

THE NATIONAL INSTITUTE OF ENGINEERING

Manandavadi Road, Mysuru



ESTD : 1946

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Curriculum Structure and Syllabus

2024-2025

| The National Institute of Engineering | | | | | | | | | | |
|---|-------------|---|---------------------|----------------|----------|-----------------------|-------------|-----------|-------------|-----------|
| Scheme of Teaching & Examination - 2022 | | | | | | | | | | |
| Effective from the Academic year 2024-25 | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | |
| B.E. 2024 Admitted Batch | | | | | | | | | | |
| I Semester – Chemistry Cycle | | | | | | | | | | |
| Sl. No. | Course Code | Course Title | Teaching Department | Theory Lecture | Tutorial | Practical/ Drawing | Examination | | | Credits |
| | | | | L | T | P | CIE Marks | SEE Marks | Final Marks | |
| 1 | BMATEIOI | Mathematics I for Electrical Engineering Stream | Maths | 2 | 2 | 2 | 100 | 100 | 100 | 4 |
| 2 | BCHEE102 | Chemistry for Electrical Engineering Stream | Chemistry | 2 | 2 | 2 | 100 | 100 | 100 | 4 |
| 3 | BCEDK103 | Computer-Aided Engineering Drawing | Mechanical | 2 | 0 | 2 | 100 | 100 | 100 | 3 |
| 4 | BESCK104x | Engineering Science Course-I | EEE | 3 | 0 | 0 | 100 | 100 | 100 | 3 |
| 5 | BPLCK105x | Programming Language Course | ECE | 2 | 0 | 2 | 100 | 100 | 100 | 3 |
| 6 | BPWSK106 | Professional Writing Skills in English | Humanities | 1 | 0 | 0 | 50 | - | 50 | 1 |
| 7 | BICOK107 | Indian Constitution | Humanities | 1 | 0 | 0 | 50 | - | 50 | 1 |
| 8 | BSFHK158 | Scientific Foundations of Health | ME | 1 | 0 | 0 | 50 | - | 50 | 1 |
| TOTAL | | | | | | | | | | 20 |

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|---|-----------------------|---|---------------------|----------------|----------|-----------------------|-------------|-----------|-------------|-----------|
| Scheme of Teaching & Examination - 2022 | | | | | | | | | | |
| Effective from the Academic year 2024-25 | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | |
| B.E. 2024 Admitted Batch | | | | | | | | | | |
| II Semester - Physics Cycle | | | | | | | | | | |
| Sl. No. | Course Code | Course Title | Teaching Department | Theory Lecture | Tutorial | Practical/ Drawing | Examination | | | Credits |
| | | | | L | T | P | CIE Marks | SEE Marks | Final Marks | |
| 1 | BMATE201 | Mathematics -II for Electrical Engineering Stream | Maths | 2 | 2 | 2 | 100 | 100 | 100 | 4 |
| 2 | BPHYE202 | Physics for Electrical Engineering Stream | Physics | 2 | 2 | 2 | 100 | 100 | 100 | 4 |
| 3 | BBEE203 | Basic Electronics | ECE | 2 | 0 | 2 | 100 | 100 | 100 | 3 |
| 4 | BESCK204x | Engineering Science Course-II | ESC | 2 | 0 | 2 | 100 | 100 | 100 | 3 |
| 5 | BETCK205x | Emerging Technology Course - II | ESC | 3 | 0 | 0 | 100 | 100 | 100 | 3 |
| 6 | BENGK206 | Communicative English | Humanities | 1 | 0 | 0 | 50 | - | 50 | 1 |
| 7 | BKSKK207/ BKBKK207 | Sanskrutika Kannada / Balake Kannada | Humanities | 1 | 0 | 0 | 50 | - | 50 | 1 |
| 8 | BIDTK258 | Innovation and Design Thinking | ME | 1 | | 0 | 50 | - | 50 | 1 |
| TOTAL | | | | | | | | | | 20 |

| Engineering Science Courses (ESC) | | | | |
|-----------------------------------|---|-------------------|---|---|
| Course Code | Course Title | Teaching Hrs/Week | | |
| | | L | T | P |
| BESCK104A/ 204A | Introduction to Civil Engineering | 3 | 0 | 0 |
| BESCK104B/204B | Introduction to Electrical Engineering | 3 | 0 | 0 |
| BESCK104C/204C | Introduction to Electronics Communication | 3 | 0 | 0 |
| BESCK104D/204D | Introduction to Mechanical Engineering | 3 | 0 | 0 |
| BESCK104E/204E | Introduction to C Programing | 2 | 0 | 2 |

| Programming Language Courses (PLC) | | | | |
|------------------------------------|------------------------------------|-------------------|---|---|
| Course Code | Course Title | Teaching Hrs/Week | | |
| | | L | T | P |
| BPLCK105A/205A | Introduction to Web Programming | 2 | 0 | 2 |
| BPLCK105B/205B | Introduction to Python Programming | 2 | 0 | 2 |
| BPLCK105C/205C | Introduction to JAVA programming | 2 | 0 | 2 |
| BPLCK105D/205D | Introduction to C++ Programming | 2 | 0 | 2 |

