



HINDUSTAN
INSTITUTE OF TECHNOLOGY & SCIENCE
(DEEMED TO BE UNIVERSITY)

DEPARTMENT OF ELECTRICAL ANDELECTRONICS ENGINEERING

CURRICULUM AND SYLLABUS

Under CBCS

(Applicable for Students admitted from Academic Year 2021-22)

B. Tech. Electrical and Computer Engineering

DEPARTMENT OF ELECTRICAL AND ELECTRONICSENGINEERING

SCHOOL OF ELECTRICAL SCIENCES

HINDUSTAN INSTITUTE OF TECHNOLOGY & SCIENCE VISION AND MISSION

MOTTO

To make every man a success and no man a failure.

VISION

To be an International Institute of Excellence, providing a conducive environment for education with a strong emphasis on innovation, quality, research and strategic partnership blended with values and commitment to society.

MISSION

- To create an ecosystem for learning and world class research.
- To nurture a sense of creativity and innovation.
- To instill highest ethical standards and values with a sense of professionalism.
- To take up activities for the development of Society.
- To develop national and international collaboration and strategic partnership with industry and institutes of excellence.
- To enable graduates to become future leaders and innovators

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING VISION AND MISSION

Vision

To educate the students in the recent developments of emerging fields in Electrical, Electronics and Computer Engineering, to encourage research activities, innovative techniques and to develop managerial abilities so as to make them excel globally with ethical values.

Mission

M1: To empower students with state-of-art knowledge and technological skills in Electrical ,Electronics and Computer Engineering.

M2: To provide practical skills in the advancements of the Electrical and Computer Engineering field to meet the emerging industrial requirement.

M3: To mould students for research, innovation and entrepreneurship.

M4: To inculcate managerial and professional capabilities with ethics and human values.

B. Tech. ELECTRICAL AND COMPUTER ENGINEERING

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

The Program Educational Objectives (PEOs) of **B.Tech. Electrical and Computer Engineering** are listed below:

The graduate after 3-5 years of programme completion will

PEO I Excel in his/her professional career and/or pursue higher education including research by applying the knowledge of Electrical and Computer Engineering

PEO II Demonstrate the technical skills to analyze, model, design and develop appropriate solutions for problems using advanced techniques with social consciousness and ethical values.

PEO III Apply Electrical and Computer engineering to address real world problems and adapt to the dynamic changes in the industry requirements

PROGRAM OUTCOMES (ALIGNED WITH GRADUATE ATTRIBUTES) (PO)

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

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

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

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

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

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

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOMES (PSO)

On completion of the B.Tech. Electrical and Computer Engineering degree the graduates will be able to

- **PSO1:** Apply mathematical, conceptual knowledge of Electrical and computing, and analytical skills to solve complex engineering problems, and develop electrical components and systems.

PSO2: Integrate the knowledge of fundamental electronics, power system, control system, programming, machine learning and embedded systems for designing industrial control system.

PSO3: Contribute for the development of smart power grid, electric vehicle, and integrating green energy to meet the increasing demand of the society and industry.

