a Programmer: An Introduction to Creative Problem Solving", Cengage
Learning EMEA, 2012.
4. Sham Tickoo "A Problem-solving Approach", Delmar/Cengage Learning, 2009.
5. Harold Abelson & Gerald Jay Sussman, "Structure and Interpretation of Computer Programs", McGraw- HillBook Company, 1997.

## Web References

1. https://www.edx.org/learn/problem-solving
2. https://www.lynda.com/Business-Skills-tutorials/Problem-Solving-Techniques/553700-2.html
3. https://www.classcentral.com/course/problem-solving-skills-6687
4. https://www.coursera.org/learn/problem-solving
5. http://www.sso.sy/sites/default/files/competitive%20programming%203_1.pdf

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| 1 | 2 | 1 | - | - | 1 | - | - | - | 1 | - | - | 1 | 1 | 1 | 2 |
| 2 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | 1 | 1 | 1 | 2 |
| 3 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | 1 | 1 | 1 | 2 |
| 4 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | 1 | 1 | 1 | 2 |
| 5 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | 1 | 1 | 1 | 2 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20EST123 | BASICS OF ELECTRONICS ENGINEERING | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

**Course Objectives**

- To introduce fundamental concepts, various laws and principles associated with electrical circuits and its analysis.
- To provide knowledge about the various factors in AC circuits and resonance condition.
- To provide the basic knowledge in semiconductor devices and its application
- To provide knowledge on semiconductor transistor
- To understand the purpose of communication and acquire knowledge on different communication systems.

**Course Outcomes**

*After completion of the course, the students will be able to*

**CO1**- Use basic concepts, various laws and theorems to solve DC circuits.(**K3**)
**CO2**- Solve the AC circuits and develop resonance circuits.(**K3**)
**CO3** - Explain the importance of semiconductor devices and its applications.(**K2**)
**CO4**- Describe the working of transistor and its application.(**K2**)
**CO5** - Paraphrase different Communication Systems. (**K2**)

**UNIT I D.C CIRCUITS AND NETWORK THEOREMS (9 Hrs)**

Concept of Potential difference, voltage, current, work, Power, Energy, Electric networks, voltage source and current sources, linear passive and active elements, current-voltage relation, ideal and practical sources, Kirchhoff-s laws and applications to network solutions using mesh and nodal analysis, Simplifications of networks using series-parallel, Network Theorem – Superposition, Thevenin's, Norton's and Maximum Power Transfer.

**UNIT II AC CIRCUITS (9 Hrs)**

AC waveform- definitions, form factor, peak factor, study of R-L, R-C,RLC series circuit, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, Resonance in series circuits, bandwidth and quality factors

**UNIT - III SEMICONDUCTOR DIODES AND APPLICATIONS (9 Hrs)**

Introduction semiconductor materials-Doping-Intrinsic and Extrinsic Semiconductor –PN junction diode, structure, characteristics-diffusion and depletion capacitance-clipper,Rectifier, Half wave and Full wave rectifier-zener diode characteristics-zener diode as regulator –Light Emitting Diode(LED)photo diode-Solar Panel

**UNIT - IV TRANSISTORS (9 Hrs)**

Bipolar Junction Transistor-construction-operation-Common Base, Common Emitter, Common collector Configuration-characteristics- -Junction Field Effect Transistor(JFET), Metal oxide semiconductor Field Effect Transistor, MOSFET operation characteristics-Numerical applications

**UNIT V - COMMUNICATION SYSTEMS (9 Hrs)**

Need for Modulation – Block diagram of analog communication System - AM, FM, PM Definitions and Waveforms – Comparison of digital and analog communication system- Block diagram of digital communication system – Electromagnetic Spectrum. Wired and wireless Channel – Block diagram of communication systems – satellite communication – Cellular Mobile Communication – Fibre Optical Communication System.

**Text Books**

1. Edward Hughes, John Hiley, Keith Brown, Ian McKenzie Smith, "Electrical and Electronics Technology", Pearson Education Limited, New Delhi, 2010.

2. Sudhakar.A and Shyam Mohan.S.P, "Circuits and Networks Analysis and Synthesis", Tata McGraw Hill Publishing Company Ltd., New Delhi, 4th edition, 2010.
3. Wayne Tomasi, "Electronic Communication Systems- Fundamentals Theory Advanced", Fourth Edition, Pearson Education, 2001.

## Reference Books

1. 'Kothari D P and Nagrath I J, "Basic Electrical Engineering", Tata McGraw Hill, 2009.
2. S.K. Sahdev, "Fundamentals of Electrical Engineering and Electronics", Dhanpat Rai & Co, 2013.
3. R.L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", PHI Learning Private Limited, Ninth Edition, 2008
4. David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education Press, 5th Edition, 2010
5. R.S.Sedha, "Applied Electronics", S.Chand& co, 2000

## Web References

1. http://www.electronics-tutorials.ws
2. http://www.eeweb.com/articles
3. https://onlinecourses.nptel.ac.in/noc20_ee16/preview
4. https://alison.com/course/introduction-to-network-theorems
5. https://www.classcentral.com/course/transistor-field-effect-transistor-bipol-12135

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 3 | 1 | 2 | - | - | - | - | - | - | - | 1 | 1 | - | - |
| 2 | 2 | 3 | 1 | 2 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 3 | 2 | 1 | 2 | - | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 4 | 2 | 1 | 2 | - | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 5 | 2 | 1 | - | - | - | - | - | - | - | - | - | 1 | 1 | 1 | - |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20ESP124 | BASIC ELECTRONICS ENGINEERING LABORATORY | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 | 30 |

## Course Objectives

- To understand the basic electrical tools and accessories.
- To study electronic components and equipments.
- To study VI characteristics of Diodes
- To study application of diode
- To understand Input and output characteristics of Transistors

## Course Outcome

*After completion of the course, the students will be able to*

**CO 1**-Utilize specific tools and accessories for electrical wiring(**K3**)
**CO2**-Describe characteristics of semiconductor diode and utilize it for different applications(**K3**)
**CO 3**-Impart characteristics of transistor for various applications(**K4**)
**CO 4**-Construct and verify application of diodes(**K4**)
**CO 5**-Verify Kichoff's law(**K4**)

## LIST OF EXPERIMENTS

1. Electrical Safety, Precautions, study of tools and accessories
2. Study of Electronic components and equipments: Resistor, Capacitor
3. Measurement of AC signal parameter (Peak-Peak, rms period, frequency) using CRO.
4. Soldering Practice: Soldering Components Devices and Circuits Using general purpose PCB.
5. VI Characteristics of PN junction diode, Zener diode
6. Input and output characteristics of Common Emitter configuration of BJT
7. Characteristics of JFET
8. Characteristics of MOSFET
9. VI characteristics of LED and Photo diode
10. Study of clipper circuits
11. Measurement of Ripple factor of HWR
12. Determine the voltage and current in given circuits using Kirchoff"s laws theoretically and verify the laws experimentally