| Emerging Technology Courses (ETC) | | | | |
|-----------------------------------|---|-------------------|---|---|
| Code | Course Title | Teaching Hrs/Week | | |
| | | L | T | P |
| BETCK105A/205A | Smart Materials and systems | 3 | 0 | 0 |
| BETCK105B/205B | Green Buildings | 3 | 0 | 0 |
| BETCK105C /205C | Introduction to Nano Technology | 3 | 0 | 0 |
| BETCK105D /205D | Introduction to Sustainable Engineering | 3 | 0 | 0 |
| BETCK105E /205E | Renewable Energy Sources | 3 | 0 | 0 |
| BETCK105F/205F | Waste Management | 3 | 0 | 0 |
| BETCK105G /205G | Emerging Applications of Biosensors | 3 | 0 | 0 |
| BETCK105H/205H | Introduction to Internet of Things (IoT) | 3 | 0 | 0 |
| BETCK105I /205I | Introduction to Cyber Security | 3 | 0 | 0 |
| BETCK105J/205J | Introduction to Embedded Systems | 3 | 0 | 0 |
| BETCK105P /205P | Infrastructure for Smart Cities | 3 | 0 | 0 |
| BETCK105Q/205Q | Geographic Information Technologies | 3 | 0 | 0 |
| BETCK105R/205R | Introduction to Building Environment | 3 | 0 | 0 |
| BETCK105S/205S | Introduction to robotics, electric vehicle system and 3D printing | 3 | 0 | 0 |
| BETCK105T/205T | Renewable Energy Technology | 3 | 0 | 0 |
| BETCK105U/205U | Introduction to Smart City | 3 | 0 | 0 |
| BETCK105V/205V | Introduction to Database Management Systems | 3 | 0 | 0 |

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| Scheme of Teaching & Examination - 2022 | | | | | | | | | | | | | |
| Effective from the Academic year 2024-25 | | | | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | | | | |
| B.E. 2024 Admitted Batch | | | | | | | | | | | | | |
| Semester : III | | | | | | | | | | | | | |
| Sl. No | Type of Course | Course Code | Course Title | Teaching Department (TD) | Question Paper setting Board (PSB) | Teaching Hrs / Week | | | | Examination | | | C |
| | | | | | | L | T | P | S | Duration in Hours | CIE Marks | SEE Marks | |
| 1 | PCC | BEC301 | Analog Electronic Circuits | EC | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 |
| 2 | IPCC | BEC302 | Analysis and Design of Digital Circuits | EC | EC | 3 | 0 | 2 | | 3 | 50 | 50 | 100 |
| 3 | PCC | BEC303 | Network Analysis | EC | EC | 3 | 2 | 0 | | 3 | 50 | 50 | 100 |
| 4 | PCC | BEC304A/ BEC407A | AV Mathematics for EC Engineering | Maths/XX | Maths/XX | 3 | 0 | 0 | | 3 | 50 | 50 | 100 |
| | OR | | | | | | | | | | | | |
| | BSC | BBOK304B/ BBOK407B | Biology for Biomimicry in E&C | Chemistry / EC | Chemistry / EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 |
| 5 | PCCL | BECL305 | Analog Electronic Circuits Laboratory | EC | EC | 0 | 0 | 2 | | 3 | 50 | 50 | 100 |
| 6 | ESC | BEC306X | ESC/ETC/PLC | EC | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 |
| 7 | UHV | BSCK307 | Social Connect & Responsibility | EC | EC | 0 | 0 | 2 | | 1 | 100 | — | 100 |
| 8 | AEC/SEC | BXX358x | Ability Enhancement Course (AEC)/ Skill Enhancement Course (SEC) - III | EC | EC | If the course is a Theory | | | | 50 | 50 | 100 | |
| | | | | | | 1 | 0 | 0 | | | | | 1 |
| | | | | | | If the course is a Lab | | | | | | | |
| | | | | | | 0 | 0 | 2 | | 2 | | | |
| 9 | MC | BNSK359 | National Service Scheme (NSS) | NSS Coordinator | NSS Coordinator | 0 | 0 | 2 | | — | 100 | — | 100 |
| | | BPEK359 | Physical Education (PE) Sports & Athletics | PED | PED | | | | | | | | |
| | | BYOK359 | Yoga | Yoga Teacher | Yoga Teacher | | | | | | | | |
| Total | | | | | | | | | | | 600 | 400 | 1000 |