PROGRAMME CURRICULUM: COURSE GRID

| B.TECH –ELECTRICAL AND COMPUTER ENGINEERING | | | | | | | | | |
|---|-----------------|----------------------|---|-----------|----------|-----------|-----------------------|----------|-------------------|
| (165 CREDIT STRUCTURE) | | | | | | | | | |
| SEMESTER – I | | | | | | | | | |
| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
| 1 | BS | MEB4101/ ELA4101 | Engineering Graphics And Computer Aided Design / Professional English and soft skills | 1 | 1 | 2 | 3 | 1 | 4 |
| 2 | BS | MAA4102 | Applied Linear Algebra | 3 | 0 | 2 | 4 | 1 | 5 |
| 3 | BS | PHA4102/ CYA4101 | Engineering Physics / Engineering Materials | 3 | 0 | 0 | 3 | 1 | 3 |
| 4 | PC | CSA4101/ GEA4102 | Problem solving using C* / Sustainable Engineering Systems | 2 | 0 | 2* | 3/2 | 1 | 4/3 |
| 5 | PC | EEB4101 / EEB4118 | Introduction to Digital Systems / Engineering And Design | 3 | 0 | 0 | 3 | 1 | 3 |
| 6 | BS | EAA4131 | Engineering Immersion Lab | 0 | 0 | 2 | 0.5 | 2 | 2 |
| 7 | BS | PHA4131/ CYA4131 | Engineering Physics / Materials Chemistry Lab | 0 | 0 | 2 | 1 | 0 | 2 |
| Total | | | | 12 | 1 | 10 | 17.5/ 16.5 | 7 | 23/ 22 |
| *Project based learning | | | | | | | | | |
| SEMESTER – II | | | | | | | | | |
| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
| 1 | BS | MAA4118 | Vector Calculus and Transforms | 3 | 0 | 2 | 4 | 1 | 5 |
| 2 | BS | PHA4102/ CYA4101 | Engineering Physics / Engineering Materials | 3 | 0 | 0 | 3 | 1 | 3 |
| 3 | BS | MEB4101/ ELA4101 | Engineering Graphics And Computer Aided Design / Professional English and soft skills | 1 | 1 | 2 | 3 | 1 | 4 |
| 4 | PC | CSA4101/ GEA4102 | Problem solving using C* / Sustainable Engineering Systems | 2 | 0 | 2* | 2/3 | 1 | 3/4 |
| 5 | PC | EEB4101 / EEB4118 | Introduction to Digital Systems / Engineering And Design | 2 | 0 | 2 | 3 | 1 | 4 |
| 6 | PC | CSB4117 | Data Structures Using C | 3 | 0 | 0 | 3 | 1 | 3 |
| 7 | PC | ESB4117 | Electrical and Electronics Circuits | 3 | 0 | 2 | 4 | 0 | 5 |
| 8 | PC | CSB4146 | Data Structures Lab | 0 | 0 | 3 | 1 | 0 | 3 |

| | | | | | | | | | |
|--------------|----|---------------------|--|-----------|----------|-------------------|-----------------------|----------|-------------------|
| 9 | BS | EEA4131 | Engineering Immersion Lab | 0 | 0 | 2 | 0.5 | 2 | 2 |
| 10 | BS | PHA4131/ CYA4131 | Engineering Physics / Materials Chemistry Lab | 0 | 0 | 2 | 1 | 1 | 2 |
| Total | | | | 17 | 1 | 15/ 17 | 24.5/ 25.5 | 9 | 34/ 35 |

SEMESTER – III

| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TC H |
|--------------|-----------------|-------------|---|-----------|----------|----------|-----------|----------|-----------|
| 1 | BS | MAA4202 | Applied Statistics for Electrical Engineers | 3 | 0 | 2 | 4 | 2 | 5 |
| 2 | PC | ESB4201 | Electromagnetic Theory | 3 | 0 | 0 | 3 | 1 | 3 |
| 3 | PC | CSB4118 | Object Oriented Programming using C++ | 3 | 0 | 2 | 4 | 1 | 5 |
| 4 | PC | CSB4203 | Java Programming | 3 | 0 | 2 | 4 | 1 | 5 |
| 5 | DE | | Department Elective-I | 3 | 0 | 0 | 3 | 0 | 3 |
| 6 | NE | | Non Department Elective- I | 2 | 0 | 0 | 2 | 0 | 2 |
| 7 | PC | ESB4231 | Design Project – I | 0 | 0 | 3 | 1 | 0 | 3 |
| Total | | | | 17 | 0 | 9 | 21 | 5 | 26 |

