



**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA**  
**KAKINADA – 533 003, Andhra Pradesh, India**  
**DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING**

## **COURSE STRUCTURE-R19**

### **COURSE STRUCTURE AND SYLLABUS**

**For**

**B. TECH ELECTRICAL AND ELECTRONICS ENGINEERING**

*(Applicable for batches admitted from 2019-2020)*



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### COURSE STRUCTURE-R19

#### I Year – I SEMESTER

| Sl. No               | Course Code | Subjects                                    | L         | T        | P         | Credits   |
|----------------------|-------------|---|-----------|----------|-----------|-----------|
| 1                    | HS1101      | English                                     | 3         | 0        | 0         | 3         |
| 2                    | BS1101      | Mathematics - I                             | 3         | 0        | 0         | 3         |
| 3                    | BS1106      | Applied Chemistry                           | 3         | 0        | 0         | 3         |
| 4                    | ES1101      | Programming for Problem Solving Using C     | 3         | 0        | 0         | 3         |
| 5                    | ES1103      | Engineering Drawing                         | 1         | 0        | 3         | 2.5       |
| 6                    | HS1102      | English Lab                                 | 0         | 0        | 3         | 1.5       |
| 7                    | BS1107      | Applied Chemistry Lab                       | 0         | 0        | 3         | 1.5       |
| 8                    | ES1102      | Programming for Problem Solving Using C Lab | 0         | 0        | 3         | 1.5       |
| 9                    | MC1101      | Environmental Science                       | 3         | 0        | 0         | 0         |
| <b>Total Credits</b> |             |   | <b>16</b> | <b>0</b> | <b>12</b> | <b>19</b> |

#### I Year – II SEMESTER

| Sl. No               | Course Code | Subjects                        | L         | T        | P         | Credits   |
|----------------------|-------------|---------------------------------|-----------|----------|-----------|-----------|
| 1                    | BS1202      | Mathematics – II                | 3         | 0        | 0         | 3         |
| 2                    | BS1203      | Mathematics – III               | 3         | 0        | 0         | 3         |
| 3                    | BS1204      | Applied Physics                 | 3         | 0        | 0         | 3         |
| 4                    | ES1212      | Fundamentals of Computers       | 3         | 0        | 0         | 3         |
| 5                    | ES1217      | Electrical Circuit Analysis - I | 3         | 0        | 0         | 3         |
| 6                    | ES1218      | Electrical Engineering Workshop | 0         | 0        | 3         | 1.5       |
| 7                    | BS1205      | Applied Physics Lab             | 0         | 0        | 3         | 1.5       |
| 8                    | HS1203      | Communication Skills Lab        | 0         | 1        | 2         | 2         |
| 9                    | PR1201      | Engineering Exploration Project | 0         | 0        | 2         | 1         |
| <b>Total Credits</b> |             |                                 | <b>15</b> | <b>1</b> | <b>10</b> | <b>21</b> |



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### COURSE STRUCTURE-R19

#### II Year – I SEMESTER

| S. No                | Course Code | Subjects                                  | Category | L         | T        | P        | Credits   |
|----------------------|-------------|---|----------|-----------|----------|----------|-----------|
| 1                    |             | Electrical Circuit Analysis - II          | EE       | 3         | --       | --       | 3         |
| 2                    |             | Electrical Machines-I                     | EE       | 3         | --       | --       | 3         |
| 3                    |             | Electronic Devices and Circuits           | ES       | 3         | --       | --       | 3         |
| 4                    |             | Electro Magnetic Fields                   | EE       | 3         | --       | --       | 3         |
| 5                    |             | Thermal and Hydro Prime movers            | ES       | 3         | --       | --       | 3         |
| 6                    |             | Managerial Economics & Financial Analysis | BS       | 3         | --       | --       | 3         |
| 7                    |             | Thermal and Hydro Laboratory              | ES       | --        | --       | 3        | 1.5       |
| 8                    |             | Electrical Circuits Laboratory            | EE       | --        | --       | 3        | 1.5       |
| 9                    |             | Essence of Indian Traditional Knowledge   | MC       | 3         | --       | --       | 0         |
| <b>Total Credits</b> |             |   |          | <b>24</b> | <b>0</b> | <b>6</b> | <b>21</b> |