## Reference Books

1. 'Kothari D P and Nagrath I J, "Basic Electrical Engineering", Tata McGraw Hill, 2009.
2. S.K. Sahdev, "Fundamentals of Electrical Engineering and Electronics", Dhanpat Rai & Co, 2013.
3. R.L. Boylestad and L. Nashelsky, "Electronic Devices and Circuit Theory", PHI Learning Private Limited, Ninth Edition, 2008
4. David A. Bell, "Electronic Devices and Circuits", Oxford Higher Education Press, 5th Edition, 2010
5. R.S.Sedha, "Applied Electronics", S.Chand& co, 2000

## Web References

1. http://www.electronics-tutorials.ws
2. http://www.eeweb.com/articles
3. https://onlinecourses.nptel.ac.in/noc20_ee16/preview
4. https://alison.com/course/introduction-to-network-theorems
5. https://www.classcentral.com/course/transistor-field-effect-transistor-bipol-12135

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| **1** | 3 | 1 | 2 | - | 1 | - | - | - | 2 | 1 | - | 2 | 1 | - | - |
| **2** | 3 | 1 | 2 | - | 1 | - | - | - | 2 | 1 | - | 2 | 1 | - | - |
| **3** | 3 | 1 | 2 | - | 1 | - | - | - | 2 | 1 | - | 2 | 1 | - | - |
| **4** | 3 | 1 | 2 | - | 1 | 2 | - | - | 2 | 1 | - | 2 | 1 | - | - |
| **5** | 3 | 2 | 2 | 1 | 1 | - | - | - | 2 | 1 | - | 2 | 1 | - | - |

Correlation Level: 1-Low, 2-Medium, 3- High

| | | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| U20ESP111 | **PROGRAMMING IN PYTHON LABORATORY** | 0 | 0 | 2 | 1 | 30 |

(Common to CSE, IT, CCE and FT)

## Course Objectives

- To acquire programming skill in core python.
- To learn how to design python program and applications.
- To acquire object oriented skills in python.
- To design and implement modules and packages.
- To develop the skill of designing applications.

## Course Outcomes

*After completion of the course, the students will be able to*

**CO1** - Examine Python syntax and semantics.**(K3)**
**CO2** - Demonstrate proficiency in handling Strings and File Systems.**(K3)**
**CO3** - Compile, run and manipulate Python Programs using core data structures.**(K3)**
**CO4**- Interpret the concepts of Object-Oriented Programming as used in Python.**(K3)**
**CO5**- Implement exemplary applications related to modules and packages in Python.**(K3)**

## LIST OF EXERCISES

1. Develop simple programs using python syntax and semantics.
2. Demonstrate python program using Arithmetic expressions.
3. Demonstrate python program using Strings.
4. Demonstrate python program using relational expressions.
5. Understand the decision making statement.
6. Illustrate Conditional statements with real time problems.
7. Write Python Functions to facilitate code reuse.
8. Basic python applications using List, Tuples, Sets.
9. Implementation of searching.
10. Implementation of sorting.
11. Implement python programs using Dictionaries
12. Illustrate file concepts with real time problems
13. Use Exception handling in python applications for error handling.
14. Implement simple applications using Modules
15. Implement simple applications using Packages
16. Develop Real time application like Number guessing, Dice rolling simulator, Mobile contacts, etc

## Reference Books

1. Ben Stephenson, "The Python Workbook A Brief Introduction with Exercises and Solutions", Springer International Publishing Switzerland 2014.
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd., 2016.
3. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.
4. Mark Lutz, "Programming Python", O'Reilly Media, Third Edition, 2006.
5. Wesley J Chun, "Core Python Applications Programming", Prentice Hall, Third Edition, 2012.

## Web References

1. https://www.learnpython.org/
2. https://pythonprogramming.net/introduction-learn-python-3-tutorials/
3. https://www.codecademy.com/learn/learn-python
4. https://nptel.ac.in/courses/106/106/106106182/
5. https://www.coursera.org/learn/python-programming-introduction

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 1 | - | - | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 2 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 3 | 2 | 1 | - | - | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 4 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |
| 5 | 3 | 2 | 1 | 1 | 1 | - | - | - | - | - | - | - | 3 | 3 | 2 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| | ENGINEERING GRAPHICS USING AUTOCAD | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| U20ESP112 | (Common to ECE, CSE, IT, ICE, CCE, Mechatronics, BME) | 0 | 0 | 2 | 1 | 30 |

## Course Objectives

- To understand the basic principles of engineering drawing
- To develop graphical skills using the concepts, ideas and design of engineering products
- To generate the pictorial views and development of surfaces
- To expose the technical existing national standards related to drawing
- To develop software skills for creating 2D and 3D models.

## Course Outcomes

*After completion of the course, the students will be able to*

**CO1** –Define the fundamentals and standards of engineering graphics. **(K2)**
**CO2**–Compare freehand sketching of basic geometrical constructions and multiple view of objects **(K3)**
**CO3** - Relate and draw orthographic projections of lines & plane surfaces and development of surfaces. **(K2)**
**CO4**–Sketch the isometric and perspective sections of simple solids. **(K3)**
**CO5**- Usage of software packages for drafting and modeling. **(K3)**

## LIST OF EXPERIMENTS

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc., and Dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-Dmodel.

**Note :** Plotting of drawings must be made for each exercise and attached to the records written by Students.

## Reference Books

1. James D. Bethune, "Engineering Graphics with AutoCAD A Spectrum book", 1st Edition, Macromedia Press, Pearson, 2020
2. NS Parthasarathy and Vela Murali, "Engineering Drawing", Oxford university press, 2015.
3. Bhatt N.D and Panchal V.M, Engineering Drawing: Plane and Solid Geometry, Charotar Publishing House, 2017.
4. Jeyapoovan T, Engineering Drawing and Graphics Using AutoCAD, 7th Edition, Vikas Publishing House Pvt Ltd., New Delhi, 2016
5. C M Agrawal, BasantAgrawal, "Engineering Graphics", McGraw Hill, 2012

## Web References

1. http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/egraphics_lab/labs/index.php
2. https://www.autodesk.com/solutions/technical-drawing

3. https://www.mbit.org/domain/44
4. https://dl.acm.org/doi/book/10.5555/580969
5. https://www.brooklinebooksmith.com/book/9781133960393

**COs/POs/PSOs Mapping**

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | 1 | 1 | 2 | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 2 | 2 | 1 | 1 | 1 | 2 | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 3 | 2 | 1 | 1 | 1 | 2 | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 4 | 2 | 1 | 1 | 1 | 2 | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 5 | 2 | 1 | 1 | 1 | 2 | - | - | - | - | - | 1 | 1 | 1 | - | - |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| | | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| U20CCC1XX | CERTIFICATION COURSES | 0 | 0 | 4 | - | 50 |

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

## U20CCM101 INDUCTION PROGRAM 3 Weeks

Induction program for students to be offered right at the start of the first year

| Duration of the Program | 3 Weeks |
|---|---|
| Induction program | • Physical Activity<br>• Creative Arts and Culture<br>• Mentoring and Universal Human Values<br>• Familiarization with College, Dept./Branch<br>• Literary Activity<br>• Proficiency Modules<br>• Lectures and Workshops by Eminent People<br>• Visits in Local Area<br>• Extra-Curricular Activities in College |

**1. Physical Activity**

This would involve a daily routine of physical activity with games and sports. There would be games in the evening or at other suitable times according to the local climate. These would help develop team work besides health. Each student could pick one game and learn it for the duration of the induction program and hopefully, continue with it later.