SEMESTER – IV

| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
|--------------|-----------------|-------------|-------------------------------------|-----------|----------|----------|-----------|----------|-----------|
| 1 | BS | MAA4219 | Resource Management Technique | 3 | 1 | 0 | 4 | 1 | 4 |
| 2 | PC | ESB4216 | Signals and System | 3 | 0 | 0 | 3 | 1 | 3 |
| 3 | PC | ESB4217 | Electrical machines | 3 | 0 | 0 | 3 | 1 | 3 |
| 4 | PC | CSB4218 | Operating System | 3 | 0 | 0 | 3 | 1 | 3 |
| 5 | BS | GEA4216 | Professional Ethics and Life Skills | 2 | 0 | 0 | 2 | 0 | 2 |
| 6 | DE | | Department Elective-II | 3 | 0 | 0 | 3 | 0 | 3 |
| 7 | NE | | Non Department Elective–II | 2 | 0 | 0 | 2 | 0 | 2 |
| 8 | PC | ESB4241 | Electrical machines Lab | 0 | 0 | 3 | 1 | 0 | 3 |
| 9 | PC | CSB4242 | Operating System Lab | 0 | 0 | 3 | 1 | 0 | 3 |
| 10 | PC | ESB4243 | Design Project II | 0 | 0 | 3 | 1 | 0 | 3 |
| Total | | | | 19 | 1 | 9 | 23 | 4 | 29 |

| SEMESTER – V | | | | | | | | | |
|--------------|-----------------|-------------|-------------------------------|-----------|----------|----------|-----------|----------|-----------|
| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
| 1 | PC | ESB4301 | Control Systems | 3 | 1 | 0 | 4 | 1 | 4 |
| 2 | PC | ESB4302 | Transmission and Distribution | 3 | 0 | 0 | 3 | 1 | 3 |
| 3 | PC | ESB4303 | Analog Electronics | 3 | 0 | 3 | 4 | 0 | 6 |
| 4 | PC | ESB4304 | Sensor and sensor networks | 3 | 0 | 0 | 3 | 1 | 3 |
| 5 | DE | | Department Elective-III | 3 | 0 | 0 | 3 | 0 | 3 |
| 6 | NE | | Non Department Elective–III | 2 | 0 | 0 | 2 | 0 | 2 |
| 7 | PC | ESB4331 | Control System Laboratory | 0 | 0 | 3 | 1 | 0 | 3 |
| 8 | PC | ESB4332 | Design Project III | 0 | 0 | 3 | 1 | 0 | 3 |
| Total | | | | 17 | 1 | 9 | 21 | 3 | 27 |

| SEMESTER – VI | | | | | | | | | |
|---------------|-----------------|-------------|----------------------------------|-----------|----------|-----------|-----------|----------|-----------|
| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
| 1 | PC | ESB4316 | Power Electronics and Drives | 3 | 0 | 3 | 4 | 1 | 6 |
| 2 | PC | ESB4317 | Power System Analysis | 3 | 0 | 0 | 3 | 1 | 3 |
| 3 | PC | CSB4202 | Data Base Management Systems | 3 | 0 | 0 | 3 | 1 | 3 |
| 4 | PC | CSB4317 | Machine Learning | 3 | 0 | 2 | 4 | 1 | 5 |
| 5 | BS | GEA4304 | Business Economics | 2 | 0 | 0 | 2 | 0 | 2 |
| 6 | DE | | Department Elective-IV | 3 | 0 | 0 | 3 | 0 | 3 |
| 7 | NE | | Non Department Elective -IV | 2 | 0 | 0 | 2 | 0 | 2 |
| 8 | PC | ESB4341 | Power System Simulation Lab | 0 | 0 | 3 | 1 | 0 | 3 |
| 9 | PC | CSB4232 | Data Base Management Systems Lab | 0 | 0 | 3 | 1 | 0 | 3 |
| 10 | PC | ESB4343 | Design Project IV | 0 | 0 | 3 | 1 | 0 | 3 |
| Total | | | | 19 | 0 | 13 | 24 | 4 | 33 |

