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| CRITERION 3 | Course Outcomes and Program Outcomes | 175 |
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3.1 ESTABLISH THE CORRELATION BETWEEN COURSES AND THE PROGRAM OUTCOMES (POs) AND PROGRAM SPECIFIC OUTCOMES (PSOs): (25)

Program Outcomes (POs):

Engineering Graduates will be able to:

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 modelling 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 and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

| PSO | Statement |
|------|---|
| PSO1 | Students should be competent, creative and imaginative electrical engineers employable in fields of design, research, manufacturing, safety, quality, technical services. |
| PSO2 | Students should be able to progress through an advanced degree, certificate programs or participate in continuing education in electrical engineering, business, and other professionally related fields. |
| PSO3 | Students should take lead in innovation and entrepreneurship activities with high professional standards and moral ethics and prove themselves beneficial to society at large. |

3.1.1 Evidence of Course Outcomes (COs): (5)

The COs are defined as per Bloom's Taxonomy and approved by Board of Studies (BOS) / Departmental Under-Graduate Committee (DUGC) and further sent to Institute Senate for ratification.

The COs are published at the following level:

- Course Syllabus
- Departmental Website
- Notice Boards

Six courses are mentioned below for demonstration with one course per semester.

On successful completion of this course, students should be able to:

| S. No | Course | COURSE OUTCOMES | |
|-------|---|-----------------|--|
| 1 | MET-302 Electrical Engineering Materials | CO.1 | Understand about the crystal structures of different metals and alloys |
| | | CO.2 | Understand the basics of electrical conduction in metal and alloys |
| | | CO.3 | Understand the semiconductor materials and dielectric behaviour of materials |
| | | CO.4 | Discuss about basic principles of magnetic materials and superconductive materials |
| | | CO.5 | Understand about optical properties in metals and non-metals |
| 2 | ELE-401 Electric Machines-I | CO.1 | Detailed study of Transformers construction, operation, phasor analysis, equivalent circuit models, various tests performed and finding the efficiency of operation. |
| | | CO.2 | Study the principles of electromechanical energy conversions. |
| | | CO.3 | Construction and principle of operation of DC machines, formulating emf and torque calculations. |
| | | CO.4 | To compare the characteristics of various types of DC generators and motors, discuss starting and braking of DC motors. |

| | | | |
|---|--|------|---|
| | | CO.5 | Compare and contrast various types of DC motors for various domestic and commercial applications. |
| 3 | ELE-501 Power System-I | CO.1 | Understand the basic of power systems generation, transmission & distribution. |
| | | CO.2 | Classification of overhead line insulators and evaluation of string efficiency. |
| | | CO.3 | Modeling, design, and evaluation of various parameters of transmission lines. |
| | | CO.4 | Acquire knowledge of underground cables, its construction, methods of laying, its grading and fault location. |
| | | CO.5 | Investigate the concept of corona and its effect online design. |
| 4 | ELE-601 Power System-II | CO.1 | Acquire and apply the knowledge of Per unit representation of Power system. |
| | | CO.2 | Analysis of faults, balanced faults & Un-balanced faults. |
| | | CO.3 | Investigate the concept of Insulation co-ordination, over voltage, lightning surges, switching surges and switching operations. |
| | | CO.4 | Analysis of interference of power line with a communication circuit |
| | | CO.5 | Analysis of surge performance of transmission lines and Explain the knowledge of HVDC & FACTS Technology. |
| 5 | ELE-702 Advanced Power Electronics | CO.1 | Investigating modern self-commutating power semiconductor devices |
| | | CO.2 | Analysis of three-phase voltage source and current source inverters and their modulation strategies. |
| | | CO.3 | Study and design of switched mode power supplies. |
| | | CO.4 | Study of switched mode and isolated DC-DC converter. |
| | | CO.5 | Gain knowledge of power line disturbances and various power conditioners. |
| 6 | ELE-803 High Voltage Engineering | CO.1 | Explain conduction and breakdown in gases, liquid, and solid dielectrics |
| | | CO.2 | Understand the application of insulating materials in electrical and electronic equipment's. |
| | | CO.3 | Understand the phenomenon of generation of high voltages and currents. |
| | | CO.4 | Understand various methods of measurement of high voltages and currents. |
| | | CO.5 | Understand various methods of non-destructive testing and Gain knowledge of testing of electrical apparatus. |

3.1.2 Explanation of Course Articulation Matrix to be ascertained: (10)

The various levels of correlation used are as follows:

- Strong correlation (High) - 3
- Moderate correlation (Medium) - 2
- Low correlation (Low) - 1
- No correlation (Blank) -