**2. Creative Arts**

Every student would chose one skill related to the arts whether visual arts or performing arts. Examples are painting, music, dance, pottery, sculpture etc. The student would pursue it every day for the duration of the program. These would allow for creative expression. It would develop a sense of aesthetics and also enhance creativity which would, hopefully, flow into engineering design later.

**3. Mentoring and Universal Human Values**

Mentoring and connecting the students with faculty members is the most important part of student induction. Mentoring takes place in the context and setting of Universal Human Values. It gets the student to explore oneself and experience the joy of learning, prepares one to stand up to peer pressure and take decisions with courage, be aware of relationships and be sensitive to others, understand the role of money in life and experience the feeling of prosperity. Need for character building has been underlined by many thinkers, universal human values provide the base. Methodology of teaching this content is extremely important. It must not be through do's and dont's, but by getting the students to explore and think by engaging them in a dialogue. It is best taught through group discussions and real life activities rather than lecturing. The role of group discussions, however, with clarity of thought of the teachers cannot be over emphasized. It is essential for giving exposure, guiding thoughts, and realizing values. The teachers must come from all the departments rather than only one department like HSS or from outside of the Institute. Experiments in this direction at IIT(BHU) are noteworthy and one can learn from them. Discussions would be conducted in small groups of about 20 students with a faculty mentor each. It is to open thinking towards the self. Universal Human Values discussions could even continue for rest of the semester as a normal course, and not stop with the induction program. Besides drawing the attention of the student to larger issues of life, it would build relationships between teachers and students which last for their entire 4-year stay and possibly beyond.

**4. Other Activity**

Activities that are not there on a daily basis, but are conducted for 3-4 days (typically in the afternoons) and change thereafter.

### 4.1. Familiarization with College, Department/Branch

The incoming students should be told about the credit and grading system, and about the examinations. They should be informed about how study in college differs from study in school. They should also be taken on a tour of the college and shown important points such as library, canteen, and other facilities. They should be shown their department, and told what it means to get into the branch or department. Describe what role the technology related to their department plays in society and after graduation what role the student would play in society as an engineer in that branch. A lecture by an alumnus of the Dept. would be very helpful in this regard. They should also be shown the laboratories, workshops and other facilities. The above should be done right in the first two days, and then over the afternoons thereafter, as appropriate.

### 4.2. Literary Activity

Literary activity would encompass reading a book, writing a summary, debating, enacting a play etc.

### 4.3. Proficiency Modules

The induction program period can be used to overcome some critical lacunas that students might have, for example, English, computer familiarity etc. These should run like crash courses, so that when normal courses start after the induction program, the student has overcome the lacunas substantially. We hope that problems arising due to lack of English skills, wherein students start lagging behind or failing in several subjects, for no fault of theirs, would, hopefully, become a thing of the past.

### 4.4. Lectures and Workshops by Eminent People

Lectures by eminent people should be organized, say, once a week. It would give the students exposure to people who are eminent, in industry or engineering, in social service, or in public life. Alumni could be invited as well. Motivational lectures about life, meditation, etc. by Ramakrishna Mission, Art of Living, Vivekanand Kendras, S-VYASA, etc. may be organized. Workshops which rejuvenate or bring relief to students would also be welcome, such as, Art of Living workshops (3 sessions, 9 hours).

### 4.5. Visits in Local Area

A couple of visits to the local landmarks including historical monuments should be organized. This would familiarize the students with the area together with bonding with each other, like in a picnic. Visits should also be organized to a hospital, orphanage or a village. These would expose them to people in suffering or to different lifestyles. This might also sensitize them to engineering needs in these areas.

### 4.6. Extra-Curricular Activities in College

The new students should be introduced to the extra-curricular activities at the college/university. They should be shown the facilities and informed about activities related to different clubs etc. This is when selected senior students involved in or leading these activities can give presentations, under faculty supervision.

| | | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| U20BST215 | ENGINEERNG MATHEMATICS – II MULTIPLE INTEGRALS AND TRANSFORMS (Common to all Branches except CSBS) | 2 | 2 | 0 | 3 | 60 |

## Course Objectives

- To develop logical thinking and analytic skills in evaluating multiple integrals.
- To equip themselves familiar with Laplace transform and solve the differential equations using Laplace transform techniques.
- To enable the students to expand functions into Fourier series using change of intervals.
- To gain good knowledge in application of Fourier transform.
- To inculcate the computational knowledge in Z-transforms.

## Course Outcomes

*After completion of the course, the students will be able to*

**CO1** - Understand the concept of double and triple integrals.**(K2)**
**CO2** - Find Laplace transform and inverse transform of simple functions.**(K3)**
**CO3** – Convert a periodic function into series form.**(K3)**
**CO4** - Compute Fourier transforms of various functions.**(K3)**
**CO5** - Solve difference equations using Z- transforms.**(K3)**

## UNIT I MULTIPLE INTEGRALS (12 Hrs)

Multiple Integrals, change of order of integration and change of variables in double integrals (Cartesian to polar). Applications: Areas by double integration and volumes by triple integration (Cartesian and polar).

## UNIT II LAPLACE TRANSFORMS AND INVERSE LAPLACE TRANSFORMS (12 Hrs)

Definition, Transforms of elementary functions, properties. Transform of derivatives and integrals. Multiplication by t and division by t. Transform of unit step function, transform of periodic functions. Initial and final value theorems, Methods for determining inverse Laplace Transforms, Convolution theorem, Application to differential equations and integral equations. Evaluation of integrals by Laplace transforms.

## UNIT III FOURIER SERIES (12 Hrs)

Dirichlet's conditions – General Fourier series – Expansion of periodic function into Fourier series – Fourier series for odd and even functions – Half-range Fourier cosine and sine series – Change of interval – Related problems.

## UNIT IV FOURIER TRANSFORMS (12 Hrs)

Fourier Integral theorem Fourier transform and its inverse, properties. Fourier sine and cosine transforms, their properties, Convolution and Parseval's identity.

## UNIT V Z - TRANSFORMS (12 Hrs)

Difference equations, basic definition, z-transform - definition, Standard z-transforms, Damping rule, Shifting rule, Initial value and final value theorems and problems, Inverse z-transform. Applications of z-transforms to solve difference equations.