| SEMESTER – VII | | | | | | | | | |
|----------------|-----------------|-------------|--|---|---|---|---|---|-----|
| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
| 1 | PC | ESB4401 | Smart Grid and IoT | 3 | 0 | 0 | 3 | 1 | 3 |
| 2 | PC | ESB4402 | Artificial intelligence for Electrical Engineers | 3 | 0 | 0 | 3 | 1 | 3 |

| | | | | | | | | | |
|--------------|----|---------|-----------------------------|-----------|----------|----------|-----------|----------|-----------|
| 3 | PC | ESB4403 | Electric Vehicle Technology | 3 | 0 | 0 | 3 | 2 | 3 |
| 4 | PC | ESB4404 | Real Time Embedded System | 3 | 0 | 0 | 3 | 1 | 3 |
| 5 | PC | CSB4402 | Big Data and Analytics | 3 | 0 | 0 | 3 | 1 | 3 |
| 6 | DE | | Department Elective - V | 3 | 0 | 0 | 3 | 0 | 3 |
| 7 | NE | | Non Department Elective – V | 2 | 0 | 0 | 2 | 0 | 2 |
| 8 | PC | ESB4431 | Comprehension | 0 | 0 | 3 | 1 | 0 | 3 |
| 9 | PC | ESB4432 | Design Project – V | 0 | 0 | 3 | 1 | 0 | 3 |
| Total | | | | 20 | 0 | 6 | 22 | 6 | 26 |

SEMESTER – VIII

| SL. NO | COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
|--------|-----------------|-------------|----------------------------------|---|---|----|----|---|-----|
| 1 | PC | ESB4441 | Industrial Project & Viva – voce | 0 | 0 | 24 | 12 | 0 | 24 |

Total credits**165****LIST OF DEPARTMENTAL ELECTIVES WITH GROUPING**

| COURSE CATEGORY | COURSE CODE | NAME OF THE COURSE | L | T | P | C | S | TCH |
|---------------------|-------------|---|---|---|---|---|---|-----|
| III Semester | | | | | | | | |
| DE | ESD4251 | Electrical Safety | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4252 | Microcontroller and Embedded Systems | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4253 | Introduction to Electric Vehicle | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | CSB4216 | Computer Organization and Architecture | 3 | 0 | 0 | 3 | 0 | 3 |
| IV Semester | | | | | | | | |
| DE | ESD4266 | Renewable Power Generation Technologies | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4267 | Power Plant Engineering | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4268 | Internet of Things | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4269 | EV Battery and Energy Storage | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | CSB4217 | Computer Networks | 3 | 0 | 0 | 3 | 0 | 3 |
| V Semester | | | | | | | | |
| DE | ESD4351 | Design of Electrical Apparatus | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4352 | High Voltage Engineering | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4353 | Embedded IoT | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4354 | Industrial IoT | 3 | 0 | 0 | 3 | 0 | 3 |

| | | | | | | | | |
|---------------------|---------|--|---|---|---|---|---|---|
| DE | ESD4355 | Electric Vehicle in Smart Grid | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | CSC4266 | Mobile Application Development | 3 | 0 | 0 | 3 | 0 | 3 |
| VI Semester | | | | | | | | |
| DE | ESD4366 | Power System and Smart Grid | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4367 | Advanced Control Theory | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4368 | IoT Application development using Mobile phone | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4369 | Power Electronics Converter for Electric Vehicle | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4370 | Basic Python Programming | 3 | 0 | 0 | 3 | 0 | 3 |
| VII Semester | | | | | | | | |
| DE | ESD4451 | Utilization of Electrical Power | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4452 | Power system Protection Control and stability | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4453 | Industrial Automation | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4454 | Embedded system for Electric and Hybrid Vehicles | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | ESD4455 | Electric Vehicle Design | 3 | 0 | 0 | 3 | 0 | 3 |
| DE | CSB4319 | Software Engineering | 3 | 0 | 0 | 3 | 0 | 3 |

Electives are grouped according to the following domains

Power & Energy systems

IoT& Embedded System

Electric Vehicle Design

Advanced Computer Applications