# COEP Technological University Pune

**(A Unitary Public Univresity of Govt. of Maharashtra)**

## School of Electrical and Communication Engineering

**Curriculum Structure All Four Year**

## Electrical Engineering, E & TC, Instrumentation and Control

(F.Y. Structure Effective from: A.Y. 2023-24)

List of Abbreviations

|  |  |
| --- | --- |
| **Abbreviation** | **Title** |
| BS | Basic Science Course |
| ESC | Engineering Science Course |
| PCC | Programme Core Course (PCC) |
| PEC | Programme Elective Course (PEC) |
| OE/SE | Open/School Elective (OE/SE) other than particular program |
| MD M | Multidisciplinary Minor (MD M) |
| VSEC | Vocational and Skill Enhancement Course (VSEC) |
| HSMC | Humanities Social Science and Management |
| IKS | Indian Knowledge System (IKS) |
| VEC | Value Education Course (VEC) |
| RM | Research Methodology (RM) |
| -- | Internship |
| -- | Project |
| CEA | Community Engagement Activity (CEA)/Field Project |
| CCA | Co-curricular & Extracurricular Activities (CCA) |

## F.Y. B. Tech.

### Electrical Engineering, E & TC, Instrumentation and Control

**Semester -I**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | BS-01 | Matrix Algebra, Calculus and Probability | 2 | 1 | 0 | 1 | 3 | BSC |
| 02 | BS-02 | Engineering Chemistry | 2 | 0 | 2 | 1 | 3 | BSC |
| 03 | BS-03 | Biology for Engineers | 2 | 0 | 0 | 1 | 2 | BSC |
| 04 | ES-01 | Elements of Electronics Engineering | 2 | 0 | 2 | 1 | 3 | ESC |
| 05 | ES-02 | Engineering Mechanics | 2 | 0 | 2 | 1 | 3 | ESC |
| 06 | ES-03 | Programming for problem solving | 2 | 0 | 2 | 2 | 3 | ESC |
| 07 | HSMC- 01 | Indian Knowledge System | 2 | 0 | 0 | 1 | 2 | IKS |
| 08 | CCA-01 | Liberal Learning course - I | 0 | 0 | 2 | 2 | 1 | CCA |
| **Total** | | | **14** | **01** | **10** | **10** | **20** |  |

**Semester -II**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | BS-04 | Differential Equations and Complex Algebra | 2 | 1 | 0 | 1 | 3 | BSC |
| 02 | BS-05 | Engineering Physics | 2 | 0 | 2 | 1 | 3 | BSC |
| 03 | ES-04 | Basic Electrical Engineering | 2 | 0 | 2 | 1 | 3 | ESC |
| 04 | ES-05 | Engineering Drawing and Graphics | 1 | 0 | 4 | 1 | 3 | ESC |
| 05 | PCC-01 | Fundamentals of measurement and sensors | 2 | 0 | 2 | 1 | 3 | PCC |
| 06 | VSEC- 01 | Data Visualization and Pre-processing | 1 | 0 | 2 | 2 | 2 | VSEC |
| 07 | HSMC- 02 | Communication Skills | 1 | 0 | 2 | 0 | 2 | AEC |
| 08 | CCA-02 | Liberal Learning course - II | 0 | 0 | 2 | 2 | 1 | CCA |
| **Total** | | | **11** | **01** | **16** | **09** | **20** |  |

* Exit option to qualify for Certification, common at the School Level:
  + Printed Circuit Board (PCB) Design and Production (3 Credits)
  + Electrical Workshop (3 Credits)
  + Instrumentation Workshop (3 Credits)
* Note: Exiting students need to take one SEC from his/her discipline and the other of his/her choice.

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**(A Unitary Public Univresity of Govt. of Maharashtra)**

## School of Electrical and Communication Engineering

**Curriculum Structure SY, TY and Final Year**

## Electrical Engineering

(F.Y. Structure Effective from: A.Y. 2023-24)

**S.Y. B. Tech. in Electrical Engineering**

[Regular]

**[Level 5, UG Diploma] Regular Students Semester -III**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Course Type** | **Course Code** | **Course Name** | **L** | **T** | **P** | **S** | **Cr** | **Evaluation Scheme (Weightages in %)** | | | | |
| **Theory** | | | **Laboratory** | |
| MSE | TA | ESE | ISE | ESE |
| 01 | PCC | *<tbd>* | Signals and Systems | 2 | 1 | 0 | 1 | 3 | 30 | 10 | 60 | -- | -- |
| 02 | PCC | *<tbd>* | Electric Circuit Analysis | 2 | 0 | 2 | 1 | 3 | 30 | 20 | 50 | 50 | 50 |
| 03 | PCC | *<tbd>* | Analog and Digital Electronics | 3 | 0 | 2 | 1 | 4 | 30 | 10 | 60 | 50 | 50 |
| 04 | OE | *<tbd>* | Open Elective - I | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 05 | HSMC | *<tbd>* | Indian language | 2 | 0 | 0 | 1 | 2 | CIE: 100 | | | -- | -- |
| 06 | VEC | *<tbd>* | Environmental Studies | 1 | 0 | 0 | 2 | 1 | CIE: 100 | | | -- | -- |
| 07 | CEA | *<tbd>* | Community Engagement Activity (CEA)/Field Project | - | - | - | - | 2 | -- | -- | -- | CIE: 100 | |
| 08 | HSMC | *<tbd>* | Entrepreneurship | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 09 | HSMC | *<tbd>* | Design Thinking and Idea | - | - | 2 | 1 | 1 | -- | -- | -- | CIE: 100 | |
| **Total** | | | | **14** | **01** | **06** | **09** | **20** |  | | | | |

**[Level 5, UG Diploma] Semester -IV**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Course Type** | **Course Code** | **Course Name** | **L** | **T** | **P** | **S** | **Cr** | **Evaluation Scheme (Weightages in %)** | | | | |
| **Theory** | | | **Laboratory** | |
| MSE | TA | ESE | ISE | ESE |
| 01 | PCC | *<tbd>* | Microcontrollers and Applications | 3 | 0 | 2 | 1 | 4 | 30 | 10 | 60 | 50 | 50 |
| 02 | PCC | *<tbd>* | Electromagnetic Fields | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 03 | PCC | *<tbd>* | Electrical Machines | 3 | 0 | 2 | 1 | 4 | 30 | 10 | 60 | 50 | 50 |
| 04 | PCC | *<tbd>* | Numerical Methods and Computer Programming | 1 | 0 | 2 | 1 | 2 | CIE:100 | | | 50 | 50 |
| 05 | VEC-2 | *<tbd>* | Constitution of India | 1 | 0 | 0 | 2 | 1 | CIE: 100 | | | -- | -- |
| 06 | OE | *<tbd>* | Open Elective - II | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 07 | VSEC | *<tbd>* | Cornerstone Project-I | 0 | 0 | 4 | 2 | 2 | -- | -- | -- | 50 | 50 |
| 08 | MD M | *<tbd>* | Multidisciplinary Minor - I | 2 | 0 | 2 | 1 | 3 | 30 | 20 | 50 | 50 | 50 |
| **Total** | | | | **14** | **00** | **12** | **10** | **20** |  | | | | |

**Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits**

**ISE-In-Semester-Evaluation, ESE-End-Semester-Evaluation, MSE-Mid-Semester-Evaluation, TA-Teachers’ Assessment, CIE-Continuous-Internal-Evaluation**

**Exit option to qualify for UG Diploma:**

* Electrical Installation, Estimation and Costing (3 Credits)
* PLC for Industrial Automation (3 Credits)

**S. Y. B. Tech. Electrical Engineering**

**[Level 5, UG Diploma] - Semester -III**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Course Type** | **Course Code** | **Course Name** | **L** | **T** | **P** | **S** | **Cr** | **Evaluation Scheme (Weightages in %)** | | | | |
| **Theory** | | | **Laboratory** | |
| MSE | TA | ESE | ISE | ESE |
| 01 | PCC | *<tbd>* | Signals and Systems | 2 | 1 | 0 | 1 | 3 | 30 | 10 | 60 | -- | -- |
| 02 | PCC | *<tbd>* | Electric Circuit Analysis | 2 | 0 | 2 | 1 | 3 | 30 | 20 | 50 | 50 | 50 |
| 03 | PCC | *<tbd>* | Analog and Digital Electronics | 3 | 0 | 2 | 1 | 4 | 30 | 10 | 60 | 50 | 50 |
| 04 | BS-06 | *<tbd>* | Matrices, Differential Calculus and Probability | 3 | 0 | 0 | 1 | 3 | 30 | 10 | 60 | --- | --- |
| 05 | OE | *<tbd>* | Open Elective - I | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 06 | HSMC | *<tbd>* | Indian language | 2 | 0 | 0 | 1 | 2 | CIE: 100 | | | -- | -- |
| 07 | VEC | *<tbd>* | Environmental Studies | 1 | 0 | 0 | 2 | 1 | CIE: 100 | | | -- | -- |
| 08 | CEA | *<tbd>* | Community Engagement Activity (CEA)/Field Project | - | - | - | - | 2 | -- | -- | -- | CIE: 100 | |
| 09 | HSMC | *<tbd>* | Entrepreneurship | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 10 | HSMC | *<tbd>* | Design Thinking | - | - | 2 | 1 | 1 | -- | -- | -- | CIE: 100 | |
| **Total** | | | | **17** | **01** | **06** | **11** | **23** |  | | | | |

**[Level 5, UG Diploma]**

**Lateral Entry Students Semester -IV**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Course Type** | **Course Code** | **Course Name** | **L** | **T** | **P** | **S** | **Cr** | **Evaluation Scheme (Weightages in %)** | | | | |
| **Theory** | | | **Laboratory** | |
| MSE | TA | ESE | ISE | ESE |
| 01 | PCC | *<tbd>* | Microcontrollers and Applications | 3 | 0 | 2 | 1 | 4 | 30 | 10 | 60 | 50 | 50 |
| 02 | PCC | *<tbd>* | Electromagnetic Fields | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 03 | PCC | *<tbd>* | Electrical Machines | 3 | 0 | 2 | 1 | 4 | 30 | 10 | 60 | 50 | 50 |
| 04 | PCC | *<tbd>* | Numerical Methods and Computer Programming | 1 | 0 | 2 | 1 | 2 | CIE:100 | | | 50 | 50 |
| 05 | VEC-2 | *<tbd>* | Constitution of India | 1 | 0 | 0 | 2 | 1 | CIE: 100 | | | -- | -- |
| 06 | OE | *<tbd>* | Open Elective - II | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 07 | VSEC | *<tbd>* | Cornerstone Project-I | 0 | 0 | 4 | 2 | 2 | -- | -- | -- | 50 | 50 |
| 08 | MDM | *<tbd>* | Multidisciplinary Minor - I | 2 | 0 | 2 | 1 | 3 | 30 | 20 | 50 | 50 | 50 |
| 09 | HSMC | *<tbd>* | Communication Skills | 1 | 0 | 2 | 0 | 2 | CIE:100 | | | CIE:100 | |
| **Total** | | | | **15** | **00** | **14** | **10** | **22** |  | | | | |

**Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits**

**ISE-In-Semester-Evaluation, ESE-End-Semester-Evaluation, MSE-Mid-Semester-Evaluation, TA-Teachers’ Assessment, CIE-Continuous-Internal-Evaluation**

**Exit option to qualify for UG Diploma:**

* Electrical Installation, Estimation and Costing (3 Credits)
* PLC for Industrial Automation (3 Credits)

### Open Electives

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr. No.** | **Course Type** | **Course Code** | **Course Name** | **L** | **T** | **P** | **S** | **Cr** | **Evaluation Scheme (Weightages in %)** | | | | |
| **Theory** | | | **Laboratory** | |
| MSE | TA | ESE | ISE | ESE |
| 01 | OE-I | *<tbd>* | Electrical Machines and Drives | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 02 | OE-II | *<tbd>* | Principles of Electronic Communication | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| 03 | OE-III | *<tbd>* | Sensors and Actuators | 2 | 0 | 0 | 1 | 2 | 30 | 20 | 50 | -- | -- |
| **Total** | | | | **6** | **0** | **0** | **3** | **6** |  | | | | |

### Additional Credits for Exits

### After Completion of Second Year

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Cr** | **Category** |
| 01 | VSEC- 02 | Electrical Installation, Estimation and Costing | 1 | 0 | 4 | 3 | VSEC |
| 02 | VSEC- 03 | PLC for Industrial Automation | 1 | 0 | 4 | 3 | VSEC |
|  |  | **Total** | **02** | **00** | **08** | **06** |  |