## Text Books

1. Ravish R Singh and Mukul Bhatt, "Engineering Mathematics", Tata McGraw Hill, 1st Edition, New Delhi, 2016.
2. Sivaramakrishna Das P. and Vijayakumar C., "Engineering Mathematics", Pearsons, New Delhi, 2017.
3. M.D.Petale, "A text book on Z- Transforms (Engineering Mathematics)", Bames and Noble, New Edition, 2020.

## Reference Books

1. Dass .H.K, "Advanced Engineering Mathematics", S. Chand & co, New Delhi, 2019.
2. Bali N.P. and Dr. Manish Goyal, "Engineering Mathematics", Lakshmi Publications Pvt. Ltd., New Delhi, 9th Edition, 2015.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, New Delhi, 10th Edition. 2019.
4. Gupta .C.B, Shree Ram Singh, M. Kumar, "Engineering Mathematics for semester I & II", Tata McGraw Hill, New Delhi, 2015.
5. Ramana B.V.,"Higher Engineering Mathematics", Tata McGraw Hill, New Delhi 2018.

## Web References

1. https://nptel.ac.in/courses/111105121/
2. https://nptel.ac.in/courses/111105035/
3. https://nptel.ac.in/courses/111107119/
4. https://swayam.gov.in/nd1_noc20_ma17/preview
5. https://nptel.ac.in/courses/111/103/111103021/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| | 2 | 1 | - | - | - | - | - | - | - | 1 | 1 | 1 | 2 | 1 | - |
| | 3 | 2 | 1 | 1 | - | 1 | - | - | - | 1 | 1 | 1 | 2 | 1 | - |
| | 3 | 2 | 1 | 1 | - | 1 | - | - | - | 1 | 1 | 1 | 2 | 1 | -- |
| | 3 | 2 | 1 | 1 | - | 1 | - | - | - | 1 | 1 | 1 | 2 | 1 | - |
| | 3 | 2 | 1 | 1 | - | - | - | - | - | 1 | 1 | 1 | 2 | 1 | - |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| | PROGRAMMING IN C | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| U20EST201 | (Common to CSE, ECE, EEE, IT, ICE, MECH, CIVIL, BME, MECHTRONICS, CCE) | 3 | 0 | 0 | 3 | 45 |

**Course Objectives**

- To understand the Fundamentals of Computers and introduction to C language.
- To study about the programs using Control structures.
- To understand programs using looping and arrays.
- To understand the concepts of Functions and Pointers.
- To study about Structure, Union and File Management Operations in C.

**Course Outcomes**

*After completion of the course, the students will be able to*

**CO1** - Comprehend the basic constructs of C programming. **(K2)**

**CO2**- Illustrate the concepts of sequential, selection and repetition control structures in C program. **(K2)**

**CO3** - Implement simple programs using looping structure and arrays. **(K3)**

**CO4** - Demonstrate programs using Functions and Pointers. **(K3)**

**CO5**- Build programs using Structure, Union and understand the concept of File management Operations. **(K3)**

**UNIT I INTRODUCTION TO C** **(9 Hrs)**

C programming: Overview of C- Visual Studio code - Constants- Compiling a C Program -Variables and Data Types-Technical Difference between Keywords and Identifiers--Types of C Qualifiers and format specifies - Operators and Expressions-Operators Precedence-Type conversion-Input-Output Statements.

**UNIT II DECISION MAKING** **(9 Hrs)**

Decision making and branching- Relational operators – Logical operators- if – if else-if else if –nested if. Switch-case.

**UNIT III LOOPING AND ARRAYS** **(9 Hrs)**

Looping: while - do while – for – break – continue - nested loop. Arrays: One Dimensional Arrays-Two-Dimensional Arrays-Multi-Dimensional Array-Dynamic arrays-Character Arrays and String-Sorting - Searching.

**UNIT IV FUNCTIONS, POINTERS** **(9 Hrs)**

Functions: Introduction - Definition – Declaration – Categories of Functions - Nesting of Functions, Recursive functions - Passing Arrays to Functions - Strings – String library function. Pointers: Introduction - Declaring Pointer Variables - Initialization of Pointer Variables - Accessing the address of a variable - Accessing a variable thorough Pointer - Chain of Pointers - Pointer Expressions - Pointers and arrays – Pointers and functions – Call by Reference - Pointers and character strings - Array of Pointers - Pointers and Structures.

**UNIT V STRUCTURES AND UNIONS, FILE MANAGEMENT** **(9 Hrs)**

User defined data types: Introduction – Structure: definition - declaration - Arrays of Structures – Nested structures – Passing structures to functions — Union - Enumeration and Typedef. Introduction to File Handling in C, Input and Output operations on a file – Error Handling - Random access to files – command line arguments. Introduction to pre-processor – Macro substitution directives – File inclusion directives –conditional compilation directives – Miscellaneous directives.

**Text Books**

1. E.Balagurusamy, "Programming in ANSI C", Tata McGraw Hill, 8th Edition, 2019.

2. Herbert Schildt," C: The Complete Reference", McGraw Hill, Fourth Edition, 2014.
3. Yashvant Kanetkar, "Let us C", BPB Publications, 16th Edition, 2017.

## Reference Books

1. Ashok N Kamthane, "Computer Programming", Pearson education, Second Impression, 2012.
2. Vikas Verma, "A Workbook on C ", Cengage Learning, Second Edition, 2012.
3. Dr. P. Rizwan Ahmed, "Office Automation", Margham Publications, 2016.
4. P.Visu, R.Srinivasan and S.Koteeswaran, "Fundamentals of Computing and Programming", Fourth Edition, Sri Krishna Publications, 2012.
5. Pradip Dev, Manas Ghoush, "Programming in C", Second Edition, Oxford University Press, 2011.

## Web References

1. https://www.programiz.com/c-programming
2. https://www.geeksforgeeks.org/c-language-set-1-introduction/
3. https://www.tutorialspoint.com/cprogramming
4. https://www.assignment2do.wordpress.com/.../solution-programming-in-ansi-c
5. https://nptel.ac.in/courses/106/104/106104128/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 2 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 3 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 4 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 5 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20CCT201 | INTRODUCTION TO WEB TECHNOLOGIES | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

## Course Objectives

- To understand the principles of creating an effective web page
- To develop skills in analysing the usability of a web site.
- To understand how to plan and conduct user research related to web usability
- To learn the language of the web: HTML and CSS.
- To gain basic knowledge on web publishing and hosting

## Course Outcome

*After completion of the course, the students are able to*

**CO 1**- Explain Internet and basic HTML tags (**K2**)
**CO 2**- Build the website using CSS. (**K3**)
**CO 3**- Implement interactive and responsive website using JavaScript (**K3**)
**CO 4**- Explore cross platform websites using PHP(**K3**)
**CO 5**- Design a website and Host it (**K3**)