| Engineering Science Course (ESC/ETC/PLC) | | | | | | | | | | | | | |
|---|----------|-------------|---|---|-----------------------|----------|---------------------|----------------------|-------------------|-----------|-----------|-------------|---------|
| Sl. No | Category | Course Code | Course Title | Teaching Department (TD) / Question Paper Setting Board (PSB) | Teaching Hours / Week | | | | Examination | | | | Credits |
| | | | | | Theory Lecture | Tutorial | Practical / Drawing | Self-study Component | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1 | ESC | BEC306A | Engineering Statistics and Linear Algebra | ECE | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 2 | | BEC306B | Sensors and Instrumentation | | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 3 | | BEC306C | Engineering Electromagnetics | | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 4 | | BEC306D | 8051 Microcontroller | | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| Ability Enhancement Course (AEC) / Skill Enhancement Course (SEC) | | | | | | | | | | | | | |
| 1 | AEC | BEC358A | Data Structures Using C++ | ECE | 0 | 0 | 2 | | 2 | 50 | 50 | 100 | 1 |
| 2 | | BEC358B | Simulink Programming Basics | | 0 | 0 | 2 | | 2 | 50 | 50 | 100 | 1 |
| 3 | | BEC358C | PCB Design | | 0 | 0 | 2 | | 2 | 50 | 50 | 100 | 1 |
| 4 | | BEC358D | IOT for Smart Infrastructure | | 1 | 0 | 0 | | 1 | 50 | 50 | 100 | 1 |

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| Scheme of Teaching & Examination - 2022 | | | | | | | | | | | | | |
| Effective from the Academic year 2023-24 | | | | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | | | | |
| B.E. 2024 Admitted Batch | | | | | | | | | | | | | |
| Semester : IV | | | | | | | | | | | | | |
| Sl. No | Type of Course | Course Code | Course Title | Teaching Department (TD) & Question Paper setting Board (PSB) | Teaching Hrs. / Week | | | | Examination | | | | Credits |
| | | | | | L | T | P | S | Duration in Hours | CIE Marks | SEE Marks | Total Marks | |
| 1 | PCC | BEC401 | ARM Microcontroller | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 2 | IPCC | BEC402 | Digital System Design Using Hardware Description and Verification Languages | | 3 | 0 | 2 | | 3 | 50 | 50 | 100 | 4 |
| 3 | PCC | BEC403 | Signals and Systems | | 3 | 2 | 0 | | 3 | 50 | 50 | 100 | 4 |
| 4 | PCCL | BECL404 | ARM laboratory | | 0 | 0 | 2 | | 3 | 50 | 50 | 100 | 1 |
| 5 | ESC | BEC405X | ESC/ETC/PLC | | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 6 | AEC / SEC | BEC456X | Ability Enhancement Course (AEC) / Skill Enhancement Course (SEC) | | If the course is a Theory | | | | 50 | 50 | 100 | 1 | |
| | | | | 1 | 0 | 0 | | 1 | | | | | |
| | | | | If the course is a Lab | | | | | | | | | |
| 7 | PCC | BEC407A/ BEC304A | AV Mathematics for EC Engineering | Maths/XX | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| | OR | | | | | | | | | | | | |
| | BSC | BBOK407B/ BBOK304B | Biology for Biomimicry in E&C | Chemistry | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | |
| 8 | UHV | BUHK408 | Universal Human Values Course | EC | 1 | 0 | 0 | | 1 | 50 | 50 | 100 | 1 |
| | | BNSK459 | National Service Scheme (NSS) | NSS Coordinator | | | | | | | | | |

| | | | | | | | | | | | | | |
|--------------|----|---------|--|--------------|---|---|---|--|---|------------|------------|-------------|-----------|
| 9 | MC | BPEK459 | Physical Education (PE) Sports & Athletics | PED | 0 | 0 | 2 | | - | 100 | - | 100 | 0 |
| | | BYOK459 | Yoga | Yoga Teacher | | | | | | | | | |
| Total | | | | | | | | | | 550 | 450 | 1000 | 20 |

| Engineering Science Course (ESC/ETC/PLC) | | | | | | | | | | | | | |
|---|----------|-------------|---------------------------------------|---|-----------------------|----------|---------------------|----------------------|-------------------|-----------|-----------|-------------|---------|
| Sl. No | Category | Course Code | Course Title | Teaching Department (TD) / Question Paper Setting Board (PSB) | Teaching Hours / Week | | | | Examination | | | | Credits |
| | | | | | Theory Lecture | Tutorial | Practical / Drawing | Self-study Component | Duration in hours | CIE Marks | SEE Marks | Total Marks | |
| | | | | | L | T | P | S | | | | | |
| 1 | ESC | BEC405A | Applied Numerical Methods | ECE | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 2 | | BEC405B | Industrial Electronics | | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 3 | | BEC405C | Operating Systems | | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 4 | | BEC405D | Linear Integrated Circuits | | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| Ability Enhancement Course (AEC) / Skill Enhancement Course (SEC) | | | | | | | | | | | | | |
| 1 | AEC | BEC456A | Electronic Devices | ECE | 1 | 0 | 0 | | 1 | 50 | 50 | 100 | 1 |
| 2 | | BEC456B | LICs Lab using PSPICE | | 0 | 0 | 2 | | 2 | 50 | 50 | 100 | 1 |
| 3 | | BEC456C | LabVIEW Programming | | 0 | 0 | 2 | | 2 | 50 | 50 | 100 | 1 |
| 4 | | BEC456D | Risk Management in IoT Implementation | | 1 | 0 | 0 | | 1 | 50 | 50 | 100 | 1 |