#### II Year – II SEMESTER

| S. No                | Course Code | Subjects                                  | Category | L         | T        | P        | Credits   |
|----------------------|-------------|---|----------|-----------|----------|----------|-----------|
| 1                    |             | Electrical Measurements & Instrumentation | EE       | 3         | --       | --       | 3         |
| 2                    |             | Electrical Machines-II                    | EE       | 3         | --       | --       | 3         |
| 3                    |             | Digital Electronics                       | ES       | 3         | --       | --       | 3         |
| 4                    |             | Control Systems                           | EE       | 3         | --       | --       | 3         |
| 5                    |             | Power Systems-I                           | EE       | 3         | --       | --       | 3         |
| 6                    |             | Signals and Systems                       | EE       | 3         | --       | --       | 3         |
| 7                    |             | Electrical Machines -I Laboratory         | EE       | --        | --       | 3        | 1.5       |
| 8                    |             | Electronic Devices & Circuits Laboratory  | EE       | --        | --       | 3        | 1.5       |
| 9                    |             | Professional Ethics and Human Values      | MC       | 3         | 0        | 0        | 0         |
| <b>Total Credits</b> |             |   |          | <b>21</b> | <b>0</b> | <b>6</b> | <b>21</b> |



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### COURSE STRUCTURE-R19

#### III Year – I SEMESTER

| S. No                | Course Code | Subjects   | Category | L         | T        | P        | Credits   |
|----------------------|-------------|--|----------|-----------|----------|----------|-----------|
| 1                    |             | Power Systems-II                                     | EE       | 3         | --       | --       | 3         |
| 2                    |             | Power Electronics                                    | EE       | 3         | --       | --       | 3         |
| 3                    |             | Linear IC Applications                               | ES       | 3         | --       | --       | 3         |
| 4                    |             | Digital Signal Processing                            | EE       | 3         | --       | --       | 3         |
| 5                    |             | Microprocessors and Microcontrollers                 | EE       | 3         | --       | --       | 3         |
| 6                    |             | Electrical Machines-II Laboratory                    | EE       | --        | --       | 3        | 1.5       |
| 7                    |             | Control Systems Laboratory                           | EE       | --        | --       | 2        | 1         |
| 8                    |             | Electrical Measurements & Instrumentation Laboratory | EE       | --        | --       | 3        | 1.5       |
| 9                    |             | Socially Relevant Projects                           | MC       | --        | --       | 1        | 1         |
| <b>Total Credits</b> |             |  |          | <b>15</b> | <b>0</b> | <b>9</b> | <b>20</b> |

#### III Year – II SEMESTER

| S. No                | Course Code | Subjects                                      | Category | L         | T  | P        | Credits   |
|----------------------|-------------|---|----------|-----------|----|----------|-----------|
| 1                    |             | Electric Drives                               | EE       | 3         | -- | --       | 3         |
| 2                    |             | Power System Analysis                         | EE       | 3         | -- | --       | 3         |
| 3                    |             | Data Structures                               | ES       | 3         | -- | --       | 3         |
| 4                    |             | Digital Control Systems                       | EE       | 3         | -- | --       | 3         |
| 5                    |             | <b>Elective - I</b>                           | EL       | 3         | -- | --       | 3         |
| 6                    |             | <b>Open Elective - I</b>                      | OE       | 3         | -- | --       | 3         |
| 7                    |             | Power Electronics Laboratory                  | EE       | --        | -- | 3        | 1.5       |
| 8                    |             | Microprocessors & Microcontrollers Laboratory | EE       | --        | -- | 3        | 1.5       |
| 9                    |             | Employability Skills                          | MC       | 3         | -- | --       | 0         |
| <b>Total Credits</b> |             |   |          | <b>18</b> |    | <b>6</b> | <b>21</b> |