### UNIT- I WEB TECHNOLOGY AND HTML (9 Hrs)

Concept of WWW, Internet and WWW, HTTP Protocol : Request and Response, Web browser and Web servers, Features of Web 2.0.
Basics of HTML, formatting and fonts, commenting code, color, hyperlink, lists, tables, images, forms, XHTML, Meta tags, Character entities, frames and frame sets, Browser architecture and Web site structure. Overview and features of HTML5

### UNIT- II STYLE SHEETS (9 Hrs)

Need for CSS, introduction to CSS, basic syntax and structure, using CSS, background images, colors and properties, manipulating texts, using fonts, borders and boxes, margins, padding lists, positioning using CSS, CSS2, Overview and features of CSS3

### UNIT- III JAVASCRIPT (9 Hrs)

Client side scripting with JavaScript, variables, functions, conditions, loops and repetition, Pop up boxes, Advance JavaScript: JavaScript and objects, JavaScript own objects, the DOM and web browser environments, Manipulation using DOM, forms and validations, DHTML : Combining HTML, CSS and JavaScript, Events and buttons

### UNIT- IV PHP (9 Hrs)

Introduction and basic syntax of PHP, decision and looping with examples, PHP and HTML, Arrays, Functions, Browser control and detection, string, Form processing, Files, Advance Features: Cookies and Sessions, Object Oriented Programming with PHP

### UNIT-V WEB PUBLISHING AND HOSTING (9 Hrs)

Creating the Web Site, Saving the site, working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

## Text Books

1. Ralph Moseley, M.T. Savaliya, "Developing Web Applications", BPB Publications, 2017.
2. Hirdesh Bhardwaj,, "Web Designing", Pothi.com, 2016
3. Jon Duckett.HTML and CSS: Design and Build Websites", Wiley, 2011

## Reference Books


1. Ralph Moseley, "Developing Web Applications", Wiley India Pvt. Ltd, 2013
2. Joel Sklar, " Principles of Web Design", 6th edition, Cengage Learning, Inc, 2014
3. B. M. Harwani," Developing Web Applications in PHP and AJAX", Tata McGraw-Hill Education, 2010
4. Robert Peterson, "PHP and My-SQL a Full Basics & Advanced", Independently Published, 2019
5. Kogent, "Web Technologies Black Book", Dreamtech Press, 2009


## Web References

1. https://nptel.ac.in/courses/106/106/106106156/
2. https://www.coursera.org/learn/html-css-javascript-for-web-developers
3. https://code.tutsplus.com/courses/how-to-become-a-web-developer
4. https://webdesignerwall.com/
5. https://www.smashingmagazine.com/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 1 | 2 | 1 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 |
| 2 | 3 | 1 | 2 | 1 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 |
| 3 | 3 | 1 | 2 | 1 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 |
| 4 | 3 | 1 | 2 | 1 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 |
| 5 | 3 | 1 | 2 | 1 | 3 | 1 | - | - | - | - | 1 | 1 | 1 | - | 1 |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20CCT202 | ELECTRONIC CIRCUITS | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

## Course Objectives

- To learn biasing concepts and design amplifier using BJT
- To infer needs of feedback amplifier and design audio and radio oscillator
- To study power amplifier and its efficiency
- To study features and functional block diagram of operational amplifier
- To learn application of operational amplifier

## Course Outcome

*After completion of the course, the students will be able to*

**CO1**- Design BJT amplifier and analyze A.C load line (**K3**)
**CO2**- Design feedback amplifiers and oscillators (**K3**)
**CO3**- Explain classification and efficiency of power amplifiers (**K2**)
**CO4**-Explain characteristics of operational amplifier (**K2**)
**CO5**-Solve real time problems using operational amplifier (**K3**)

### UNIT- I BJT AMPLIFIER (9 Hrs)

BJT– Need for biasing – DC Load Line and Bias Point – DC analysis of Transistor circuits – Various biasing methods of BJT – Bias Circuit Design – Thermal stability – Stability factors – Bias compensation techniques using Diode, thermistor and sensistor; Small Signal Hybrid π equivalent circuit of BJT – Early effect – Analysis of CE, CC and CB amplifiers using Hybrid π equivalent circuits

### UNIT- II FEEDBACK AMPLIFIER AND OSCILLATORS (9 Hrs)

Feedback amplifiers: Effect of positive and negative feedback on gain, frequency response and distortion, Feedback topologies and its effect on input and output impedance, Feedback amplifier circuits in each feedback topologies

### UNIT- III OSCILLATORS (9 Hrs)

Classification of oscillators, Barkhausen criterion, Analysis of RC phase shift and Wien bridge oscillators, Working of Hartley, Colpitts and Crystal oscillators

### UNIT- IV OPERATIONAL AMPLIFIERS (9 Hrs)

Functional block diagram of Operational amplifier- Ideal Characteristics of an operational Amplifier , frequency response of OP-AMP–Common Mode Rejection Ratio-CMRR, Basic Applications of OP-Amp as an Inverting and Non-Inverting Amplifier, Integrator, Differentiator, Summer ,Subtractor, V to I converter, I to V converter.

### UNIT- V APPLICATIONS OF OPERATIONAL AMPLIFIERS (9 Hrs)

Instrumentation amplifier, Log and Antilog Amplifiers, first and second order active filters, comparators, multivibrators, waveform generators, S and H circuit, D/A converter (R- 2R ladder and weighted resistor types), A/D converters using opamps.

## Text Books

1. Adel .S. Sedra, Kenneth C. Smith, "Micro Electronic Circuits", 6th Edition, Oxford University Press, 2013.
2. Robert L. Boylestad and Louis Nasheresky, "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education /PHI, 2008.
3. D.Roy Choudhry, Shail Jain, "Linear Integrated Circuits", New Age International Pvt. Ltd., 5thEdition, 2018

## Reference Books


1. David A., Bell "Electronic Devices and Circuits", Oxford Higher Education Press, 5th Edition, 2010
2. D.Schilling and C.Belove, "Electronic Circuits", 3rd Edition, McGraw Hill, 2009
3. Donald .A. Neamen, "Electronic Circuit Analysis and Design", 2nd Edition,Tata McGraw Hill, 2009
4. Millman J. and C. Halkias, Integrated Electronics, 2/e, McGraw-Hill, 2010•
5. R.S.Sedha, "Applied Electronics", S.Chand& co, 2000


## Web References

1. http://www.build-electronic-circuits.com/
2. https://www.allaboutcircuits.com/
3. https://www.electronics-tutorials.ws/amplifier/amp_1.html
4. https://nptel.ac.in/courses/117/103/117103063/
5. https://www.electronics-lab.com/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 2 | 3 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 3 | 3 | 2 | 2 | 2 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 4 | 3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 5 | 3 | 2 | 2 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20CCT203 | DIGITAL ELECTRONICS | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