3.1.2.1. Demonstration of CO-PO mapping for courses mentioned at 3.1.1

| Course | PO CO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 | PO 11 | PO 12 |
|---|----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|
| MET-302 Electrical Engineering Materials | CO.1 | 1 | | | 2 | | | | | | | | |
| | CO.2 | 2 | 2 | 2 | 2 | | 1 | 1 | 1 | | | | 1 |
| | CO.3 | 3 | 2 | 2 | 2 | | 1 | 1 | 1 | | | | 1 |
| | CO.4 | 3 | 2 | 2 | 2 | | 1 | 1 | 1 | | | | 1 |
| | CO.5 | 3 | 2 | 2 | 2 | | 1 | 1 | 1 | | | | 1 |
| | CO | 2.4 | 2 | 2 | 2 | | 1 | 1 | 1 | | | | 1 |
| ELE-401 Electric Machines-I | CO.1 | 2 | 2 | | 1 | | 3 | 1 | | | | 2 | |
| | CO.2 | 3 | 3 | | 2 | | 3 | 2 | | | | 3 | |
| | CO.3 | 2 | 3 | | 3 | | 3 | 3 | | | | 3 | |
| | CO.4 | 3 | 1 | | 1 | | 1 | 2 | | | | 1 | |
| | CO | 2.5 | 2.25 | | 1.75 | | 2.5 | | | | | 2.25 | |

| | | | | | | | | | | | | |
|---|-----------|------------|-------------|------------|-------------|----------|------------|------------|--|--|---|------------|
| ELE-501 Power System-I | CO.1 | 1 | 2 | 1 | | 1 | 3 | | | | | 2 |
| | CO.2 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | | | | 2 |
| | CO.3 | 3 | 3 | 3 | 2 | 1 | | | | | 1 | 2 |
| | CO.4 | 1 | 2 | 1 | | | | | | | | 2 |
| | CO.5 | 1 | 2 | 1 | | | | | | | | 2 |
| | CO | 1.8 | 2.4 | 1.8 | 2.5 | 1 | 1.5 | 2.5 | | | | 1 |
| ELE-601 Power System-II | CO.1 | 2 | 3 | | 1 | 1 | | | | | | |
| | CO.2 | 3 | | 2 | 2 | 3 | | | | | | 1 |
| | CO.3 | 2 | 2 | 2 | 2 | | | | | | 2 | 1 |
| | CO.4 | 2 | 1 | | 2 | | | | | | 1 | 1 |
| | CO.5 | 1 | 3 | | | 2 | | | | | | 1 |
| | CO | 2 | 2.25 | 2 | 1.75 | 2 | | | | | | 1.5 |
| ELE-702 Advanced Power Electronics | CO.1 | 3 | 3 | 2 | | 1 | 1 | | | | | 2 |
| | CO.2 | 3 | 3 | 2 | 1 | 1 | | 1 | | | | 2 |
| | CO.3 | 3 | 3 | 2 | | | | 1 | | | | 2 |
| | CO.4 | 3 | 3 | 2 | | | | 1 | | | | 2 |
| | CO.5 | 3 | 3 | 3 | | | 1 | | | | | 2 |
| | CO | 3 | 3 | 2.2 | 1 | 1 | 1 | 1 | | | | |
| ELE-803 High Voltage Engineering | CO1 | 3 | 2 | 2 | 1 | 2 | 1 | | | | | 2 |
| | CO2 | 3 | 2 | 2 | 1 | 2 | 1 | | | | | 2 |
| | CO3 | 3 | 2 | 2 | 1 | 2 | 1 | 1 | | | | 2 |
| | CO4 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | | | | 2 |
| | CO | 3 | 2 | 2 | 1.25 | 2 | 1 | 1 | | | | |

3.1.2.2. Demonstration of CO-PSO mapping for courses mentioned at 3.1.1

| Course | CO | PSO1 | PSO2 | PSO3 |
|---|-------------------|------------|-------------|-------------|
| MET-302 Electrical Engineering Materials | CO.1 | 1 | 1 | |
| | CO.2 | 2 | 1 | 1 |
| | CO.3 | 2 | 1 | 2 |
| | CO.4 | 2 | 1 | 2 |
| | CO.5 | 2 | 1 | 2 |
| | CO-MET-302 | 1.8 | 1 | 1.75 |
| ELE-401 Electric Machines-I | CO.1 | 2 | 2 | 1 |
| | CO.2 | 2 | 3 | 1 |
| | CO.3 | 2 | 3 | 1 |
| | CO.4 | 2 | 1 | 1 |
| | CO-ELE-401 | 2 | 2.25 | 1 |
| ELE-501 Power System-I | CO.1 | 1 | 2 | 1 |
| | CO.2 | 3 | 3 | 3 |
| | CO.3 | 3 | 2 | 2 |
| | CO.4 | 2 | 3 | 2 |
| | CO.5 | 2 | 3 | 2 |
| | CO-ELE-501 | 2.2 | 2.6 | 2 |
| ELE-601 Power System-II | CO.1 | 2 | 2 | |
| | CO.2 | 2 | 2 | |
| | CO.3 | 2 | 2 | |
| | CO.4 | 2 | 2 | |
| | CO.5 | 2 | 2 | |
| | CO-ELE-601 | 2 | 2 | |
| ELE-701 Power system protection | CO.1 | 2 | 2 | 1 |
| | CO.2 | 2 | 3 | 1 |
| | CO.3 | 2 | 3 | 1 |
| | CO.4 | 2 | 3 | 1 |
| | CO-ELE-701 | 2 | 2.75 | 1 |

| | | | | |
|---|-------------------|----------|----------|----------|
| ELE-803 High Voltage Engineering | CO.1 | 3 | 3 | 1 |
| | CO.2 | 3 | 3 | 1 |
| | CO.3 | 3 | 3 | 1 |
| | CO.4 | 3 | 3 | 1 |
| | CO-ELE-803 | 3 | 3 | 1 |

3.1.3 Explanation of Program Articulation Matrix to be ascertained: (10)

The matrix for program level Course-PO/PSO calculation is done by taking average of CO-PO/PSO correlation matrix for any course as demonstrated in 3.1.2.1 and 3.1.2.2 respectively. This is done for all courses offered by the program.