**T.Y. B. Tech. in Electrical Engineering**

**Semester -V**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-10 | Digital Signal Processing | 2 | 0 | 2 | - | 3 | PCC |
| 02 | PCC-11 | Synchronous Machines | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-12 | Control Systems | 3 | 0 | 0 | 1 | 3 | PCC |
| 04 | PEC-01 | Program Specific Elective I | 3 | 0 | 2 | 1 | 4 | PEC |
| 05 | OE-03 | Open Elective – III | 2 | 0 | 0 | 1 | 2 | OE |
| 06 | OJT-01 | Internship | -- | -- | -- | -- | 3 | OJT |
| 07 | MD M- 02 | Multidisciplinary Minor - II | 3 | 0 | 0 | 1 | 4 | MD M |
| **Total** | | | **15** | **00** | **08** | **05** | **23** |  |

**Semester -VI**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-13 | Power Electronics and Drives | 3 | 0 | 2 | 1 | 4 | PCC |
| 02 | PCC-14 | Control System Design | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-15 | Power System Operation and Control | 3 | 0 | 2 | 1 | 4 | PCC |
| 04 | PEC-02 | Program Specific Elective II | 2 | 0 | 2 | 1 | 3 | PEC |
| 05 | VSEC- 03 | Cornerstone Project-II | 0 | 0 | 4 | -- | 2 | VSEC |
| 06 | MD M- 03 | Multidisciplinary Minor - III | 2 | 0 | 2 | 1 | 4 | MD M |
|  |  | **Total** | **13** | **00** | **14** | **05** | **20** |  |

Exit option to qualify for B. Voc. :

* Internship of 8 weeks

**Final Year B. Tech. in Electrical Engineering**

**Semester -VII**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-16 | Digital Protection and Switchgears | 3 | 0 | 2 | 1 | 4 | PCC |
| 02 | PCC-17 | Electric Drives | 3 | 0 | 0 | 1 | 3 | PCC |
| 03 | PEC-03 | Program Specific Elective III | 2 | 0 | 2 | 1 | 3 | PEC |
| 04 | PEC-04 | Program Specific Elective IV | 2 | 0 | 2 | 1 | 3 | PEC |
| 05 | RM | Research Methodology | 2 | 0 | 0 | -- | 2 | RM |
| 06 | OJT-02 | Internship | - | - | - | -- | 3 | OJT |
| 07 | MD M- 04 | Multidisciplinary Minor -IV | 3 | 0 | 0 | 1 | 3 | MD M |
| **Total** | | | **15** | **00** | **06** | **05** | **21** |  |

**Semester -VIII**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PEC-05 | Program Specific Elective - MOOC-I | 3 | 0 | 0 | -- | 3 | PEC |
| 02 | PEC-06 | Program Specific Elective - MOOC- II | 3 | 0 | 0 | -- | 3 | PEC |
| 03 | OJT-03/ VSEC-03 | Internship cum Capstone Project | - | - | - | -- | 6 | OJT/VSEC |
| **Total** | | | **06** | **00** | **00** | **00** | **12** |  |

### Program Elective Courses (PECs)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **PEC/Sem** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** |
| Sustainable Mobility | Electrical Machines | Power Systems | Control Systems | Renewable Energy Systems |
| PEC - 1/V | Energy Storage Systems | Electrical Machine Design | Utilization of Electrical Energy | Mathematical Modelling of Dynamic  Systems | Energy Economics |
| PEC - 2/VI | Motor Control for Electric  Mobility | Analysis of Electric Machinery | High Voltage Engineering | Motor Control for Electric  Mobility | Distributed Generation |
| PEC - 3/VII | Converters for Electric Vehicles | Condition Monitoring of Electrical Machines | Smart Grid Technologies | Intelligent Control | Solar and Wind Energy Systems |
| PEC - 4/VII | Machine Learning and Artificial Intelligence for Electric Vehicles | Machine Learning and Artificial Intelligence | Applications of Machine Learning and Artificial Intelligence in Power Systems | Machine Learning and Artificial Intelligence | Applications of Machine Learning and Artificial Intelligence in Renewable  Energy |
| PEC - 5/ VIII | MOOC Courses offered by NPTEL/SWAYAM | | | | |
| PEC - 6/ VIII | MOOC Courses offered by NPTEL/SWAYAM | | | | |

**Open Electives**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | OE – I | Electrical Machines and Drives | 2 | 0 | 0 | -- | 2 | OE |
| 02 | OE – II | Principles of Electronic Communication | 2 | 0 | 0 | -- | 2 | OE |
| 03 | OE - III | Sensors and Actuators | 2 | 0 | 0 | 1 | 2 | OE |
|  | | **Total** | **6** | **0** | **0** | **1** | **6** |  |

### Additional Credits for Exits

After Completion of Second Year

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Cr** | **Category** |
| 01 | VSEC- 02 | Electrical Installation, Estimation and Costing | 1 | 0 | 4 | 3 | VSEC |
| 02 | VSEC- 03 | PLC for Industrial Automation | 1 | 0 | 4 | 3 | VSEC |
|  |  | **Total** | **02** | **00** | **08** | **06** |  |

After Completion of Third Year

* + **Eight Weeks Internship**

### Multidisciplinary Minor

**Title: Electrical Energy Systems**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| IV | MD M-01 | Clean and Green Energy | 3 | 0 | 0 | 1 | 3 |
| V | MD M-02 | Energy Resources, Economics and Environment | 3 | 0 | 2 | 1 | 4 |
| VI | MD M-03 | Energy Audit and Management | 3 | 0 | 2 | 1 | 4 |
| VII | MD M-04 | Multidisciplinary Project | 0 | 0 | 4 | 1 | 3 |
| **Total** | | | **11** | **0** | **8** | **4** | **14** |

### Interdisciplinary Minor - I

**Title: Electric Mobility**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| III | ID M-01 | Introduction to Electric Mobility | 3 | 0 | 0 | 1 | 3 |
| IV | ID M-02 | Converters for Electric Vehicles | 3 | 0 | 2 | 1 | 4 |
| V | ID M-03 | Auto SAR | 3 | 0 | 2 | 1 | 4 |
| VI | ID M-04 | Electric Drives for Electric Vehicles | 3 | 0 | 2 | 1 | 4 |
| VII | ID M-05 | Energy Storage Systems | 3 | 0 | 0 | 1 | 3 |
|  |  | **Total** | **15** | **00** | **06** | **05** | **18** |