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| Scheme of Teaching & Examination (2022 Scheme) | | | | | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | | | | | |
| B.E. 2024 Admitted Batch | | | | | | | | | | | | | | |
| Semester : V | | | | | | | | | | | | | | |
| Sl. No | Type of Course | Course Code | Course Title | Teaching Department (TD) | Question Paper Setting Board (PSB) | Teaching Hrs / Week | | | | Examination | | | Credits | |
| | | | | | | L | T | P | S | Duration in Hours | CIE Marks | SEE Marks | | Total Marks |
| 1 | HSMS | BEC501 | Engineering Management and Entrepreneurship | Department name - EC | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 2 | IPCC | BEC502 | Integrated Professional Core Courses (IPCC) Control Systems | | EC | 3 | 2 | 0 | | 3 | 50 | 50 | 100 | 4 |
| 3 | PCC | BEC503 | Professional Core Course (PCC) Communication Systems | | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 4 |
| 4 | PCC | BEC504 | Professional Core Course (PCC) Digital Signal Processing | | EC | 3 | 0 | 2 | | 3 | 50 | 50 | 100 | 3 |
| 5 | PCCL | BECL505 | Professional Core Course Laboratory (PCCL) Communication Systems Lab | | EC | 0 | 0 | 2 | | 3 | 50 | 50 | 100 | 1 |
| 6 | PEC | BEC515 | Professional Elective Course (Industry suggested course) | | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 7 | PROJ | BEC586 | Minor Project | | | 0 | 0 | 2 | | - | 50 | - | 50 | 1 |
| 8 | AEC | BRMK557 | Research Methodology and IPR | Any Department | EC | 2 | 0 | 0 | | 2 | 50 | 50 | 100 | 2 |
| 9 | MC | BESK508 | Environmental Studies | TD: Civil/Chemistry | Civil | 1 | 0 | 0 | | - | 50 | - | 50 | 1 |
| 10 | MC | BNSK559 | National Service Scheme (NSS) | NSS Coordinator | | | | | | | | | | |
| | | | Physical Education (PE) (Sports & Athletics) | PED | | 0 | 0 | 2 | | - | 100 | - | 100 | 0 |
| | | | Yoga | Yoga Teacher | | | | | | | | | | |
| Total | | | | | | | | | | 550 | 350 | 900 | 22 | |

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| Scheme of Teaching & Examination (2022 Scheme) | | | | | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | | | | | |
| B.E. 2023 Admitted Batch | | | | | | | | | | | | | | |
| Semester : VI | | | | | | | | | | | | | | |
| Sl. No | Type of Course | Course Code | Course Title | Teaching Department (TD) | Question Paper Setting Board (PSB) | Teaching Hrs / Week | | | | Examination | | | | Credits |
| | | | | | | L | T | P | S | Duration in Hours | CIE Marks | SEE Marks | Total Marks | |
| 1 | IPCC | BEC601 | Integrated Professional Core Courses (IPCC) Computer Networks | Department name - EC | EC | 3 | 0 | 2 | | 3 | 50 | 50 | 100 | 4 |
| 2 | PCC | BEC602 | Professional Core Course (PCC) Embedded System and Architecture | EC | EC | 3 | 0 | 2 | | 3 | 50 | 50 | 100 | 4 |
| 3 | PEC | BEC613X | Professional Elective Course - Group II | EC | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 4 | OEC | BEC654X | Open Elective Course - Group II | EC | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 5 | PCC | BEC605 | Professional Core Course (PCC) Wireless Communication | EC | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 6 | PCC | BEC606 | Professional Core Course (PCC) Principles of Digital VLSI | EC | EC | 3 | 0 | 0 | | 3 | 50 | 50 | 100 | 3 |
| 7 | PCCL | BECL607 | Professional Core Course laboratory VLSI Lab | EC | EC | 0 | 0 | 2 | | - | 50 | 50 | 100 | 1 |
| 8 | AEC/S DC | BEC657L | Ability Enhancement Course / Skill Development Course V / PCB design and Fabrication | EC | EC | If the course is a Theory | | | | 50 | 50 | 100 | 1 | |
| | | | | | | 1 | 0 | 0 | | | | | | 1 |
| | | | | | | OR | | | | | | | | |
| | | | | | | If the course is a Laboratory | | | | | | | | |
| | | | | | | 0 | 0 | 2 | | 2 | | | | |
| 9 | MC | BNSK658 | National Service Scheme (NSS) | NSS Coordinator | | 0 | 0 | 2 | | - | 100 | - | 100 | 0 |
| | | BPEK658 | Physical Education (PE) (Sports & Athletics) | PED | | | | | | | 100 | - | 100 | 0 |
| | | BYOK658 | Yoga | Yoga Teacher | | | | | | - | | | | |
| | | BIKK259 | Indian Knowledge System | Humanities | | | | | | | | | | |

| | | | | Total | 500 | 400 | 900 | 22 |
|--|--|---------|--|-------|-----|-----|-----|----|
| Professional Elective Course - Group II | | | | | | | | |
| BEC613A | ASIC Design | BEC613D | Industrial Internet Of Things | | | | | |
| BEC613B | Signal Processing and Machine Learning | BEC613E | Object Oriented Programming | | | | | |
| BEC613C | Optical Fibre Communication | BEC613F | Transmission Lines and Radiating Systems | | | | | |
| Open Elective Course - Group II | | | | | | | | |
| BEC654A | Internet of Things and Applications | BEC654D | Introduction to VLSI | | | | | |
| BEC654B | Vehicular Electronics | BEC654E | Introduction to Radar systems for Autonomous driving | | | | | |
| BEC654C | Multicore systems and programming | | | | | | | |