3.1.3.1. Program level Course-PO Matrix for all courses

| Course Code | Course Name | POs | | | | | | | | | | | |
|-------------|---|------|------|------|------|------|------|------|------|------|------|------|------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| PHY 101 | Physics-I | 3 | 3 | 2.75 | 1.25 | 1 | 1 | | | | | | |
| PHY 101 P | Physics-I Lab | 2.40 | 1.60 | 2.00 | 1.60 | 1.80 | 1.75 | 1.60 | 1.75 | 2.40 | 1.75 | 2.00 | 1.80 |
| CHM-101 | Chemistry-I | 2.50 | 2.25 | 1.50 | | 2.00 | 1.33 | 1.75 | | 1.00 | 1.75 | 2.00 | 2.25 |
| CHM-101P | Chemistry-I Lab | 2.50 | 1.50 | | | 2.50 | 2.00 | 2.25 | | | 1.33 | 2.00 | 1.25 |
| MTH-101 | Mathematics-I | 1.60 | 2.00 | 1.80 | 2.00 | 1.80 | 1.25 | | | | | | |
| HSS-101 | Communication Skills and Oral Presentation | | | | | | | | | 2.25 | 2.50 | 2.25 | |
| CIV-102 | Engineering Drawing | 3 | 3 | 3 | 3 | 2 | 1.5 | 1.75 | 2 | | | 3 | 2 |
| ITL 101 | Computer Fundamentals and Problem Solving | 2.50 | 3.00 | 1.00 | | 2.00 | | | | | | | 2.00 |
| IT-102P | Computer Fundamentals and Problem Solving Lab | 2.20 | 1.67 | 1.50 | | 2.20 | | | | | | | 2.00 |
| WSP-1 | Workshop Practice | 3.00 | 1.00 | 1.00 | | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 2.00 | | 3.00 |
| PHY-201 | Physics-II | 3.00 | 3.00 | 2.75 | 1.25 | 1.00 | | | | 1.00 | | | |
| PHY-201 P | Physics-II Lab | 1.80 | 2.40 | 1.80 | 1.60 | 2.20 | 1.75 | 1.20 | 1.50 | 1.60 | 2.00 | 2.00 | 3.00 |
| CHM-201 | Chemistry-II | 2.25 | 1.75 | 2.00 | 1.00 | 1.50 | 1.00 | 2.33 | 1.00 | 1.00 | 2.00 | | 1.75 |
| CHM-201P | Chemistry-II Lab | 2.50 | 2.00 | 1.75 | | | 1.75 | 2.00 | | | 1.50 | 1.33 | 1.25 |
| MTH-201 | Mathematics-II | 3.00 | 2.40 | 2.60 | 2.20 | 2.60 | | | | | | | |
| HSS-201 | Introduction to Social Science | 2.00 | 1.80 | 2.00 | 1.60 | 1.80 | 1.75 | 2.80 | 1.75 | 1.60 | 1.75 | 2.00 | 1.40 |
| MEC-201 | Machine Drawing | 1.40 | 2.00 | 2.20 | 2.00 | 1.80 | 1.75 | 2.00 | 1.75 | 1.60 | 2.25 | 2.00 | 3.00 |
| CSE-201 | Computer Programming | 1.00 | 3.00 | 2.75 | | 3.00 | | | | | | | |
| CSE-201 P | Programming Lab | 1.00 | 1.80 | 2.00 | 1.60 | 1.80 | 1.75 | 2.00 | 1.75 | 1.60 | 2.25 | 2.00 | 1.80 |
| CIV-201 | Engineering Mechanics | 1.20 | 2.20 | 1.60 | 1.60 | 1.80 | 1.75 | 2.00 | 1.75 | 2.00 | 2.25 | 2.00 | 1.80 |
| WSP-II | Workshop Practice | 3.00 | 1.00 | 1.00 | | 2.00 | 2.00 | 2.00 | 2.00 | 3.00 | 2.00 | | 3.00 |
| ELE 301 | Basic Electric Engineering | 2.80 | 1.80 | 1.80 | 2.20 | 1.50 | | | | | | 2.33 | 1.40 |
| ELE 301-P | Basic Electric Engineering Lab | 2.5 | 2.25 | | 1.75 | | 2.5 | 2.00 | | | | 2.25 | |
| ECE 301 | Network Analysis and Synthesis | 3.00 | 3.00 | 3.00 | 2.50 | 2.50 | 1.00 | 2.67 | 2.00 | 3.00 | 2.50 | 3.00 | 3.00 |
| ECE 302 | Electronics-I | 2.75 | 2.25 | 2.50 | 2.25 | | 2.50 | 1.75 | | | | 1.50 | 3.00 |
| ECE 302-P | Electronics-I Lab | 2.20 | 2.00 | 2.40 | 1.60 | 1.00 | 1.75 | | | 2.60 | | 2.80 | 1.80 |
| PHY 303 | Electromagnetic Fields & Waves | 3.00 | 2.50 | 2.00 | 1.50 | 2.75 | | | | | | | |
| MET 302 | Electrical Engineering Materials | 2.40 | 2.00 | 2.00 | 2.00 | | 1.00 | 1.00 | 1.00 | | | | 1.00 |
| MTH 305 | Mathematics-III | 2.25 | 2.50 | 2.25 | 2.00 | | | | | | 1.00 | | 1.00 |
| MECH-ELE | Thermal Engineering | 3.00 | 2.25 | 2.25 | | 2.00 | 2.00 | 1.75 | 2.00 | | | 3.00 | 2.00 |
| ELE 401 | Electric Machines-I | 2.50 | 2.25 | | 1.75 | | 2.50 | | | | | 2.25 | |
| ELE 401-P | Electric Machines-I Lab | 2.50 | 2.25 | | 1.75 | | 2.50 | | | | | 2.25 | |
| ELE 402 | Control Systems -I | 3.00 | 2.80 | 3.00 | 2.40 | 2.60 | 1.75 | 2.80 | 1.75 | 2.40 | 2.25 | 2.00 | 3.00 |
| ELE 403 | Electrical Measurements & Measuring Instruments | 2.75 | 2.75 | 2.50 | 2.00 | 1.00 | 2.75 | 2.50 | | | | 2.75 | 2.00 |