### Interdisciplinary Minor - II

**Title: Renewable Energy Systems**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| III | ID M- 01 | Renewable Energy Sources | 3 | 0 | 0 | 1 | 3 |
| IV | ID M- 02 | Solar and Wind Energy | 3 | 0 | 2 | 1 | 4 |
| V | ID M- 03 | Energy Economics and Policy | 3 | 0 | 0 | 1 | 4 |
| VI | ID M- 04 | Grid Interface of Renewable Energy Sources | 3 | 0 | 2 | 1 | 4 |
| VII | ID M- 05 | Energy Storage Systems | 3 | 0 | 0 | 1 | 3 |
|  |  | **Total** | **15** | **0** | **04** | **05** | **18** |

### Honors

Title: Electrical Engineering

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| IV | H-01 | Engineering Optimization | 3 | 0 | 0 | 1 | 3 |
| V | H-02 | Electrical Power Distribution Systems | 3 | 0 | 2 | 1 | 4 |
| VI | H-03 | Modelling and Analysis of Electrical Machines | 3 | 1 | 0 | 1 | 4 |
| VII | H-04 | Advanced Power Electronics | 3 | 0 | 2 | 1 | 4 |
| VIII | H-O5 | Digital Control Systems | 3 | 0 | 0 | 1 | 3 |
|  |  | **Total** | **15** | **01** | **04** | **05** | **18** |

**MOOCs Identified – NPTEL- PEC-05, 06**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr. No** | **Course Name** | **#**  **Weeks** | **Level** | **NOC URL** |
| 1 | DC Microgrid and Control System | 12 | UG | https://onlinecourses.nptel.ac.in/no c20\_ee84/preview |
| 2 | Electrical Distribution System Analysis | 12 | UG | https://onlinecourses.nptel.ac.in/no c19\_ee61/preview |
| 3 | Electrical Equipment And Machines: Finite Element  Analysis | 12 | UG | https://onlinecourses.nptel.ac.in/no c20\_ee81/preview |
| 4 | Control And Tuning Methods In Switched Mode Power  Converters | 12 | UG | https://archive.nptel.ac.in/courses/ 108/105/108105180/ |
| 5 | Power System Dynamics, Control And Monitoring | 12 | UG | https://onlinecourses.nptel.ac.in/no c21\_ee16/preview |
| 6 | Design And Simulation of  DC-DC Converters Using Open-Source Tools | 12 | UG | https://archive.nptel.ac.in/noc/cour ses/noc16/SEM1/noc16-ec07/ |
| 7 | Industrial Automation And Control | 12 | UG | https://archive.nptel.ac.in/courses/ 108/105/108105062/ |
| 8 | High Power Multilevel Converters - Analysis, Design  And Operational Issues | 12 | UG | https://archive.nptel.ac.in/courses/ 108/102/108102157/ |
| 9 | Data Analytics using Python | 12 | UG | https://nptel.ac.in/noc/courses/no c20/SEM1/noc20-cs46/ |
| 10 | Linear Dynamical Systems | 12 | UG | [https://onlinecourses.nptel.ac.in/no](https://onlinecourses.nptel.ac.in/noc20_ee47/preview) [c20\_ee47/preview](https://onlinecourses.nptel.ac.in/noc20_ee47/preview) |
| 11 | Linear System Theory | 12 | UG | [https://archive.nptel.ac.in/courses/](https://archive.nptel.ac.in/courses/108/106/108106150/) [108/106/108106150/](https://archive.nptel.ac.in/courses/108/106/108106150/) |
| 12 | Deep Learning | 12 | UG | https://nptel.ac.in/noc/courses/no  c19/SEM2/noc19-cs54 |
| 13 | Embedded System Design with ARM | 12 | UG | https://nptel.ac.in/noc/courses/noc 20/SEM1/noc20-cs15/ |

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**(A Unitary Public University of Govt. of Maharashtra)**

## School of Electrical and Communication Engineering

**Curriculum Structure SY, TY and Final Year**

## Electronics and Telecommunication Engineering

(F.Y. Structure Effective from: A.Y. 2023-24)

## S. Y. B. Tech in

### Electronics and Telecommunication Engineering

[Regular]

**Semester - III**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-02 | Signals and Systems | 2 | 1 | 0 | 1 | 3 | PCC |
| 02 | PCC-03 | Electronic Devices and Circuits | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-04 | Digital System Design | 2 | 1 | 2 | 1 | 4 | PCC |
| 04 | OE-01 | Open Elective - I | 2 | 0 | 0 | 1 | 2 | OE |
| 05 | HSMC-03 | Indian Language | 2 | 0 | 0 | 1 | 2 | AEC |
| 06 | HSMC-04 | Environmental Studies | 1 | 0 | 0 | 2 | 1 | VEC |
| 07 | CEA-01 | Community Engagement Activity (CEA)/Field Project | -- | -- | -- | -- | 2 | CEA |
| 08 | HSMC-05 | Entrepreneurship | 2 | 0 | 0 | 1 | 2 | HSMC |
| 09 | HSMC-06 | Design Thinking | 0 | 0 | 2 | 1 | 1 | HSMC |
| 10 | MD M-01 | Multidisciplinary Minor –  I | 2 | 0 | 0 | 1 | 2 | MD M |
| **Total** | | | **16** | **02** | **06** | **10** | **22** |  |

**Semester -IV**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-05 | Microcontrollers and Applications | 3 | 0 | 2 | 1 | 4 | PCC |
| 02 | PCC-06 | Analog and Digital Communication | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-07 | Analog Circuits | 3 | 1 | 2 | 1 | 5 | PCC |
| 04 | HSMC-07 | Constitution of India | 1 | 0 | 0 | 2 | 1 | VEC |
| 05 | OE-02 | Open Elective - II | 2 | 0 | 0 | 1 | 2 | OE |
| 06 | VSEC-01 | Cornerstone project -I | 0 | 0 | 4 | 2 | 2 | VSEC |
| 07 | MD M-02 | Multidisciplinary Minor - II | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **14** | **01** | **12** | **09** | **21** |  |

* Exit option to qualify for Diploma:
  + Advanced PCB Design
  + Electronic Product Design

## S. Y. B. Tech in

### Electronics and Telecommunication Engineering

[Lateral Entry]