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| Scheme of Teaching & Examination (2022 Scheme) | | | | | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | | | | | |
| B.E. 2024 Admitted Batch | | | | | | | | | | | | | | |
| Semester : VII | | | | | | | | | | | | | | |
| Sl. No | Type of the Course | Course Code | Course Title | Teaching Department (TD) | Question Paper Setting Board (PSB) | Teaching Hrs / Week | | | | Examination | | | | Credits |
| | | | | | | L | T | P | S | Duration in Hours | CIE Marks | SEE Marks | Total marks | |
| 1 | IPCC | BXX701 | Integrated Professional Core Courses Real Time Operating Systems | EC | EC | 3 | 0 | 2 | | 3 | 50 | 100 | 100 | 4 |
| 2 | PCC | BXX702 | Professional Core Course Information Theory and Coding | EC | EC | 3 | 0 | 0 | | 3 | 50 | 100 | 100 | 4 |
| 3 | PEC | BXX713X | Professional Elective Course - Group III | EC | EC | 3 | 0 | 0 | | 3 | 50 | 100 | 100 | 3 |
| 4 | OEC | BXX754X | Open Elective Course - Group III | EC | EC | 3 | 0 | 0 | | 3 | 50 | 100 | 100 | 3 |
| 5 | PROJ | BXX785 | Major Project | EC | EC | 3 | 0 | 0 | | 3 | 100 | 100 | 200 | 3 |
| Total | | | | | | | | | | | 300 | 300 | 600 | 20 |
| Professional Elective Course - Group III | | | | | | | | | | | | | | |
| BXX713A | Elective –I Information And Network Security | | | | BXX713E | Elective –V Radar Systems for Autonomous driving | | | | | | | | |
| BXX713B | Elective –II Quantum circuits and Algorithms | | | | BXX713F | Elective VI Detection and Estimation Theory | | | | | | | | |
| BXX713C | Elective –III Next generation wireless systems | | | | BXX713G | Elective –VII Wireless Adhoc Networks | | | | | | | | |
| BXX713D | Elective –IV Satellite Communication | | | | BXX713H | Elective –VIII Deep Learning Techniques | | | | | | | | |
| Open Elective Course - Group III | | | | | | | | | | | | | | |
| BXX754A | Open Elective – I Introduction to Quantum Computing | | | | BXX754C | Mobile Communication | | | | | | | | |
| BXX754B | Open Elective –II Wireless networks | | | | | | | | | | | | | |

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| Scheme of Teaching & Examination (2022 Scheme) | | | | | | | | | | | | | | |
| Department: Electronics and Communication Engineering | | | | | | | | | | | | | | |
| B.E. 2024 Admitted Batch | | | | | | | | | | | | | | |
| Semester : VIII | | | | | | | | | | | | | | |
| Sl. No | Type of the Course | Course Code | Course Title | Teaching Department (TD) | Question Paper Setting Board (PSB) | Teaching Hrs / Week | | | | Examination | | | Credits | |
| | | | | | | L | T | P | S | Duration in Hours | CIE Marks | SEE Marks | | Total marks |
| 1 | PEC | BXX801X | Professional Elective - Group IV (Online Course) | EC | EC | - | - | - | | - | - | 50 | 100 | 3 |
| 2 | OEC | BXX802X | Open Elective - Group IV (Online Course) | EC | EC | - | - | - | | - | - | 50 | 100 | 3 |
| 3 | INT | BXX803 | Internship(Industry/ Research) (14-16 weeks) | EC | EC | 0 | 0 | 20 | | 3 | 100 | 100 | 200 | 10 |
| Total | | | | | | | | | | | 100 | 200 | 400 | 16 |
| Professional Elective Course - Group IV (Online Courses – NPTEL / Coursera) | | | | | | | | | | | | | | |
| BXX801A | Elective –I | | | | BXX801D | | | | Elective –IV | | | | | |
| BXX801B | Elective –II | | | | BXX801E | | | | Elective –V | | | | | |
| BXX801C | Elective –III | | | | | | | | | | | | | |
| Open Elective Course - Group IV (Online Courses – NPTEL / Coursera) | | | | | | | | | | | | | | |
| BXX802A | Open Elective – I | | | | BXX802C | | | | Open Elective –III | | | | | |
| BXX802B | Open Elective –II | | | | BXX802D | | | | Open Elective –IV | | | | | |