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**COURSE STRUCTURE-R19**

**IV Year – I SEMESTER**

| S. No                | Course Code | Subjects   | Category | L         | T        | P         | Credits   |
|----------------------|-------------|--|----------|-----------|----------|-----------|-----------|
| 1                    |             | Switchgear & Protection  | EE       | 3         | --       | --        | 3         |
| 2                    |             | OOPs through JAVA  | ES       | 3         | --       | --        | 3         |
| 3                    |             | Renewable Energy Systems   | EE       | 3         | --       | --        | 3         |
| 4                    |             | <b>Elective – II</b>   | EL       | 3         | --       | --        | 3         |
| 5                    |             | <b>Elective - III</b>  | EL       | 3         | --       | --        | 3         |
| 6                    |             | Linear & Digital IC Applications Laboratory                          | ES       | --        | --       | 2         | 1         |
| 7                    |             | Power Systems& Simulation Laboratory                                 | EE       | --        | --       | 2         | 1         |
|                      |             | Industrial Training /Skill Development Programmes / Research Project | Project  | --        | --       | 2         | 1         |
| 8                    |             | Project-I  | Project  |           |          | 4         | 2         |
| <b>Total Credits</b> |             |  |          | <b>15</b> | <b>0</b> | <b>10</b> | <b>20</b> |

**IV Year – II SEMESTER**

| S. No                | Course Code | Subjects                         | Category | L         | T  | P         | Credits   |
|----------------------|-------------|----------------------------------|----------|-----------|----|-----------|-----------|
| 1                    |             | Power System Operation & Control | EE       | 3         | -- | --        | 3         |
| 2                    |             | <b>Open Elective - II</b>        | OE       | 3         | -- | --        | 3         |
| 3                    |             | <b>Elective - IV</b>             | EL       | 3         | -- | --        | 3         |
| 4                    |             | Project-II                       | Project  | --        | -- | 16        | 8         |
| <b>Total Credits</b> |             |                                  |          | <b>09</b> |    | <b>16</b> | <b>17</b> |

BS – Basic Sciences

HS – Humanity Sciences

ES – Engineering Sciences

EE – Electrical Engineering

OE – Open Elective

EL – Elective

Proj- Project

MC–Mandatory Course





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**COURSE STRUCTURE-R19**

**Open Electives offered by EEE Department for Other Branches( Except for EEE Branch)**

**Open Elective-I:**

1. Renewable Energy Sources
2. Essentials of Analog and Digital Electronics
3. Electrical Estimation and Costing
4. Power Electronic Devices & Circuits
5. Fundamentals of Electrical Machines

**Open Elective-II:**

1. Measurements & Instrumentation
2. Fundamentals of Utilization of Electrical Energy
3. Concepts of Power System Engineering
4. Basics of Control Systems
5. Energy Audit



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## **COURSE STRUCTURE AND SYLLABUS**

**For**

**B.TECH – ELECTRICAL AND ELECTRONICS ENGINEERING**

*(Applicableforbatchesadmittedfrom2020-2021)*



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**I B.Tech – I SEMESTER**

| Sl. No               | Course Components | Subjects   | L           | T | P | Credits |
|----------------------|-------------------|--|-------------|---|---|---------|
| 1                    | HSMC              | Communicative English                                    | 3           | 0 | 0 | 3       |
| 2                    | BSC               | Mathematics-I<br>(Calculus and Differential Equations)   | 3           | 0 | 0 | 3       |
| 3                    | BSC               | Mathematics-II<br>(Linear Algebra and Numerical Methods) | 3           | 0 | 0 | 3       |
| 4                    | ESC               | Programming for Problem Solving Using C                  | 3           | 0 | 0 | 3       |
| 5                    | ESC               | Engineering Drawing & Design                             | 1           | 0 | 4 | 3       |
| 6                    | HSMC              | English Communication Skills Laboratory                  | 0           | 0 | 3 | 1.5     |
| 7                    | BSC               | Electrical Engineering Workshop                          | 0           | 1 | 3 | 1.5     |
| 8                    | ESC               | Programming for Problem Solving Using C Lab              | 0           | 0 | 3 | 1.5     |
| <b>Total Credits</b> |                   |  | <b>19.5</b> |   |   |         |