| | | | | | | | | | | | | | |
|-----------|---|------|------|------|------|------|------|------|------|------|------|------|------|
| ELE 403-P | Electrical Measurements & Measuring Instruments Lab | 3.00 | 3.00 | 2.67 | 1.33 | 1.67 | 1.00 | 1.00 | 1.00 | 3.00 | 2.67 | 2.67 | 2.33 |
| ECE 402 | Electronics-II | 2.50 | 2.50 | 2.00 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.50 | 0.00 | 2.25 |
| ECE 402-P | Electronics-II Lab | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | | | | | | | 3.00 |
| CIV 401 | Hydraulic and Hydraulic Machines | 3.00 | 3.00 | 3.00 | 3.00 | | 2.00 | 2.00 | 1.00 | | 1.00 | | 2.00 |
| MTH 402 | Mathematics-IV | 2.20 | 2.60 | 2.40 | 2.20 | | | | | | 1.00 | | 1.00 |
| ELE 501 | Power Systems-I | 1.80 | 2.40 | 1.80 | 2.50 | 1.00 | 1.50 | 2.50 | | | | 1.00 | 2.00 |
| ELE 501-P | Power Systems-I Lab | 2.75 | 1.75 | 2.00 | 2.00 | 2.00 | 1.67 | 2.00 | | | | | 2.00 |
| ELE 502 | Electric Machines-II | 3.00 | 2.50 | 2.33 | 1.33 | 1.67 | 1.00 | 1.00 | | | | | 2.00 |
| ELE 502-P | Electric Machines-II Lab | 1.50 | 1.75 | 1.75 | 1.00 | | 2.67 | 2.00 | 2.00 | 1.50 | 1.25 | 1.50 | 2.25 |
| ELE 503 | Control Systems -II | 3.00 | 2.50 | 2.50 | 2.50 | 2.50 | 2.00 | 2.00 | 1.00 | 1.75 | 1.33 | 1.00 | 2.50 |
| ELE 503-P | Control systems-II & VI Lab | 3.00 | 3.00 | 2.67 | 1.33 | 1.67 | 1.00 | 1.00 | 1.00 | 3.00 | 2.67 | 2.67 | 2.33 |
| ELE 504 | Computer Aided Simulation of Electrical Systems | 2.67 | 3.00 | 2.67 | 1.33 | 1.67 | 1.00 | 1.00 | 1.00 | 2.67 | 2.33 | 2.67 | 2.33 |
| ECE 508 | Communication Systems | 2.75 | 2.50 | 2.25 | 2.00 | 2.75 | 1.33 | 1.25 | 1.00 | 1.00 | 1.50 | 1.00 | 2.00 |
| ECE 509 | Digital Electronics & Logic design | 2.75 | 2.50 | 2.50 | 2.00 | 2.25 | | | | | | 2.00 | 3.00 |
| ECE 509-P | Digital Electronics & Logic design Lab | 3.00 | 2.00 | 2.50 | 2.50 | | | | 2.00 | 2.00 | | 1.25 | |
| MTH 503 | Mathematics-V | 2.20 | 2.60 | 2.40 | 2.20 | | | | | | 1.00 | | 1.00 |
| ELE 601 | Power system II | 2.00 | 2.25 | 2.00 | 1.75 | 2.00 | | | | | | 1.50 | 1.00 |
| ELE 601-P | Power system II Lab | 1.50 | 2.25 | 1.50 | 1.67 | 1.67 | | | | | | | 1.00 |
| ELE 602 | Power Electronics | 2.20 | 2.00 | 2.40 | 1.60 | 1.00 | 1.60 | | | 2.60 | | 2.80 | 1.80 |