Course Code: BBEE203**Course: Basic Electronics for EEE stream****Credits: 3****L:T:P:S – 2:2:0:0****CIE: 50% Marks****SEE: 50% Marks****SEE Hours: 3 Hrs****Max. Marks: 100**

| | |
|-----------------------------|--|
| Prerequisites if any | |
| Learning objectives | <ul style="list-style-type: none"> ➤ Students will be able to learn ➤ Operation of Semiconductor diode, Zener diode, Transistors and their applications. ➤ Logic circuits and their optimization. |

Course Outcomes:

On the successful completion of the course, the student will be able to

| COs | Course Outcomes | Bloom's level |
|-----|---|---------------|
| CO1 | Understand the construction, operation and characteristics of various semiconductor devices. | L2 |
| CO2 | Apply the acquired knowledge to construct basic analog circuits. | L3 |
| CO3 | Develop competence to construct basic combinational circuits using basics of Boolean algebra and digital logic gates. | L3 |

Mapping with POs and PSOs:

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 3 | 2 | - | 2 | - | - | - | 1 | 1 | 1 | 2 | 3 | 2 | 2 |
| CO2 | 3 | 3 | 2 | - | 2 | - | - | - | 1 | 1 | 1 | 2 | 3 | 2 | 2 |
| CO3 | 3 | 3 | 2 | - | 2 | - | - | - | 1 | 1 | 1 | 2 | 3 | 2 | 2 |

Mapping strength: 3 – Strong 2 – Medium 1 – Low

Course Structure

| | | No. of Lecture Hours | No. of Tutorial Hours | No. of Practical Hours |
|-------------------|---|----------------------------|-----------------------------|------------------------------|
| Module – 1 | | | | |
| 1.1 | Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters, Diode Approximations, DC Load Line analysis, Diode Current Equation, Numerical | 3 | 2 | - |
| 1.2 | Zener Diodes: Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Numerical | 2 | 1 | - |
| Module – 2 | | | | |
| 2.1 | Diode Applications: Clipping and Clamping circuits, Zener Diode as Voltage Regulator, Line and Load regulation | 3 | 2 | |
| 2.2 | DC Power Supply: Rectifiers - Half Wave and Full Wave Rectification, Filter: Capacitor, Inductor, RC π Filter, Numerical | 1 | 1 | |
| Module – 3 | | | | |
| 3.1 | Bipolar Junction Transistors: Introduction: Types, Construction, Working Principle, Configurations: Common Base, Common Emitter, Common Collector and their Characteristics | 3 | 1 | - |
| 3.2 | BJT Biasing: Introduction, DC Load line and Bias point, Types, BJT as an Amplifier & Switch, Numerical | 2 | 1 | - |
| Module – 4 | | | | |
| 4.1 | Field Effect Transistor: Junction Field Effect Transistor, JFET Characteristics, JFET biasing circuits, Numerical | 2 | 1 | - |
| 4.2 | MOSFETs: Types, working principle and their characteristics- N-channel MOSFET, Different MOSFET architectures- Planar and non-planar structure (Introduction) | 2 | 2 | - |
| Module – 5 | | | | |
| 5.1 | Boolean Algebra: Binary numbers, Octal & Hexa Decimal Numbers, Number Base Conversion, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean | 4 | 2 | - |

| | | | | |
|-------------------------------------|---|-----------|-----------|----------|
| | Algebra, Boolean Functions, Canonical and Standard Forms. | | | |
| 5.2 | Digital Logic Circuits: Logic Gates, Combinational logic Circuits: Introduction, Design procedure, Adders- Half adder, Full adder, Multiplexer, Demultiplexer, Encoder, Decoder and Comparator (basic concepts). | 3 | 2 | - |
| Total No. of Lecture Hours | | 25 | - | - |
| Total No. of Tutorial Hours | | | 15 | - |
| Total No. of Practical Hours | | | | 0 |

Suggested Learning Resources:

- <https://nptel.ac.in/courses/122106025>
- <https://nptel.ac.in/courses/108105132>
- <https://nptel.ac.in/courses/117104072>

Books

1. Fundamentals of Microelectronics, Behzad Razavi, 3rd Edition, Wiley, 2021
2. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016
3. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8

Course Code: BESCK104C/204C**Course: Introduction to Electronics Communication****Credits: 3****L:T:P:S – 3:0:0:0****CIE: 50% Marks****SEE: 50% Marks****SEE Hours: 3 Hrs****Max. Marks: 100**

| | |
|-----------------------------|---|
| Prerequisites if any | |
| Learning objectives | Learn how to develop and employ electronic circuit models for elementary electronic components. |

Course Outcomes:*On the successful completion of the course, the student will be able to*

| COs | Course Outcomes | Bloom's level |
|-----|--|---------------|
| CO1 | Acquire knowledge on fundamental blocks of analog electronic systems | L2 |
| CO2 | Develop logic circuits of digital electronic systems using the basics of Boolean Algebra | L3 |
| CO3 | Understand the basic concepts of embedded systems & electronic communication systems. | L2 |

Mapping with POs and PSOs:

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | 3 | 2 | 2 | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | 3 | 2 | - | - | - | - | - | - | - | - | - | - | 3 | - | - |