**Semester - III**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-02 | Signals and Systems | 2 | 1 | 0 | 1 | 3 | PCC |
| 02 | PCC-03 | Electronic Devices and Circuits | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-04 | Digital System Design | 2 | 1 | 2 | 1 | 4 | PCC |
| 04 | OE-01 | Open Elective - I | 2 | 0 | 0 | 1 | 2 | OE |
| 05 | HSMC-03 | Indian Language | 2 | 0 | 0 | 1 | 2 | AEC |
| 06 | HSMC-04 | Environmental Studies | 1 | 0 | 0 | 2 | 1 | VEC |
| 07 | BS – 06 | Mathematics | 3 | 0 | 0 | 1 | 3 | BSC |
| 08 | CEA-01 | Community Engagement Activity (CEA)/Field Project | -- | -- | -- | -- | 2 | CEA |
| 09 | HSMC-05 | Entrepreneurship | 2 | 0 | 0 | 1 | 2 | HSMC |
| 10 | HSMC-06 | Design Thinking | 0 | 0 | 2 | 1 | 1 | HSMC |
| 11 | MD M-01 | Multidisciplinary Minor –  I | 2 | 0 | 0 | 1 | 2 | MD M |
| **Total** | | | **19** | **02** | **06** | **11** | **25** |  |

**Semester -IV**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-05 | Microcontrollers and Applications | 3 | 0 | 2 | 1 | 4 | PCC |
| 02 | PCC-06 | Analog and Digital Communication | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-07 | Analog Circuits | 3 | 1 | 2 | 1 | 5 | PCC |
| 04 | HSMC-07 | Constitution of India | 1 | 0 | 0 | 2 | 1 | VEC |
| 05 | OE-02 | Open Elective - II | 2 | 0 | 0 | 1 | 2 | OE |
| 06 | HSMC –  08 | Communication Skills | 1 | 0 | 2 | -- | 2 | HSMC |
| 07 | VSEC-01 | Cornerstone project -I | 0 | 0 | 4 | 2 | 2 | VSEC |
| 08 | MD M-02 | Multidisciplinary Minor - II | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **15** | **01** | **14** | **09** | **23** |  |

* Exit option to qualify for Diploma+:
  + Advanced PCB Design
  + Electronic Product Design

## T. Y. B. Tech in

### Electronics and Telecommunication Engineering

**Semester - V**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-08 | Digital Signal Processing | 2 | 0 | 2 | 1 | 3 | PCC |
| 02 | PCC-09 | Configurable Logic design | 3 | 0 | 2 | 2 | 4 | PCC |
| 03 | PCC-10 | Electromagnetic Waves and Antennas | 2 | 1 | 0 | 1 | 3 | PCC |
| 04 | PEC-01 | Program Specific Elective | 3 | 0 | 2 | 1 | 4 | PEC |
| 05 | OE-03 | Open Elective - III | 2 | 0 | 0 | 1 | 2 | OE |
| 06 | OJT-01 | Internship | -- | -- | -- | -- | 3 | OJT |
| 07 | MD M- 03 | Multidisciplinary Minor - III | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **14** | **01** | **08** | **07** | **22** |  |

**Semester - VI**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-11 | Power electronics and drives | 2 | 0 | 2 | 1 | 3 | PCC |
| 02 | PCC-12 | Embedded system design | 2 | 0 | 2 | 1 | 3 | PCC |
| 03 | PCC-13 | Data Communication and Networking | 2 | 0 | 2 | 1 | 3 | PCC |
| 04 | PCC-14 | VLSI design | 2 | 1 | 2 | 1 | 3 | PCC |
| 05 | PEC-02 | Program Specific Elective | 3 | 0 | 2 | 1 | 4 | PEC |
| 06 | VSEC- 02 | Cornerstone project - II | 0 | 0 | 4 | 2 | 2 | VSEC |
| 07 | MD M- 04 | Multidisciplinary Minor - IV | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **13** | **01** | **16** | **08** | **21** |  |

* Exit option to qualify for B. Voc.:
  + Internship of 8 Weeks

## Final Year B. Tech in

### Electronics and Telecommunication Engineering

**Semester - VII**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-15 | Mobile Communication and Networks | 3 | 1 | 2 | 1 | 4 | PCC |
| 02 | PCC-16 | Embedded  Microcontrollers and DSP Processor | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PEC-03 | Program Specific Elective | 3 | 0 | 0 | 1 | 3 | PEC |
| 04 | PEC-04 | Program Specific Elective | 3 | 0 | 0 | 1 | 3 | PEC |
| 05 | RM | Research Methodology | 2 | 0 | 0 | 0 | 2 | RM |
| 06 | OJT-02 | Internship | - | - | - | - | 3 | OJT |
| 07 | MD M- 05 | Multidisciplinary Minor - V | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **16** | **01** | **06** | **05** | **22** |  |

**Semester - VIII**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PEC-05 | MOOCs | 3 | 0 | 0 | 0 | 3 | PEC |
| 02 | PEC-06 | MOOCs | 3 | 0 | 0 | 0 | 3 | PEC |
| 03 | OJT-03/  VSEC- 03 | Internship cum Capstone project | - | - | - | - | 6 | OJT/VSEC |
| **Total** | | | **06** | **00** | **00** | **00** | **12** |  |

### Program Elective Courses (PECs)

|  |  |  |  |
| --- | --- | --- | --- |
| **Sr.**  **No.** | **PEC/Sem** | **Option 1 Signal Processing** | **Option 2 Electronic Communication** |
| 01 | PEC - 1/V | Digital Image Processing and Applications | Information Theory and Coding |
| 02 | PEC - 2/VI | AI and Machine Learning | Fiber Optic Communication |
| 03 | PEC - 3/VII | Digital Audio Processing | Microwave Theory and Techniques |
| 04 | PEC - 4/VII | Video Analytics | Advanced Mobile Communications |
| 05 | PEC - 5/ VIII | MOOC Courses offered by NPTEL/SWAYAM | |
| 06 | PEC - 6/ VIII | MOOC Courses offered by NPTEL/SWAYAM | |

**Open Electives**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | OE – I | Electrical Machines and Drives | 2 | 0 | 0 | - | 2 | OE |
| 02 | OE – II | Principles of Electronic Communication | 2 | 0 | 0 | -- | 2 | OE |
| 03 | OE - III | Sensors and Actuators | 2 | 0 | 0 | 1 | 2 | OE |
|  | | **Total** | **6** | **0** | **0** | **1** | **6** |  |

### Additional Credits for Exits

After Completion of Second Year

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Cr** | **Category** |
| 01 | VSEC- 02 | Advanced PCB Design | 1 | 0 | 4 | 3 | VSEC |
| 02 | VSEC- 03 | Electronic Product Design | 1 | 0 | 4 | 3 | VSEC |
|  |  | **Total** | **02** | **00** | **08** | **06** |  |