## Course Objectives

- To introduce digital fundamentals, Boolean algebra and its application to digital systems
- To enable design of various combinational circuits using logic gates
- To explain design procedure for synchronous sequential circuits
- To familiarize asynchronous sequential circuits
- To study programmable logic devices and design combinational logic circuits using PLD

## Course Outcome

*After completion of the course, the students will be able to*

**CO 1**-Intrepret fundamental concepts of digital electronics like numbering system, Boolean theorems and reduction techniques (**K3**)
**CO 2**-Implement various combinational circuits using logic gates(**K3**)
**CO 3**-Illustrate design procedures for synchronous sequential circuits (**K3**)
**CO 4**-Explore design of asynchronous sequential circuits(**K3**)
**CO 5**-Design combinational circuits using programmable logic devices(**K3**)

### UNIT- I INTRODUCTION (9 Hrs)

Number Systems – Decimal, Binary, Octal, Hexadecimal, 1's and 2's complements, Codes – Binary, BCD, Excess 3, Gray, Alphanumeric codes, Boolean theorems, Logic gates, Universal gates, Sum of products and product of sums, Minterms and Maxterms, Karnaugh map Minimization and Quine-McCluskey method of minimization

### UNIT- II COMBINATIONAL CIRCUIT DESIGN (9 Hrs)

Design of Half and Full Adders, Half and Full Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Magnitude Comparator, Decoder, Encoder, Priority Encoder.

### UNIT- III SYNCHRONOUS SEQUENTIAL CIRCUITS (9 Hrs)

Flip flops – SR, JK, T, D, Master/Slave FF – operation and excitation tables, Triggering of FF, Analysis and design of clocked sequential circuits – Design - Moore/Mealy models, state minimization, state assignment, circuit implementation – Design of Counters- Ripple Counters, Ring Counters, Shift registers, Universal Shift Register.

### UNIT- IV LOGIC FAMILIES (9 Hrs)

Transistor as a switch, Definition of parameters-current voltage parameters, Fan in, Fan out, Noise Margin, Propagation Delay, Power Dissipation; Resistor Transistor Logic(RTL),Diode Transistor Logic (DTL), Transistor-Transistor Logic (TTL), Typical TTL NAND Gate,; Emitter Coupled Logic (ECL), Integrated Injection Logic (IIL) and MOS-logic, Comparison of Various Logic Families.

### UNIT- V PROGRAMMABLE LOGIC DEVICES (9 Hrs)

Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using PLA, PAL. Introduction to VHDL-statements- logic expression-Implementation of AND, OR, half adder and full adder and Flip-Flops

## Text Books

1. M. Morris Mano and Michael D. Ciletti, "Digital Design", 5th Edition, Pearson, 2014.
2. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
3. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011

## Reference Books

1. S.Salivahanan and S.Arivazhagan, "Digital Electronics", Ist Edition, Vikas Publishing House pvt Ltd, 2012.
2. Anil K.Maini, "Digital Electronics", Wiley, 2014.
3. A.Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, PHI Learning Private Limited, 2016.
4. Soumitra Kumar Mandal, "Digital Electronics", McGraw Hill Education Private Limited, 2016.
5. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design.",Vikas Publisher, 2009

## Web References

1. https://www.electronics-tutorials.ws/boolean/bool_1.html
2. https://www.electronics-tutorials.ws/logic/logic_1.html
3. https://nptel.ac.in/courses/117/103/117103064/
4. http://www.asic-world.com/digital/tutorial.html
5. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 3 | 1 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 2 | 3 | 2 | 3 | 2 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 3 | 3 | 2 | 3 | 2 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 4 | 3 | 2 | 3 | 2 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |
| 5 | 3 | 2 | 3 | 3 | - | 1 | - | - | - | - | - | 1 | 1 | - | - |

**- Correlation Level: 1-Low, 2-Medium, 3- High**

| U20CCT204 | COMPUTER ORGANIZATION | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 | 45 |

## Course Objectives

- To introduce about basic system architecture
- To enrich knowledge in type of instructions and parallelism
- To solve 2's complement problems and gain knowledge about booths algorithm
- To study various semiconductor memories and programmable logic devices
- To familiarize about various computer peripherals.

## Course Outcome

*After completion of the course, the students will be able to*

**CO 1**-Explain the basic functional blocks of computer (**K2**)
**CO 2**-Classify the type of instructions and addressing modes (**K3**)
**CO 3**-Solve arithmetic problems by 2's complement and booth algorithm (**K3**)
**CO 4**-Classify types of memory used for various applications(**K3**)
**CO 5**-Classify various interfacing buses used in computer organization and its application (**K3**)

### UNIT- I INTRODUCTION (9 Hrs)

IAS Computer, Von Neumann Computer, System Bus. Instruction Cycle, Data Representation, Machine instruction and Assembly Language, CPU Organization: Arithmetic and Logic Unit, Control Unit, CPU Registers, Instruction Registers, Program Counter, Stack Pointer. CISC &RISC processors

### UNIT- II INSTRUCTION AND CONTROL UNIT (9 Hrs)

Operation Code and Operand. Zero, One, Two and Three address instruction. Instruction types. Addressing modes. Stack organization. Control Structure and Behaviour, Hardwired Control and Micro programmed Control : Basic Concept, Parallelism in Microinstruction

### UNIT- III ALU (9 Hrs)

Basic Structure of ALU, Addressing mode, Instruction Formats, Handling of interrupts and subroutines, Combinational ALU, 2's Complement Addition, Subtraction Unit, Booth's Algorithm for multiplication and division..

### UNIT- IV MEMORY (9 Hrs)

Types of Memory, RAM, ROM, EPROM, EEPROM, DRAM, SRAM, SAM, PLA. Different storage technology; Memory Hierarchy: CPU Register, Cache Memory, Primary Memory, Secondary Memory and Virtual Memory

### UNIT- V INPUT/OUTPUT AND COMPUTER PERIPHERALS (9 Hrs)

Polling, Interrupts, DMA, I/O Bus and Protocol, Memory mapped I/O and I/O mapped I/O,I/O system organization and interfacing, Bus: SCSI, PCI, USB, Bus arbitration. Computer peripherals :VDU, Keyboard, Mouse, Printer and Scanner

## Text Books

1. J.P.Hayes, "Computer Architecture and Organization", 3rd edition, TMH, 2017.
2. Thomas C. Bartee, "Computer Architecture and Logic Design", Mc. Graw Hill, 2010
3. M. Morris Mano, "Computer System Architecture", 3rd edition PHI, 2007

## Reference Books


1. William Stallings, " Computer Organization and Architecture", 10th edition, Pearson Education, 2015
2. V.P. Heuring, H.F. Jordan: Computer System design and architecture, 2 nd edition, Pearson Publisher, 2004
3. David A. Patterson and John L , "Computer Organization and Design: The Hardware/Software Interface" 5 th edition, MK publisher, 2014
4. V. Rajaraman, T. Radhakrishnan, "Computer Organization And Architecture", PHI Learning Pvt. Ltd, 2007
5. Sivaraama Dandamudi, "Fundamentals or Computer Organization and Design", Springer Int. Edition., 2003