**I B.Tech – II SEMESTER**

| Sl. No               | Course Components | Subjects   | L           | T | P | Credits |
|----------------------|-------------------|--|-------------|---|---|---------|
| 1                    | BSC               | Mathematics-III<br>(Vector Calculus, Transforms and PDE) | 3           | 0 | 0 | 3       |
| 2                    | BSC               | Applied Physics  | 3           | 0 | 0 | 3       |
| 3                    | ESC               | Data Structures Through C                                | 3           | 0 | 0 | 3       |
| 4                    | ESC               | Electrical Circuit Analysis-I                            | 3           | 0 | 0 | 3       |
| 5                    | ESC               | Basic Civil and Mechanical Engineering                   | 3           | 0 | 0 | 3       |
| 6                    | BSC               | Applied Physics Lab                                      | 0           | 0 | 3 | 1.5     |
| 7                    | ESC               | Basic Civil and Mechanical Engineering Lab               | 0           | 0 | 3 | 1.5     |
| 8                    | ESC               | Data Structures through C Lab                            | 0           | 0 | 3 | 1.5     |
| 9                    | Mandatory Course  | Constitution of India                                    | 2           | 0 | 0 | 0       |
| <b>Total Credits</b> |                   |  | <b>19.5</b> |   |   |         |



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**II B.Tech – I Semester**

| Sl. No               | Course Components | Subjects   | L           | T | P | Credits |
|----------------------|-------------------|--|-------------|---|---|---------|
| 1                    | BSC               | Mathematics– IV  | 3           | 0 | 0 | 3       |
| 2                    | PCC               | Electronic Devices and Circuits  | 3           | 0 | 0 | 3       |
| 3                    | PCC               | Electrical Circuit Analysis –II  | 3           | 0 | 0 | 3       |
| 4                    | PCC               | DC Machines and Transformers   | 3           | 0 | 0 | 3       |
| 5                    | PCC               | Electro Magnetic Fields  | 3           | 0 | 0 | 3       |
| 6                    | PCC               | Electrical Circuits Lab  | 0           | 0 | 3 | 1.5     |
| 7                    | PCC               | DC Machines and Transformers Lab   | 0           | 0 | 3 | 1.5     |
| 8                    | PCC               | Electronic Devices and Circuits lab  | 0           | 0 | 3 | 1.5     |
| 9                    | SC                | Skill oriented course -<br>Design of Electrical Circuits using<br>Engineering Software Tools | 0           | 0 | 4 | 2       |
| 10                   | MC                | Professional Ethics & Human Values   | 2           | 0 | 0 | 0       |
| <b>Total Credits</b> |                   |  | <b>21.5</b> |   |   |         |

**II B.Tech – II Semester**

| Sl. No               | Course Components | Subjects   | L           | T | P | Credits |
|----------------------|-------------------|--|-------------|---|---|---------|
| 1                    | ESC               | Python Programming   | 3           | 0 | 0 | 3       |
| 2                    | PCC               | Digital Electronics  | 3           | 0 | 0 | 3       |
| 3                    | PCC               | Power System-I   | 3           | 0 | 0 | 3       |
| 4                    | PCC               | Induction and Synchronous Machines                                       | 3           | 0 | 0 | 3       |
| 5                    | HSMC              | Managerial Economics & Financial Analysis                                | 3           | 0 | 0 | 3       |
| 6                    | ESC               | Python Programming Lab   | 0           | 0 | 3 | 1.5     |
| 7                    | PCC               | Induction and Synchronous Machines Lab                                   | 0           | 0 | 3 | 1.5     |
| 8                    | PCC               | Digital Electronics Lab  | 0           | 0 | 3 | 1.5     |
| 9                    | SC                | Skill oriented course-<br>IoT Applications of Electrical Engineering Lab | 0           | 0 | 4 | 2       |
| <b>Total Credits</b> |                   |  | <b>21.5</b> |   |   |         |
|                      |                   | Minors Course*   | 4           | 0 | 0 | 4       |
|                      |                   | Honors Course*   | 4           | 0 | 0 | 4       |