After Completion of Third Year

* + - **Eight Weeks Internship**

Multidisciplinary Minor Internet of Things

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Sem** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| 01 | III | MD M-01 | Introduction to  Microcontrollers | 2 | 0 | 0 | 1 | 2 |
| 02 | IV | MD M-02 | Digitization and IoT  applications | 2 | 0 | 2 | 1 | 3 |
| 03 | V | MD M-03 | Wireless sensor networks | 2 | 0 | 2 | 1 | 3 |
| 04 | VI | MD M-04 | Cloud computing and IoT  platforms | 2 | 0 | 2 | 1 | 3 |
| 05 | VII | MD M-05 | IoT Applications in Smart Cities/Agriculture/Healthcare | 2 | 0 | 2 | 1 | 3 |
| **Total** | | | | **10** | **00** | **08** | **05** | **14** |

Interdisciplinary Minor

AI and ML in Signal Processing

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Sem** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| 01 | III | ID M-01 | Signal Transforms | 2 | 0 | 2 | 1 | 3 |
| 02 | IV | ID M-02 | Image and Video processing | 3 | 0 | 2 | 1 | 4 |
| 03 | V | ID M-03 | Introduction to AI & ML  techniques | 3 | 0 | 2 | 1 | 4 |
| 04 | VI | ID M-04 | Computer vision and Pattern Recognition | 3 | 0 | 2 | 1 | 4 |
| 05 | VII | ID M-05 | Deep learning algorithms for  Signal processing | 2 | 0 | 2 | 1 | 3 |
| **Total** | | | | **13** | **00** | **10** | **05** | **18** |

Honors

Wireless Communication and Next Generation Networks

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Sem** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| 01 | IV | H-01 | Random Signal and Stochastic  Process | 2 | 1 | 0 | 1 | 3 |
| 02 | V | H-02 | Advance in Digital  Communication | 3 | 0 | 2 | 1 | 4 |
| 03 | VI | H-03 | Cognitive Radio | 3 | 0 | 2 | 1 | 4 |
| 04 | VII | H-04 | Software Defined Networks | 3 | 0 | 2 | 1 | 4 |
| 05 | VIII | H-05 | Next Generation Technologies | 2 | 0 | 2 | 1 | 3 |
| **Total** | | | | **13** | **01** | **08** | **05** | **18** |

MOOCs Identified – NPTEL- PEC-05, 06

* An Introduction to Artificial Intelligence
* Advanced Computer Architecture
* Introduction to Machine Learning
* Discrete Mathematics
* Reinforcement Learning
* Deep Learning
* Advanced Computer Networks
* Cloud Computing
* Natural Language Processing
* Hardware Security
* Foundations of Cyber Physical Systems
* Understanding Incubation and Entrepreneurship
* Power Management Integrated Circuits

\*\*\*

# A white background with black border Description automatically generatedCOEP Technological University Pune

**(A Unitary Public University of Govt. of Maharashtra)**

## School of Electrical and Communication Engineering

**Curriculum Structure SY, TY and Final Year**

## Instrumentation and Control Engineering

(F.Y. Structure Effective from: A.Y. 2023-24)

## S. Y. B. Tech

### Instrumentation and Control Engineering Engineering

[Regular] Semester - III

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-02 | Signals and Systems | 2 | 0 | 2 | 1 | 3 | PCC |
| 02 | PCC-03 | Sensors and Transducers | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-04 | Analog Electronics | 3 | 0 | 2 | 1 | 4 | PCC |
| 04 | OE-01 | Open Elective - I | 2 | 0 | 0 | 1 | 2 | OE |
| 05 | HSMC-03 | Indian language | 2 | 0 | 0 | - | 2 | HSMC |
| 06 | HSMC-04 | Environmental Studies | 1 | 0 | 0 | 2 | 1 | VEC |
| 07 | CEA-01 | Community Engagement  Activity (CEA)/Field Project | - | - | - | - | 2 | CEA |
| 08 | HSMC-05 | Entrepreneurship | 2 | 0 | 0 | 1 | 2 | HSMC |
| 09 | HSMC-06 | Design Thinking | 0 | 0 | 2 | 1 | 1 | HSMC |
| 10 | MD M-01 | Multidisciplinary Minor - I | 2 | 0 | 0 | 1 | 2 | MD M |
| **Total** | | | **17** | **0** | **8** | **9** | **23** |  |

Semester -IV

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-05 | Microcontrollers and Applications | 3 | 0 | 2 | 1 | 4 | PCC |
| 02 | PCC-06 | Automatic Control System | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-07 | Digital Electronics | 3 | 0 | 2 | 1 | 4 | PCC |
| 04 | HSMC-7 | Constitution of India | 1 | 0 | 0 | 2 | 1 | VEC |
| 05 | OE-02 | Open Elective - II | 2 | 0 | 0 | 1 | 2 | OE |
| 06 | VSEC-02 | Cornerstone Project-I | 0 | 0 | 4 | - | 2 | MD M |
| 07 | MD M-02 | Multidisciplinary Minor - II | 2 | 0 | 2 | 1 | 3 | VSEC |
| **Total** | | | **14** | **0** | **12** | **7** | **20** |  |

* Exit option to qualify for Diploma:
  + Calibration and Testing
  + Programmable Logic Controller

## S. Y. B. Tech

### Instrumentation and Control Engineering Engineering

[Lateral Entry] Semester - III

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-02 | Signals and Systems | 2 | 0 | 2 | 1 | 3 | PCC |
| 02 | PCC-03 | Sensors and Transducers | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-04 | Analog Electronics | 3 | 0 | 2 | 1 | 4 | PCC |
| 04 | OE-01 | Open Elective - I | 2 | 0 | 0 | 1 | 2 | OE |
| 05 | HSMC-03 | Indian language | 2 | 0 | 0 | - | 2 | HSMC |
| 06 | HSMC-04 | Environmental Studies | 1 | 0 | 0 | 2 | 1 | VEC |
| 07 | BS – 06 | Mathematics | 3 | 0 | 0 | 1 | 3 | BSC |
| 08 | CEA-01 | Community Engagement  Activity (CEA)/Field Project | - | - | - | - | 2 | CEA |
| 09 | HSMC-05 | Entrepreneurship | 2 | 0 | 0 | 1 | 2 | HSMC |
| 10 | HSMC-06 | Design Thinking | 0 | 0 | 2 | 1 | 1 | HSMC |
| 11 | MD M-01 | Multidisciplinary Minor - I | 2 | 0 | 0 | 1 | 2 | MD M |
| **Total** | | | **20** | **0** | **8** | **10** | **26** |  |