| ELE 602-P | Power Electronics Lab | 2.25 | 2.00 | 2.25 | 1.50 | 1.00 | 1.50 | | | 2.50 | | 2.75 | 1.75 |
| ELE 603 | Electric Machines Design | 2.75 | 2.75 | 2.50 | 2.00 | 1.00 | 2.75 | 2.50 | | | | 2.75 | 2.00 |
| ELE 604 | Tour & Training | 3.00 | 2.00 | 2.00 | 2.00 | 2.33 | | 2.00 | | 1.00 | 1.50 | 2.00 | 1.67 |
| ELE 605 | Digital Signal Processing | 2.80 | 1.80 | 1.60 | 2.40 | 1.80 | 1.40 | | | | | 2.20 | 1.40 |
| ELE 606 | Microprocessors | 3.00 | 2.00 | 2.67 | 3.00 | 2.33 | 1.33 | 1.00 | | | 1.00 | 1.67 | 1.67 |
| ELE 606-P | Microprocessors Lab | 3.00 | 1.67 | 1.67 | 2.33 | 3.00 | 1.00 | | | | 1.00 | 2.00 | 1.00 |
| ELE 701 | Power System Protection | 2.75 | 2.75 | 2.50 | 2.00 | | 2.75 | | | | | 2.75 | 2.00 |
| ELE 701-P | Power System Protection Lab | 2.75 | 2.75 | 2.50 | 2.00 | 1.00 | 2.75 | 2.50 | | | | 2.75 | 2.00 |
| ELE 702 | Advanced Power Electronics | 3.00 | 3.00 | 2.20 | 1.00 | 1.00 | 1.00 | 1.00 | | | | | 2.00 |
| ELE 708 | Electronic Measurements and Instrumentation | 2.25 | 2.25 | 2.50 | 1.00 | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.25 |
| ELE 708-P | Electronic Measurements and Instrumentation Lab | 2.25 | 2.25 | 2.50 | 1.00 | | 1.00 | | | 1.00 | 1.00 | 1.00 | 1.25 |
| ELE 15/E | Utilization and Traction | 2.25 | 2.00 | 1.75 | 2.00 | 1.50 | 2.50 | 2.50 | 1.50 | | | 1.67 | 1.75 |
| ELE-4/E | Selected Topics in Advanced Control | 2.60 | 2.60 | 2.00 | 2.20 | 1.00 | 2.75 | 2.67 | 1.25 | 2.00 | 2.33 | 2.50 | 2.80 |
| ELE 706P | Project Preliminary Work/Seminar | 2.00 | 1.50 | 2.00 | | | 1.00 | | | | | 2.00 | 2.00 |
| HSS 701 | General Management and Economics | | 3.00 | 2.00 | | | 2.00 | 1.67 | 2.00 | 3.00 | | 2.80 | 3.00 |
| ELE-801 | Power system III | 2.80 | 1.80 | 1.60 | 2.67 | 1.00 | 1.25 | | | | | 2.33 | 1.40 |
| ELE-18/E | High Voltage Engineering | 3.00 | 2.00 | 2.00 | 1.25 | 2.00 | 1.00 | 1.00 | | | | | 2.00 |
| ELE-18/EP | High Voltage Engineering Lab | 2.75 | 2.00 | 2.00 | 1.50 | 1.00 | 1.00 | | | 2.00 | | | 2.00 |
| ELE 802 | Project | 2.50 | 2.50 | 2.00 | 2.33 | 1.75 | | 1.00 | 3.00 | 2.00 | 1.00 | 2.00 | |
| ELE 1-14 | Power Station Practice | 2.75 | 2.75 | 2.50 | 2.00 | | 2.75 | | | | | 2.75 | 2.00 |
| ELE-11/E | Maintenance and design of Electrical Substations | 1.75 | 1.5 | 1.5 | 1.25 | 1.75 | 1 | 1 | | | | | 2 |