## Web References

1. https://nptel.ac.in/courses/106/106/106106092/
2. https://nptel.ac.in/courses/106/106/106106166/
3. https://nptel.ac.in/courses/106/105/106105163/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 2 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 3 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 4 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 1 | 1 | - | - |
| 5 | 3 | 1 | 2 | 1 | - | - | - | - | - | - | 1 | 1 | 1 | - | - |

**Correlation Level: 1-Low, 2-Medium, 3- High**

| U20ESP202 | PROGRAMMING IN C LABORATORY<br>(Common to CSE, ECE, EEE, IT, ICE, MECH, CIVIL, BME, MECHTRONICS,CCE) | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 | 30 |

## Course Objectives

- To practice the fundamental programming methodologies in the C programming language.
- To apply logical skills for problem solving using control structures and arrays.
- To design, implement, test and debug programs that use different data types, variables, strings, arrays, pointers and structures.
- To design modular programming and provide recursive solution to problems.
- To understand the miscellaneous aspects of C and comprehension of file operations.

## Course Outcomes

*After completion of the course, the students will be able to*

**CO1**- Apply and practice logical formulations to solve simple problems leading to specific applications. (**K3**)

**CO2**- Develop C programs for simple applications making use of basic constructs, arrays and strings. (**K3**)

**CO3** - Develop C programs involving functions, recursion, pointers, and structures. (**K3**)

**CO4** - Design applications using sequential and random access file processing. (**K3**)

**CO5** - Build solutions for online coding challenges. (**K3**)

## List of Experiments

1. Simple programming exercises to familiarize the basic C language constructs.
2. Develop programs using identifiers and operators.
3. Develop programs using decision-making and looping constructs.
4. Develop programs using functions as mathematical functions.
5. Develop programs with user defined functions – includes parameter passing.
6. Develop program for one dimensional and two dimensional arrays.
7. Develop program for sorting and searching elements.
8. Develop program to illustrate pointers.
9. Develop program with arrays and pointers.
10. Develop program for dynamic memory allocation.
11. Develop programs for file operations.

## Reference Books


1. Zed A Shaw," Learn C the Hard Way: Practical Exercises on the Computational Subjects You Keep Avoiding (Like C)", Addison Wesley, 2016.
2. Anita Goel and Ajay Mittal, "Computer Fundamentals and programming in C", First edition, Pearson Education ,2011.
3. Yashvanth Kanethkar, "Let us C", 13th Edition, BPB Publications, 2008.
4. Maureen Sprankle,Jim Hubbard," Problem Solving and Programming Concepts," 9th Edition, Pearson, 2011.
5. B.W. Kernighan and D.M. Ritchie, "The C Programming language", 2nd Edition, Pearson Education, 2006.


## Web References

1. https://alison.com/course/introduction-to-c-programming
2. https://www.geeksforgeeks.org/c-programming-language/
3. http://cad-lab.github.io/cadlab_data/files/1993_prog_in_c.pdf
4. https://www.tenouk.com/clabworksheet/clabworksheet.html
5. https://fresh2refresh.com/c-programming/

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 2 | 2 | 1 | - | - | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 3 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 4 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |
| 5 | 3 | 2 | 1 | 1 | 3 | - | - | - | - | - | - | - | 3 | 2 | 3 |

Correlation Level: 1-Low, 2-Medium, 3- High

| U20CCP201 | ELECTRONIC CIRCUITS LABORATARY | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 | 30 |

## Course Objectives

- To design and analyze frequency response of CE amplifier with and without feedback
- To construct low frequency and high frequency oscillator
- To study efficiency of power amplifier
- To enable knowledge on multistage amplifier
- To study application of operational amplifier

## Course Outcome

*After completion of the course, the students will be able to*

**CO1**- Design and verify frequency response of amplifier with and without feedback.(**K4**)
**CO2**- Design and verify oscillators.(**K4**)
**CO3**- Verify efficiency of power amplifier .(**K4**)
**CO4**-Demonstrate frequency response of multistage amplifier .(**K4**)
**CO5**- Apply op-amp for performing amplification, addition and subtraction .(**K3**)

**LIST OF EXPERIMENTS**

1. Study Frequency response characteristics of RC coupled CE amplifier
2. Study Frequency response and gain of current series feedback amplifier
3. Study Frequency response of voltage series feedback amplifier
4. Design and verify RC phase shift oscillator
5. Design and verify Wein bridge oscillator
6. Design and verify Colpitt's and Hartley oscillator
7. Frequency response of cascade amplifier
8. Frequency response of cascade amplifier
9. Frequency response of tuned amplifier
10. Voltage follower, Inverting and non inverting amplifier using op-amp
11. Adder and subtractor using op-amp
12. D/A converter using opamp

## Reference Books

1. David A., "Bell Electronic Devices and Circuits", Oxford Higher Education Press, 5th Edition, 2010
2. D.Schilling and C.Belove, "Electronic Circuits", 3rd Edition, McGraw Hill, 2009
3. Donald .A. Neamen, "Electronic Circuit Analysis and Design", 2nd Edition,Tata McGraw Hill, 2009
4. Sedra A. S. and K. C. Smith, Microelectronic Circuits, 6/e, Oxford University Press, 2013
5. Millman J. and C. Halkias, Integrated Electronics, 2/e, McGraw-Hill, 2010•

## Web References

1. http://www.build-electronic-circuits.com/
2. https://www.allaboutcircuits.com/
3. https://www.electronics-tutorials.ws/amplifier/amp_1.html
4. https://nptel.ac.in/courses/117/103/117103063/
5. https://www.electronics-lab.com/

## COs/POs/PSOs Mapping

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 2 | 1 | - | - |
| 2 | 3 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 2 | 1 | - | - |
| 3 | 3 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 2 | 1 | - | - |
| 4 | 3 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 2 | 1 | - | - |
| 5 | 3 | 2 | 2 | 1 | - | - | - | 1 | - | 1 | 1 | 2 | 1 | - | - |

Correlation Level: 1-Low, 2-Medium, 3- High

| U20CCP202 | DIGITAL ELECTRONICS LABORATARY | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 | 30 |

## Course Objectives

- To understand various basic logic gates
- To design and implement various combinational circuits
- To design and implement combinational circuits using MSI devices.
- To design and implement sequential circuits
- To write VHDL code for combinational circuits

## Course Outcome

*After completion of the course, the students will be able to*

**CO1**- Verify Boolean laws using logic gates (**K3**)
**CO2**- Design and verify various combination circuits using logic gates.(**K4**)
**CO3**- Design and implement combinational circuits using MSI devices.(**K4**)
**CO4**-Design and verify sequential circuits.(**K4**)
**CO5**-Write VHDL code for combinational circuits.(**K4**)