Semester -IV

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-05 | Microcontrollers and Applications | 3 | 0 | 2 | 1 | 4 | PCC |
| 02 | PCC-06 | Automatic Control System | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-07 | Digital Electronics | 3 | 0 | 2 | 1 | 4 | PCC |
| 04 | HSMC-7 | Constitution of India | 1 | 0 | 0 | 2 | 1 | VEC |
| 05 | OE-02 | Open Elective - II | 2 | 0 | 0 | 1 | 2 | OE |
| 06 | HSMC –  08 | Communication Skills | 1 | 0 | 2 | -- | 2 | HSMC |
| 07 | VSEC-02 | Cornerstone Project-I | 0 | 0 | 4 | - | 2 | MD M |
| 08 | MD M-02 | Multidisciplinary Minor - II | 2 | 0 | 2 | 1 | 3 | VSEC |
| **Total** | | | **15** | **0** | **14** | **7** | **22** |  |

* Exit option to qualify for Diploma+:
  + Calibration and Testing
  + Programmable Logic Controller

## T. Y. B. Tech

### Instrumentation and Control Engineering Engineering

Semester - V

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-08 | Digital Signal Processing | 2 | 0 | 2 | 1 | 3 | PCC |
| 02 | PCC-09 | Control System Design | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PCC-10 | Process Loop Components | 2 | 0 | 2 | 1 | 3 | PCC |
| 04 | PEC-01 | Program Elective Course- 1 | 3 | 0 | 2 | 1 | 4 | PEC |
| 05 | OE-03 | Open Elective - III | 2 | 0 | 0 | 1 | 2 | OE |
| 06 | OJT-1 | Internship | -- | -- | -- | -- | 3 | OJT |
| 07 | MD M- 03 | Multidisciplinary Minor - III | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **14** | **00** | **10** | **05** | **22** |  |

Semester - VI

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-11 | Power Electronics and Drives | 2 | 0 | 2 | 1 | 3 | PCC |
| 02 | PCC-12 | Analytical Instrumentation | 2 | 0 | 2 | 1 | 3 | PCC |
| 03 | PCC-13 | Industrial Automation | 2 | 0 | 2 | 1 | 3 | PCC |
| 04 | PCC-14 | Instrument System Design | 2 | 0 | 2 | 1 | 3 | PCC |
| 05 | PEC-02 | Program Elective Course-2 | 3 | 0 | 2 | 1 | 4 | PEC |
| 06 | VSEC- 02 | Cornerstone Project-II | 0 | 0 | 4 | -- | 2 | VSEC |
| 07 | MD M- 04 | Multidisciplinary Minor - IV | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **13** | **00** | **16** | **06** | **21** |  |

* Exit option to qualify for B. Voc.:
  + Internship of 8 Weeks

## Final Year B. Tech in

### Instrumentation and Control Engineering Engineering

Semester - VII

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PCC-15 | Process Instrumentation | 3 | 0 | 2 | 1 | 4 | PCC |
| 02 | PCC-16 | Project Engineering and Management | 3 | 0 | 2 | 1 | 4 | PCC |
| 03 | PEC-03 | Program Elective Course- 3 | 2 | 0 | 2 | 1 | 3 | PEC |
| 04 | PEC-04 | Program Elective Course- 4 | 2 | 0 | 2 | 1 | 3 | PEC |
| 05 | RM | Research Methodology | 2 | 0 | 0 | -- | 2 | RM |
| 06 | OJT-02 | Internship | - | - | - | -- | 3 | OJT |
| 07 | MD M- 05 | Multidisciplinary Minor - V | 2 | 0 | 2 | 1 | 3 | MD M |
| **Total** | | | **14** | **00** | **10** | **05** | **22** |  |

Semester - VIII

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | PEC-05 | MOOCs | 3 | 0 | 0 | 0 | 3 | PEC |
| 02 | PEC-06 | MOOCs | 3 | 0 | 0 | 0 | 3 | PEC |
| 03 | OJT-03/ VSEC-  03 | Internship cum Capstone project | - | - | - | - | 6 | OJT/VSEC |
| **Total** | | | **06** | **00** | **00** | **00** | **12** |  |

### Program Elective Courses (PECs)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **PEC/**  **Sem** | **Option 1**  **Process Instrumentat ion** | **Option 2**  **Biomedical Instrumentat ion** | **Option 3**  **Automation and Industry 4.0** | **Option 4**  **Data Analytics and**  **Machine Learning** |
| 01 | PEC -  1/V | Process Plant Operations | Anatomy and Physiology | Introduction to IoT and Multi Sensor data  Fusion | Data Structures and Algorithms |
| 02 | PEC - 2/VI | Industrial Communication and  Programming | Medical Devices | Industrial Communication and  Programming | Applications of Machine Learning |
| 03 | PEC - 3/VII | Building Automation | Biomedical Signal  Processing | Integrating Technology and  Cyber Security | Deep Learning |
| 04 | PEC - 4/VII | Batch Process Control | Biomedical  Image Processing | Data Analytics  and Industry 4.0 | Data Analytics |
| 05 | PEC -  5/ VIII | MOOC Courses offered by NPTEL/SWAYAM | | | |
| 06 | PEC -  6/ VIII | MOOC Courses offered by NPTEL/SWAYAM | | | |

**Open Electives**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** | **Category** |
| 01 | OE – I | Electrical Machines and Drives | 2 | 0 | 0 | - | 2 | OE |
| 02 | OE – II | Principles of Electronic Communication | 2 | 0 | 0 | -- | 2 | OE |
| 03 | OE - III | Sensors and Actuators | 2 | 0 | 0 | 1 | 2 | OE |
|  | | **Total** | **6** | **0** | **0** | **1** | **6** |  |

### Additional Credits for Exits

After Completion of Second Year

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Code** | **Course Title** | **L** | **T** | **P** | **Cr** | **Category** |
| 01 | VSEC- 02 | Calibration and Testing | 1 | 0 | 4 | 3 | VSEC |
| 02 | VSEC- 03 | Programmable Logic Controller | 0 | 0 | 6 | 3 | VSEC |
|  |  | **Total** | **02** | **00** | **08** | **06** |  |

After Completion of Third Year

**Eight Weeks Internship**

Multidisciplinary Minor Industrial Instrumentation and Control

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Sem** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| 01 | III | MD M-01 | Sensors and Actuators | 2 | 0 | 0 | 1 | 2 |
| 02 | IV | MD M-02 | Feedback Control System | 2 | 0 | 2 | 1 | 3 |
| 03 | V | MD M-03 | Industrial Automation and  Control | 2 | 0 | 2 | 1 | 3 |
| 04 | VI | MD M-04 | Industrial Internet of Things | 2 | 0 | 2 | 1 | 3 |
| 05 | VII | MD M-05 | Modern Control Theory | 2 | 0 | 2 | 1 | 3 |
| **Total** | | | | **10** | **00** | **08** | **05** | **14** |