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### III B.Tech – I Semester

| Sl. No              | Course Components | Subjects   | L           | T | P | Credits |
|---------------------|-------------------|--|-------------|---|---|---------|
| 1                   | PCC               | Power Systems-II   | 3           | 0 | 0 | 3       |
| 2                   | PCC               | Power Electronics  | 3           | 0 | 0 | 3       |
| 3                   | PCC               | Control Systems  | 3           | 0 | 0 | 3       |
| 4                   | OEC               | Open Elective- I/ Job Oriented Elective-I  | 3           | 0 | 0 | 3       |
| 5                   | PEC               | Professional Elective - I  | 3           | 0 | 0 | 3       |
| 6                   | PCC               | Control Systems Lab  | 0           | 0 | 3 | 1.5     |
| 7                   | PCC               | Power Electronics Lab  | 0           | 0 | 3 | 1.5     |
| 8                   | SC                | Soft Skill Course:Employability Skills   | 2           | 0 | 0 | 2       |
| 9                   | MC                | Environmental Science  | 2           | 0 | 0 | 0       |
| 10                  | PROJ              | Summer Internship 2 Months (Mandatory) after second year (to be evaluated during V semester) | 0           | 0 | 0 | 1.5     |
| <b>TotalCredits</b> |                   |  | <b>21.5</b> |   |   |         |
|                     |                   | Minors Course*   | 4           | 0 | 0 | 4       |
|                     |                   | Honors Course*   | 4           | 0 | 0 | 4       |

### III B.Tech – II Semester

| Sl. No               | Course Components | Subjects  | L           | T | P | Credits |
|----------------------|-------------------|---|-------------|---|---|---------|
| 1                    | PCC               | Microprocessors and Microcontrollers                          | 3           | 0 | 0 | 3       |
| 2                    | PCC               | Electrical Measurements and Instrumentation                   | 3           | 0 | 0 | 3       |
| 3                    | PCC               | Power System Analysis   | 3           | 0 | 0 | 3       |
| 4                    | PEC               | Professional Elective - II                                    | 3           | 0 | 0 | 3       |
| 5                    | OEC               | Open Elective –II/ Job Oriented Elective-II                   | 3           | 0 | 0 | 3       |
| 6                    | PCC               | Electrical Measurements and Instrumentation Lab               | 0           | 0 | 3 | 1.5     |
| 7                    | PCC               | Microprocessors and Microcontrollers Lab                      | 0           | 0 | 3 | 1.5     |
| 8                    | PCC               | Power Systems and Simulation Lab                              | 0           | 0 | 3 | 1.5     |
| 9                    | SC                | <b>Skill Advanced Course:</b><br>Machine Learning with Python | 2           | 0 | 0 | 2       |
| 10                   | MC                | Research Methodology  | 2           | 0 | 0 | 0       |
| <b>Total Credits</b> |                   |   | <b>21.5</b> |   |   |         |
|                      |                   | Minors Course*  | 4           | 0 | 0 | 4       |
|                      |                   | Honors Course*  | 4           | 0 | 0 | 4       |



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**IV B.Tech – I Semester**

| Sl. No               | Course Components | Subjects   | L         | T | P | Credits |
|----------------------|-------------------|--|-----------|---|---|---------|
| 1                    | PEC               | Professional Elective – III  | 3         | 0 | 0 | 3       |
| 2                    | PEC               | Professional Elective – IV   | 3         | 0 | 0 | 3       |
| 3                    | PEC               | Professional Elective – V  | 3         | 0 | 0 | 3       |
| 4                    | OEC               | Open Elective- III/Job Oriented Elective-III   | 3         | 0 | 0 | 3       |
| 5                    | OEC               | Open Elective-IV /Job Oriented Elective-IV   | 3         | 0 | 0 | 3       |
| 6                    | HSMC              | Universal Human Values-2: Understanding Harmony  | 3         | 0 | 0 | 3       |
| 7                    | SC                | <b>Skill Advanced Course</b><br>Machine Learning with PythonLab  | 0         | 0 | 4 | 2       |
| 8                    | PROJ              | Industrial / Research Internship 2 Months<br>(Mandatory) after third year<br>(to be evaluated during VII Semester) | 0         | 0 | 3 | 3       |
| <b>Total Credits</b> |                   |  | <b>23</b> |   |   |         |
|                      |                   | Minors Course*   | 4         | 0 | 0 | 4       |
|                      |                   | Honors Course*   | 4         | 0 | 0 | 4       |