3.1.3.2. Program level Course-PSO Matrix for all courses

| Course Code | Course Name | PSO | | |
|-------------|---|------|------|------|
| | | 1 | 2 | 3 |
| PHY 101 | Physics-I | | | |
| PHY 101 P | Physics-I Lab | 2.00 | 1.20 | 1.00 |
| CHM-101 | Chemistry-I | 2.25 | 2.50 | 1.75 |
| CHM-101P | Chemistry-I Lab | 2.50 | 2.50 | 1.50 |
| MTH-101 | Mathematics-I | 2.00 | 2.25 | 1.00 |
| HSS-101 | Communication Skills and Oral Presentation | | | |
| CIV-102 | Engineering Drawing | 3 | 2 | 2 |
| ITL 101 | Computer Fundamentals and Problem Solving | 2.75 | 2.00 | 1.50 |
| IT-102P | Computer Fundamentals and Problem Solving Lab | 1.00 | | 1.00 |
| WSP-1 | Workshop Practice | 2.00 | 1.00 | 1.00 |
| PHY-201 | Physics-II | | | |
| PHY-201 P | Physics-II Lab | 2.00 | 1.33 | 1.00 |
| CHM-201 | Chemistry-II | 2.00 | 2.25 | 1.25 |
| CHM-201P | Chemistry-II Lab | 2.25 | 2.50 | 2.00 |
| MTH-201 | Mathematics-II | 1.80 | 2.00 | 1.00 |
| HSS-201 | Introduction to Social Science | 1.60 | 1.20 | 1.25 |
| MEC-201 | Machine Drawing | 2.00 | 2.00 | 1.00 |
| CSE-201 | Computer Programming | 2.00 | 2.00 | |
| CSE-201 P | Programming Lab | 2.00 | 1.20 | 1.00 |
| CIV-201 | Engineering Mechanics | 1.40 | 1.20 | 1.00 |
| WSP-II | Workshop Practice | 2.00 | 1.00 | 1.00 |
| ELE 301 | Basic Electric Engineering | 1.50 | 1.33 | 2.00 |
| ELE 301-P | Basic Electric Engineering Lab | 2 | 2.25 | 1 |
| ECE 301 | Network Analysis and Synthesis | 3.00 | 3.00 | 3.00 |
| ECE 302 | Electronics-I | 3.00 | 3.00 | 2.25 |
| ECE 302-P | Electronics-I Lab | 2.40 | 1.80 | 2.20 |
| PHY 303 | Electromagnetic Fields & Waves | | | |
| MET 302 | Electrical Engineering Materials | 1.80 | 1.00 | 1.75 |
| MTH 305 | Mathematics-III | 1.75 | 2.50 | 1.00 |
| MECH-ELE | Thermal Engineering | 3.00 | 1.75 | 3.00 |
| ELE 401 | Electric Machines-I | 2.00 | 2.25 | 1.00 |
| ELE 401-P | Electric Machines-I Lab | 2.00 | 2.25 | 1.00 |
| ELE 402 | Control Systems -I | 2.00 | 2.00 | 1.00 |
| ELE 403 | Electrical Measurements & Measuring Instruments | 2.00 | 2.75 | 1.00 |
| ELE 403-P | Electrical Measurements & Measuring Instruments Lab | 2.67 | 2.67 | 1.00 |
| ECE 402 | Electronics-II | 1.75 | 2.50 | 1.00 |
| ECE 402-P | Electronics-II Lab | 3.00 | 3.00 | |
| CIV 401 | Hydraulic and Hydraulic Machines | 2.00 | 3.00 | 3.00 |
| MTH 402 | Mathematics-IV | 1.80 | 2.20 | 1.00 |
| ELE 501 | Power Systems-I | 2.20 | 2.60 | 2.00 |
| ELE 501-P | Power Systems-I Lab | 2.25 | 1.50 | 1.25 |
| ELE 502 | Electric Machines-II | 3.00 | 3.00 | 1.00 |
| ELE 502-P | Electric Machines-II Lab | 2.00 | 2.25 | 1.50 |
| ELE 503 | Control Systems -II | 2.00 | 2.25 | 1.00 |
| ELE 503-P | Control systems-II & VI Lab | 2.67 | 2.67 | 1.00 |
| ELE 504 | Computer Aided Simulation of Electrical Systems | 2.33 | 2.67 | 1.00 |
| ECE 508 | Communication Systems | 2.75 | 2.75 | 2.50 |
| ECE 509 | Digital Electronics & Logic design | 2.25 | 2.33 | 2.50 |

| | | | | |
|-----------|--|------|------|------|
| ECE 509-P | Digital Electronics & Logic design Lab | 2.00 | 3.00 | 2.00 |
| MTH 503 | Mathematics-V | 1.80 | 2.20 | 1.00 |
| ELE 601 | Power system II | 2.00 | 2.00 | |
| ELE 601-P | Power system II Lab | 2.00 | 2.00 | 2.00 |
| ELE 602 | Power Electronics | 2.40 | 1.80 | 2.20 |
| ELE 602-P | Power Electronics Lab | 2.25 | 1.50 | 2.00 |
| ELE 603 | Electric Machines Design | 2.00 | 2.75 | 1.00 |
| ELE 604 | Tour & Training | 2.00 | 2.00 | |
| ELE 605 | Digital Signal Processing | 2.00 | 2.00 | 2.20 |
| ELE 606 | Microprocessors | 2.67 | 2.67 | 2.67 |
| ELE 606-P | Microprocessors Lab | 3.00 | 3.00 | 2.67 |
| ELE 701 | Power System Protection | 2.00 | 2.75 | 1.00 |
| ELE 701-P | Power System Protection Lab | 2.00 | 2.75 | 1.00 |
| ELE 702 | Advanced Power Electronics | 3.00 | 2.00 | 1.00 |
| ELE 708 | Electronic Measurements and Instrumentation | 2.00 | 2.00 | 3.00 |
| ELE 708-P | Electronic Measurements and Instrumentation Lab | 2.00 | 2.00 | 3.00 |
| ELE 15/E | Utilization and Traction | 1.75 | 2.00 | 1.75 |
| ELE-4/E | Selected Topics in Advanced Control | 2.20 | 2.60 | 2.40 |
| ELE 706P | Project Preliminary Work/Seminar | 2.00 | 1.00 | 2.00 |
| HSS 701 | General Management and Economics | | 3.00 | |
| ELE-801 | Power system III | 1.67 | 1.33 | 2.00 |
| ELE-18/E | High Voltage Engineering | 3.00 | 3.00 | 1.00 |
| ELE-18/EP | High Voltage Engineering Lab | 3.00 | 3.00 | 1.00 |
| ELE 802 | Project | 2.00 | 2.00 | 2.00 |
| ELE 1-14 | Power Station Practice | 2.00 | 2.75 | 1.00 |
| ELE-11/E | Maintenance and design of Electrical Substations | 1.5 | 1.5 | 1 |

3.2 ATTAINMENT OF COURSE OUTCOMES: (75)

3.2.1. Describe the assessment tools and processes used to gather the data upon which the evaluation of Course Outcome is based (10)

CO Assessment Rubrics:

- Theory Courses:

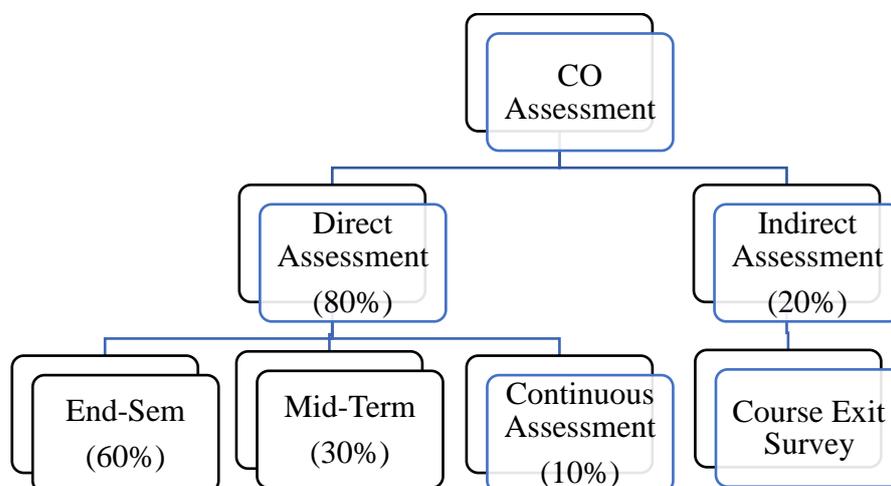


Figure A. 3.2.1a

- **Laboratory / Practical Courses:**

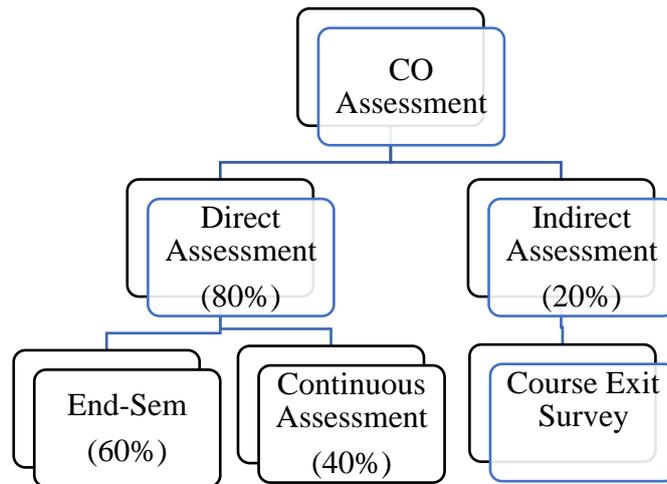


Figure A. 3.2.1a

CO Assessment Tools:

The various assessment tools used to evaluate COs and the frequency with which the assessment processes are carried out are listed in 3.2.1.1 and 3.2.1.2 respectively.

COs are evaluated based on the performance of students in a mid-term examination, one major examination and continuous assessment (in the form of assignments and quizzes). The contributions are 30%, 60% and 10% for the mid-term exam, major exam and continuous assessment, respectively.

However, the lockdowns due to abrogation of Article 370 and subsequent COVID-19, the regular pattern examination couldn't be possible and alternative evaluation schemes were adopted. For Autumn 2019, the contributions are 90% and 10% for major exam and continuous assessment respectively. In Spring 2020 the classes were held online and the evaluation was based on Mid Term (30%) as assignments and Major (40%) as Comprehensive Viva-Voce Examination (CVVE), the remaining 30% was based on the Maximum Semester Grade Point Average (SGPA) up to previous semesters. Whereas for the assessment of CO attainment purpose, the Assignments was given weightage of 40% and CVVE has been given 60% weightage.

Assessment of Course Outcomes (Upto Spring 2019)