### LIST OF EXPERIMENTS

1. Verification of Boolean Theorems using basic gates.
2. Design and verify Half adder and Full adder using basic gates
3. Design and verify 4-bit Adder / Subtractor Circuits using IC 7483.
4. Design and testing of Code Converters for BCD to Gray conversion and Excess-3-code to BCD and vice versa
5. Design and testing of 2-bit ,4-bit Magnitude Comparator and 4x16 decoder using 3 to 8 decoder
6. Design and testing of 4 to 1 multiplexer and de-multiplexer using IC74153.
7. Design and testing of Shift Registers using D-flip-flops
8. Design and testing of magnitude comparator using IC7404, IC7408, and IC7486.
9. Design and testing of 4-bit Asynchronous Counters using IC 7476
10. Design and testing of 4-bit Synchronous Counter using IC 7476
11. Design and test sequence detector
12. VHDL code for Half adder, Full adder and decoder

## Reference Books

1. S.Salivahanan and S.Arivazhagan, "Digital Electronics", Ist Edition, Vikas Publishing House pvt Ltd, 2012.
2. Anil K.Maini, "Digital Electronics", Wiley, 2014.
3. A.Anand Kumar, "Fundamentals of Digital Circuits", 4th Edition, PHI Learning Private Limited, 2016.
4. Soumitra Kumar Mandal, "Digital Electronics", McGraw Hill Education Private Limited, 2016.
5. S. Salivahanan and S. Arivazhagan, "Digital Circuits and Design.",Vikas Publisher, 2009

## Web References

1. https://www.electronics-tutorials.ws/boolean/bool_1.html
2. https://www.electronics-tutorials.ws/logic/logic_1.html
3. https://nptel.ac.in/courses/117/103/117103064/
4. http://www.asic-world.com/digital/tutorial.html
5. https://www.geeksforgeeks.org/digital-electronics-logic-design-tutorials/

## COs/POs/PSOs Mapping

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 2 | 2 | - | - | - | - | - | - | 1 | 2 | 2 | 1 | - | - |
| 2 | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | 2 | 2 | 1 | - | - |
| 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | 2 | 2 | 1 | - | - |
| 4 | 3 | 2 | 2 | 1 | - | - | - | - | - | 1 | 2 | 2 | 1 | - | - |
| 5 | 3 | 2 | 2 | 1 | 3 | - | - | - | - | 1 | 2 | 2 | 1 | - | - |

Correlation Level: 1-Low, 2-Medium, 3- High

| | | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| U20CCC2XX | CERTIFICATION COURSES | 0 | 0 | 4 | - | 50 |

Students shall choose an International certification course offered by the reputed organizations like Google, Microsoft, IBM, Texas Instruments, Bentley, Autodesk, Eplan and CISCO, etc. The duration of the course is 40-50 hours specified in the curriculum, which will be offered through Centre of Excellence.

Pass /Fail will be determined on the basis of participation, attendance, performance and completion of the course. If a candidate Fails, he/she has to repeat the course in the subsequent years. Pass in this course is mandatory for the award of degree.

| U20CCS201 | DEMONSTRATION OF WORKSHOP PRACTICES | L | T | P | C | Hours |
|---|---|---|---|---|---|---|
| | | 0 | 0 | 2 | - | 30 |

## Course Objectives

- To have practical exposure to various welding and joining processes.
- To impart skill in fabricating simple components using sheet metal
- To train the students in metal joining processes like soldering in PCB.
- To gain a good basic working knowledge required for the production of various engineering products.
- To cultivate safety aspects in handling of tools and equipment

## Course Outcomes

*After completion of the course, the students will be able to*

**CO1**–Identify different prototypes in the carpentry trade such as lap joint, Butt joint. (**K1**)
**CO2**–Classify the fabrication of simple sheet metal parts. (**K2**)
**CO3**–Interpret the casting preparation. (**K2**)
**CO4**–Identify the electrical components as per specific dimension. (**K1**)
**CO5**–Describe the skills, and modern engineering tools necessary for engineering practice. (**K1**)

## DEMONSTRATION OF EXPERIMENTS

1. Welding Exercises
    a. Introduction to BI Standards and reading of welding drawings.
    b. Butt Joint
    c. Lap Joint
    d. Arc Welding
    e. Gas Welding
2. Sheet Metal Exercises
    a. Making of Cube
    b. Making of Cone using development of surface
3. Casting
    a. Green Sand Moulding preparation
4. Troubleshooting of electrical appliances
5. Bosch Tools Demonstration
    a. Demonstration of all Bosch tools.

## Reference Books

1. K.C. John, "Mechanical Workshop Practice", PHI Learning Private Limited, 2010
2. KA Navas, "Electronics Lab Manual", Fifth edition, PHI Learning Private Limited, 2015
3. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd.,New Delhi
5. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd.

## Web References

1. https://www.weld.com/
2. https://welding.com/
3. https://sciencing.com/soldering-desoldering-techniques-8288017.html
4. https://www.instructables.com/id/The-Ultimate-Guide-to-Desoldering/
5. https://electronicsclub.info/soldering.htm

## COs/POs/PSOs Mapping

| COs | Program Outcomes (POs) | | | | | | | | | | | | Program Specific Outcomes (PSOs) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
| 1 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 2 | - | - |
| 2 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 2 | - | - |
| 3 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 2 | - | - |
| 4 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 2 | - | - |
| 5 | 3 | 1 | - | - | 3 | - | - | - | 3 | - | - | 3 | 2 | - | - |

Correlation Level: 1-Low, 2-Medium, 3- High

| U20CCM202 | ENVIRONMENTAL SCIENCE | L | T | P | C | Hrs |
|---|---|---|---|---|---|---|
| | | 2 | 0 | 0 | - | 30 |

We as human being are not an entity separate from the environment around us rather we are a constituent seamlessly integrated and co-exist with the environment around us. We are not an entity so separate from the environment that we can think of mastering and controlling it rather we must understand that each and every action of ours reflects on the environment and vice versa. Ancient wisdom drawn from Vedas about environment and its sustenance reflects these ethos. There is a direct application of this wisdom even in modern times. Idea of an activity based course on environment protection is to sensitize the students on the above issues through following two type of activities.

**(a) Awareness Activities:**

i. Small group meetings about water management, promotion of recycle use, generation of less waste, avoiding electricity waste
ii. Slogan making event
iii. Poster making event
iv. Cycle rally
v. Lectures from experts

**(b) Actual Activities:**

i) Plantation
ii) Gifting a tree to see its full growth
iii) Cleanliness drive
iv) Drive for segregation of waste
v) To live some big environmentalist for a week or so to understand his work
vi) To work in kitchen garden for mess
vii) To know about the different varieties of plants
viii) Shutting down the fans and ACs of the campus for an hour or so

Dr. V. BHAKATHI.