Mapping strength: 3 – Strong 2 – Medium 1 – Low

Course Structure

| | | No. of Lecture Hours | No. of Tutorial Hours | No. of Practical Hours |
|-------------------|---|-------------------------------------|--------------------------------------|---------------------------------------|
| Module – 1 | | | | |
| 1.1 | Diodes: PN junction diodes, Zener Diodes | 2 | 0 | 0 |
| 1.2 | Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators. | 3 | 0 | 0 |
| 1.3 | Bipolar Junction Transistors – BJT as an amplifier, BJT as a switch | 3 | 0 | 0 |
| Module – 2 | | | | |
| 2.1 | Operational amplifiers - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op- amp circuits: Inverting and non-inverting amplifiers, | 3 | 0 | 0 |
| 2.2 | voltage follower, summer, subtractor, integrator, differentiator. | 2 | 0 | 0 |
| 2.3 | Oscillators – Introduction to Oscillators, Crystal controlled oscillators | 3 | 0 | 0 |
| Module – 3 | | | | |
| 3.1 | Boolean Algebra and Logic Circuits: Introduction to number systems, Basic definitions,Axiomatic Definition of Boolean Algebra, Basic Theorems and | 2 | 0 | 0 |
| 3.2 | Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms,Other Logic Operations | 4 | 0 | 0 |
| 3.3 | Digital Logic Gates, Adders- Half adder, Full adder, Multiplexer, demultiplexer, encoder,decoder, Flip-flop’s, counters. | 2 | 0 | 0 |
| Module – 4 | | | | |
| 4.1 | Embedded Systems – Definition, Embedded systems vs general computing systems,Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, | 4 | 0 | 0 |
| 4.2 | Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC. | 4 | 0 | 0 |
| Module – 5 | | | | |

| | | | | |
|-------------------------------------|--|-----------|----------|---|
| 5.1 | Introduction to communication systems: Communication systems and types modulation schIntroduction satellite, mobile and wireless communication, | 4 | 0 | 0 |
| 5.2 | Introduction to standards of mobile and wireless communication systems. Working principleof Bluetooth and WI-FI. | 4 | 0 | 0 |
| Total No. of Lecture Hours | | 40 | - | - |
| Total No. of Tutorial Hours | | | 0 | - |
| Total No. of Practical Hours | | | | - |

Self-learning topics:

1. Power devices
2. 555 timers
3. Ring and Johnson counters
4. Interfacing circuits
5. NFC

Textbooks:

1. Electronic Devices and Circuits, David A Bell, 5th Edition, Oxford, 2016
2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203-0417-8

Course Code: BETCK105J/205J**Course: Introduction to Embedded Systems****Credits: 3****L:T:P:S – 3:0:0:0****CIE: 50% Marks****SEE: 50% Marks****SEE Hours: 3 Hrs****Max. Marks: 100**

| | |
|-----------------------------|---|
| Prerequisites if any | |
| Learning objectives | To introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around. |

Course Outcomes:*On the successful completion of the course, the student will be able to*

| COs | Course Outcomes | Bloom's level |
|-----|--|---------------|
| CO1 | Explain basic concepts and applications of Digital Electronics and Embedded Systems. | L2 |
| CO2 | Explain the concept of sensors, actuators and operating systems. | L2 |
| CO3 | Apply the concepts of Embedded systems in different applications | L3 |

Mapping with POs and PSOs:

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO2 | 3 | - | - | - | - | - | - | - | - | - | - | - | 3 | - | - |
| CO3 | 3 | 2 | 1 | - | - | - | - | - | - | - | - | - | 3 | - | - |

Mapping strength: 3 – Strong 2 – Medium 1 – Low

Course Structure

| | | No. of Lecture Hours | No. of Tutorial Hours | No. of Practical Hours |
|-----------------------------------|--|----------------------------|-----------------------------|------------------------------|
| Module – 1 | | | | |
| 1.1 | Logic Gates, Combinational and Sequential circuits: Sum of products and products of sums, Minterms and Maxterms, Karnaugh map Minimization, simplification using map entered variables, | 3 | - | - |
| 1.2 | Half and Full Adders, Half and Full Subtractors, Multiplexer, | 2 | - | - |
| 1.3 | Demultiplexer, Decoders, Flip-flops, counters, shift registers | 3 | - | - |
| Module – 2 | | | | |
| 2.1 | Introduction to Embedded Systems: Application Domain, Features and characteristics, Model of Embedded Systems | 3 | - | - |
| 2.2 | Microcontroller vs Microprocessor, Example, Figures of Merit, Classification of MCU | 2 | - | - |
| 2.3 | History and current trends, Microcontroller Unit, A popular 8-bit MCU, Memory for Embedded systems | 3 | - | - |
| Module – 3 | | | | |
| 3 | Sensors and Actuators: Introduction, Sensors | 2 | - | - |
| 3.2 | Analog to Digital Converters, Types of sensors | 3 | - | - |
| 3.3 | Actuators, Types of Actuators and Examples | 3 | - | - |
| Module – 4 | | | | |
| 4 | Operating Systems: Embedded Operating Systems, Network Operating Systems | 3 | - | - |
| 4.2 | Layers, History, Functions, Terminologies associated with OS and Computer Usage | 2 | - | - |
| 4.3 | Kernel, Tasks, Processes, Scheduling Algorithm | 3 | - | - |
| Module – 5 | | | | |
| 5 | Example of Embedded Systems: Mobile Phones, Automotive Electronics | 2 | - | - |
| 5.2 | Radio Frequency Identification, Wireless Sensor Networks, Robotics | 3 | - | - |
| 5.3 | Bio Medical Applications, Brain Machine Interfaces | 3 | - | - |
| Total No. of Lecture Hours | | 40 | - | - |

| | | |
|-------------------------------------|----------|---|
| <i>Total No. of Tutorial Hours</i> | 0 | - |
| <i>Total No. of Practical Hours</i> | | - |