Interdisciplinary Minor Intelligent Instrumentation and Control

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| **Sr.**  **No.** | **Sem** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| 01 | III | ID M-01 | Process Modeling and  Optimization | 2 | 0 | 2 | 1 | 3 |
| 02 | IV | ID M-02 | Process Control | 3 | 0 | 2 | 1 | 4 |
| 03 | V | ID M-03 | Industrial Control | 3 | 0 | 2 | 1 | 4 |
| 04 | VI | ID M-04 | Distributed Control System | 3 | 0 | 2 | 1 | 4 |
| 05 | VII | ID M-05 | Intelligent Control | 2 | 0 | 2 | 1 | 3 |
| **Total** | | | | **13** | **00** | **10** | **05** | **18** |

Honors Modeling and Control

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Sem** | **Course Code** | **Course Title** | **L** | **T** | **P** | **S** | **Cr** |
| 01 | IV | H-01 | Sensor Modeling and Design | 2 | 0 | 2 | 1 | 3 |
| 02 | V | H-02 | Optimal Control | 3 | 0 | 2 | 1 | 4 |
| 03 | VI | H-03 | Process Dynamics and Control | 3 | 0 | 2 | 1 | 4 |
| 04 | VII | H-04 | Robust Control | 3 | 0 | 2 | 1 | 4 |
| 05 | VIII | H-05 | Soft Computing | 2 | 0 | 2 | 1 | 3 |
| **Total** | | | | **13** | **00** | **10** | **05** | **18** |

MOOCs Identified – NPTEL- PEC-05, 06

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr.**  **No.** | **Course Name** | **#**  **Weeks** | **UG/ PG** | **NOC URL** |
| 1 | Data Analytics using Python | 12 | UG | [https://nptel.ac.in/noc/cours](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs46/) [es/noc20/SEM1/noc20-cs46/](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs46/) |
| 2 | Introduction to Machine Learning | 12 | UG | [https://nptel.ac.in/noc/cours](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs29) [es/noc20/SEM1/noc20-cs29](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs29) |
| 3 | Deep Learning | 12 | UG | [https://nptel.ac.in/noc](https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs54)  [/courses/noc19/SEM2/noc19](https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs54)  [-cs54](https://nptel.ac.in/noc/courses/noc19/SEM2/noc19-cs54) |
| 4 | Embedded System Design with ARM | 12 | UG | [https://nptel.ac.in/noc/cours](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs15/) [es/noc20/SEM1/noc20-cs15/](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs15/) |
| 5 | Biomedical Signal Processing | 12 | UG | [https://nptel.ac.in/courses/1](https://nptel.ac.in/courses/108105101) [08105101](https://nptel.ac.in/courses/108105101) |
| 6 | Advanced Process Control | 12 | UG | [https://nptel.ac.in/courses/1](https://nptel.ac.in/courses/103101003) [03101003](https://nptel.ac.in/courses/103101003) |
| 7 | Model Predictive Control: Theory and Applications | 12 | UG | https://onlinecourses/Nptel. ac.in/noc21\_ge0 1/preview |
| 8 | Process Control – Design Analysis and  Assessment | 12 | UG | [https://nptel.ac.in/noc/cours](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ch11/) [es/noc20/SEM1/noc20-](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ch11/) [ch11/](https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-ch11/) |
| 9 | Medical Image Analysis | 12 | UG | https://onlinecourses.nptel.a c.in/noc22\_bt34/preview |
| 10 | Introduction to Biomedical Imaging Systems | 12 | UG | https://onlinecourses.nptel.a c.in/noc21\_bt50/preview |
| 11 | Introduction to Intelligent Systems and Control | 08 | UG | https://nptel.ac.in/courses/1 08104049 |
| 12 | Optimal Control, Guidance and Estimation | 12 | UG | https://nptel.ac.in/courses/1 01108057 |

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### Program Elective Courses (PECs) at School Level

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| **PEC**  **/ Sem** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **Option 5** | **Option 6** | **Option 7** | **Option 8** | **Option 9** | **Option 10** | **Option 11** |
| **Sustaina ble Mobility** | **Electrical Machines** | **Power Systems** | **Control Systems** | **Renewab le Energy Systems** | **Signal Processin g** | **Electroni c Communi cation** | **Process Instrume ntation** | **Biomedic al Instrume ntation** | **Automati on and Industry 4.0** | **Data Analytics and**  **Machine Learning** |
| PEC -  1/V | Energy Storage Systems | Electrical Machine Design | Utilization of Electrical Energy | Mathemati cal Modelling of  Dynamic Systems | Energy Economics | Digital Image Processing and  Application s | Informatio n Theory and Coding | Process Plant Operations | Anatomy and Physiology | Introductio n to IoT and Multi Sensor  data Fusion | Data Structures and Algorithms |
| PEC - 2/VI | Motor Control for Electric Mobility | Analysis of Electric Machinery | High Voltage Engineerin g | Motor Control for Electric Mobility | Distributed Generation | AI and Machine Learning | Fiber Optic Communic ation | Industrial Communic ation and  Programmi ng | Medical Devices | Industrial Communic ation and  Programmi ng | Application s of Machine Learning |
| PEC - 3/VII | Converters for Electric Vehicles | Condition Monitoring of  Electrical Machines | Smart Grid Technologi es | Intelligent Control | Solar and Wind Energy Systems | Digital Audio Processing | Microwave Theory and  Technique s | Building Automatio n | Biomedical Signal Processing | Integrating Technolog y and  Cyber Security | Deep Learning |
| PEC - 4/VII | Machine Learning and Artificial Intelligenc e for  Electric Vehicles | Machine Learning and Artificial Intelligenc e | Application s of Machine Learning and Artificial Intelligenc | Machine Learning and Artificial Intelligenc e | Application s of Machine Learning and Artificial  Intelligenc e in | Video Analytics | Advanced Mobile Communic ations | Batch Process Control | Biomedical Image Processing | Data Analytics and Industry 4.0 | Data Analytics |

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|  |  |  | e in Power Systems |  | Renewable Energy |  |  |  |  |  |  |
| PEC -  5/ VIII | MOOC Courses offered by NPTEL/SWAYAM | | | | | | | | | | |
| PEC -  6/ VIII | MOOC Courses offered by NPTEL/SWAYAM | | | | | | | | | | |

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