**IVB.TechIISemester**

| Sl. No               | Course Components | Subjects   | L         | T  | P  | Credits |
|----------------------|-------------------|--|-----------|----|----|---------|
| 1                    | Major Project     | Project work, seminar and internship in industry<br>(6 Months) | --        | -- | -- | 12      |
| <b>Total Credits</b> |                   |  | <b>12</b> |    |    |         |

**HSMC:** Humanities and Social Science  
Including Management Courses  
**BSC** : Basic Science Courses  
**ESC:** Engineering Science Courses  
**PCC:** Professional Core Courses

**PEC** : Professional Elective Courses  
**OEC** : Open Elective Courses  
**PROJ** : Internship, Seminar, Project Work  
**MC** : Mandatory Courses  
**SC** : Skill Oriented Courses



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**Professional Elective Subjects offered to EEE Branch Students:**

**Professional Elective – I:**

1. Linear IC Applications
2. Utilization of Electrical Energy
3. Computer Architecture and Organization
4. Optimization Techniques
5. Object Oriented Programming through Java

**Professional Elective – II:**

1. Signal and Systems
2. Electric Drives
3. Advanced Control Systems
4. Switchgear and Protection
5. Big Data Analytics

**Professional Elective –III:**

1. Digital Signal Processing
2. Renewable and Distributed Energy Technologies
3. Flexible Alternating Current Transmission Systems
4. Power Systems Deregulation
5. Data Base Management Systems

**Professional Elective – IV:**

1. Hybrid Electric Vehicles
2. High Voltage Engineering
3. Programmable Logic Controllers and Applications
4. Cloud Computing with AWS
5. Deep Learning Techniques

**Professional Elective – V:**

1. Power System Operation and Control
2. Switched Mode Power Conversion
3. AI Applications to Electrical Engineering
4. Data Science
5. MEAN Stack Technologies

**Open Electives offered by EEE Department for Other Branches (Except EEE Branch)**

**Open Elective-I:**

1. Renewable Energy Sources
2. Concepts of Optimization Techniques
3. Concepts of Control Systems

**Open Elective-II:**

1. Battery Management Systems and Charging Stations
2. Fundamentals of utilization of Electrical Energy
3. Indian Electricity Act

**Open Elective-III:**

1. Concepts of Microprocessors and Microcontrollers
2. Fundamentals of Electric Vehicles
3. Concepts of Internet of Things

**Open Elective-IV:**

1. Concepts of Power System Engineering
2. Concepts of Smart Grid Technologies



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**\*For Honor's/ Minor Course Fullfillments:**

- The 20 additional Credits need to be acquired, 16/15 credits can be earned by undergoing specified courses listed as pools, with 4/5 courses, each carrying 4/3 credits. The remaining 4/5 credits must be acquired through two online MOOCs (Swayam/NPTEL), which shall be domain specific, with 2/3 credits and with a minimum duration of 8/12weeks as recommended by the Board of Studies.
- Minor Engineering subjects are offered to other branches by EEE Department (except for EEE Students).
- Honors Engineering subjects are offered to EEE Students.
- The head of the department will float the list of allowed MOOC electives in each academic year, based on the list floated by MOOCs (Swayam/NPTEL).

**\*Honors Engineering Courses offered EEE Branch students**

**II B.Tech II Semester:**

1. Communication Systems
2. Electrical Wiring, Estimation and Costing
3. Electrical Distribution Systems

**III B.Tech I Semester:**

1. Advanced Computer Networks
2. Power Quality
3. Special Electrical Machines

**III B.Tech II Semester:**

1. Digital Control Systems
2. Analysis of Power Electronic Converters
3. HVDC Transmission

**IV B.Tech I Semester:**

1. EHV AC Transmission
2. Smart Grid Technologies
3. Power Electronic Control of Electrical Drives

**\*Minor Engineering Courses offered by EEE Department for Other Branches**  
**(Except EEE Branch)**

**II B.Tech II Semester:**

1. Fundamentals of Electrical Circuits
2. Concepts of Electrical Measurements

**III B.Tech I Semester:**

1. Analysis of Linear Systems
2. Energy Auditing, Conservation and Management

**III B.Tech II Semester:**

1. Evolutionary Algorithms
2. Fundamentals of Power Electronics

**IV B.Tech I Semester:**

1. Neural Networks and Fuzzy Logic
2. Concepts of Electric Drives and Its Applications