Textbooks:

1. Mano, Morris. "Digital logic." *Computer Design. Englewood Cliffs Prentice-Hall* (1979).
2. Das, Lyla B. *Embedded systems: An integrated approach.* Pearson Education India, 2012.

Reference Books:

1. Kumar, A. Anand. **Fundamentals of Digital Circuits** 2Nd Ed. PHI Learning Pvt. Ltd.,
2. Raj Kamal, **Embedded Systems**, Tata Mc Graw Hill, India, 2005.
3. Frank Vahid and Tony Givargis, "**Embedded Systems Design**" – A Unified Hardware/Software Introduction, John Wiley
4. Shibu K V, "**Introduction to Embedded Systems**", Second Edition, Mc Graw Hill

Course Code: BETCK105H/205H**Course: Introduction to Internet of Things****Credits: 3****L:T:P:S – 3:0:0:0****CIE: 50% Marks****SEE: 50% Marks****SEE Hours: 3 Hrs****Max. Marks: 100**

| | |
|-----------------------------|---|
| Prerequisites if any | |
| Learning objectives | <ul style="list-style-type: none"> ➤ Deployment strategies and networking technologies. ➤ Potential application of IoT in healthcare, environment, and self-aware things. |

Course Outcomes:*On the successful completion of the course, the student will be able to*

| COs | Course Outcomes | Bloom's level |
|------------|--|----------------------|
| CO1 | Explain basics of networking, IoT networking components and IoT Framework. | L2 |
| CO2 | Understand the significance of various sensing devices and actuator types. | L2 |
| CO3 | Explain different Protocols and analyse IoT in real world applications. | L4 |

Mapping with POs and PSOs:

| COs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| CO1 | 3 | - | - | - | 1 | - | - | - | - | - | - | 1 | 3 | 1 | 1 |
| CO2 | 3 | - | - | - | 1 | - | - | - | - | - | - | 1 | 3 | 1 | 1 |
| CO3 | 3 | - | - | - | 1 | - | - | - | - | - | - | 1 | 3 | 1 | 1 |

Mapping strength: 3 – Strong 2 – Medium 1 – Low

Course Structure

| | | No. of Lecture Hours | No. of Tutorial Hours | No. of Practical Hours |
|-------------------------------------|--|----------------------------|-----------------------------|------------------------------|
| Module – 1 | | | | |
| 1.1 | Basics of Networking: Introduction, Network Types, Layered network models, IoT Networking Components. | 4 | 0 | - |
| 1.2 | IoT Definitions, IoT Frameworks, Internet of things application examples, Structural Aspects of the IoT. | 4 | 0 | - |
| Module – 2 | | | | |
| 2.1 | IoT Sensing and Actuation: Introduction, Sensors, Sensor Characteristics, Sensorial Deviat Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics | 8 | 0 | - |
| Module – 4 | | | | |
| 3.1 | IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. | 5 | 0 | - |
| 3.2 | IoT Connectivity Technologies: LoRA, NB-IoT, Wifi and Bluetooth. | 3 | 0 | - |
| Module – 5 | | | | |
| 4.1 | IoT Communication Technologies: Introduction and Infrastructural Protocols: IPV4/IPV6. | 4 | 0 | - |
| 4.2 | Data Protocols: MQTT, CoAP and REST. | 4 | 0 | - |
| 5.1 | Associated IoT Technologies Cloud Computing: Introduction, Virtualization, Cloud Mode Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. | 4 | 0 | - |
| 5.2 | IoT case studies and future trends: Vehicular IoT, Healthcare IoT, Agricultural IoT. | 4 | 0 | - |
| Total No. of Lecture Hours | | 40 | - | - |
| Total No. of Tutorial Hours | | | 0 | -- |
| Total No. of Practical Hours | | | | - |

Textbook:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, “**Introduction to IoT**”, Cambridge University Press 2021.
2. Daniel Minoli, “**Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications**”, Wiley, 2013.

Reference Books:

1. S. Misra, C. Roy, and A. Mukherjee, 2020. **Introduction to Industrial Internet of Things and Industry 4.0** CRC Press.
2. Vijay Madiseti, Arshdeep Bahga, “**Internet of Things A Hands-On- Approach**”, 2014.
3. Francis da Costa, “**Rethinking the Internet of Things: A Scalable Approach to Connecting Everything**”, 1st Edition, Apress Publications, 2013