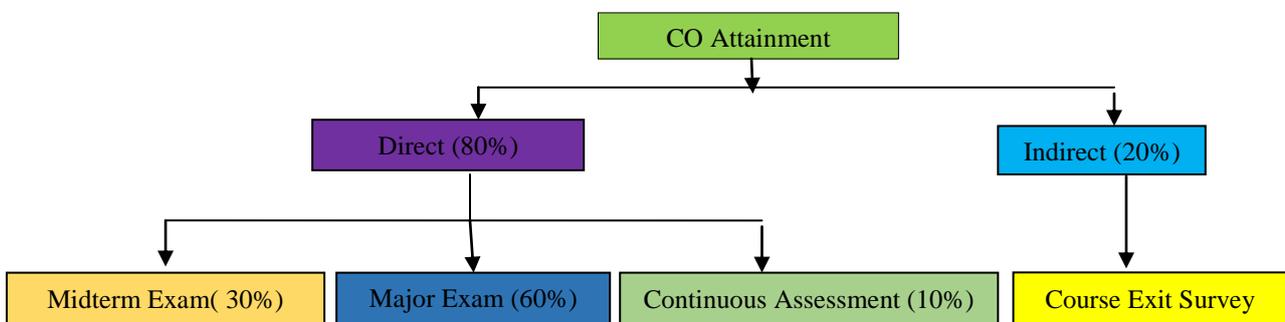
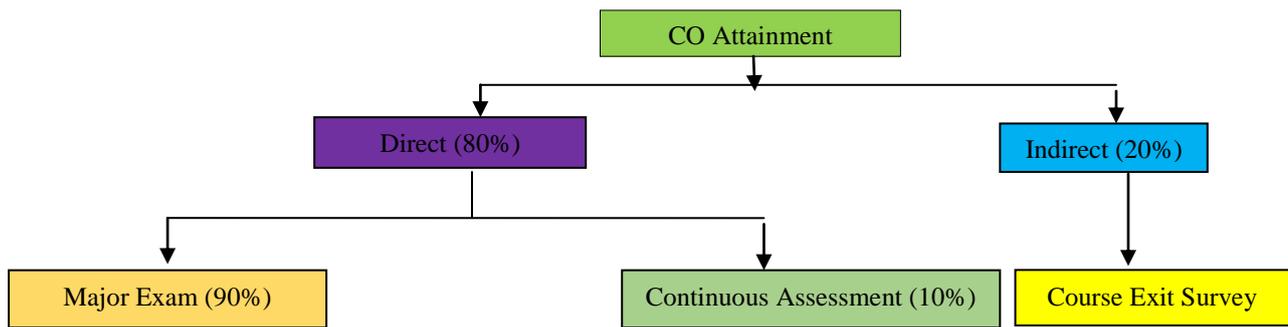
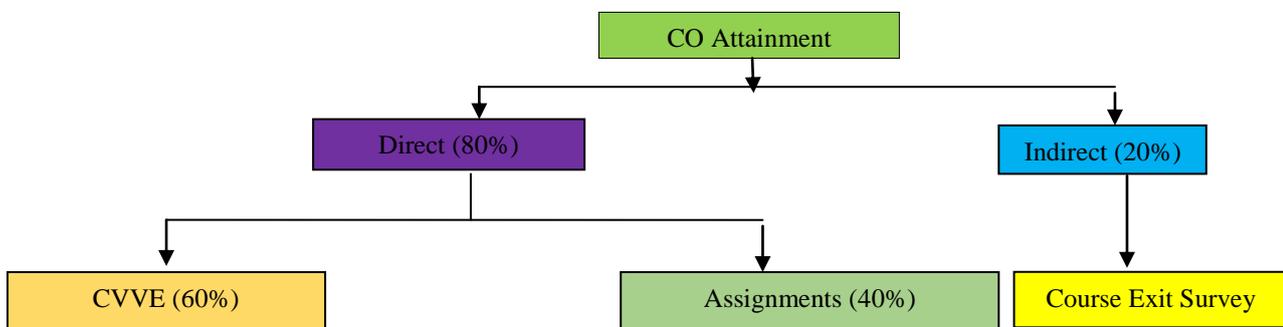


Figure B. 3.2.1a

Assessment of Course Outcomes (Autumn 2019)*Figure B. 3.2.1b***Assessment of Course Outcomes (Spring 2020)***Figure B. 3.2.1c*

The various assessment tools used to evaluate COs and the frequency with which the assessment processes are carried out are listed in the below mentioned Table.

3.2.1.1. Direct Assessment Tools

| DIRECT ASSESSMENT TOOLS | | | |
|------------------------------------|-------------------------------------|----------------------------------|--------------------------|
| Course Type | Assessment Tools | Frequency | |
| Theory | Mid-Term exam | Once per course | |
| | Continuous Assessment | Twice/Thrice per course | |
| | End Semester Exam | Once per course | |
| Practical / Laboratory | Continuous Assessment | Every lab session | |
| | End Semester Exam | Once per course | |
| Seminar (7thsem) | Presentation | Once per course | |
| Project | Phase I (7thsem) | Review | Once per semester |
| | Phase II (8thsem) | Review | Once/ Twice per semester |
| | | Evaluation by Guide | Continuous evaluation |
| | | Demonstration / Final Evaluation | Once per course |

3.2.1.2. Indirect Assessment Tools

COURSE EXIT SURVEY

Name of the Course:

Course Code:

Semester:

Session:

Note: Please rate the quality of course on the basis of course curriculum, course organization, teaching learning process, quality of learning material, assignments, progressive assessments, performance of faculty members and course outcomes.

Rate each criterion as per the legends defined below

Legend: 3 → Good 2 → Average 1 → Poor

- | | | | |
|--|----------------------------|----------------------------|----------------------------|
| 1. Course Outcomes explained | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 2. Extent of course content | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 3. Importance of course explained | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 4. Ease of learning | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 5. Logically sequenced | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 6. Linked with previous and subsequent courses | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 7. Introduction to topic | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 8. Development of content | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 9. Opportunity of participation | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 10. Quality of questions asked by teacher | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 11. Variety of teaching materials | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 12. Use of teaching aids | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 13. Summarization of learning | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |
| 14. Relevance to Course Outcomes | <input type="checkbox"/> 1 | <input type="checkbox"/> 2 | <input type="checkbox"/> 3 |

Practical / Laboratory:

Performance: Lab courses provide students with first-hand experience with course concepts and with the opportunity to explore methods used in their discipline. All the students are expected to be regular and learn the practical aspects of the subject and develop the necessary skills to become professionals. In order to facilitate interaction among the students and to develop team spirit, the students are expected to carry out experiments in groups. Performance assessment is based on the ability of the student to actively participate in the successful conduct of prescribed practical work and draw appropriate conclusions. The student submits a record of practical work performed in each class.

End-sem examination: These end-semester practical examinations are of 3 hours duration and cover the entire syllabus of the course. It should generally satisfy all course outcomes for a particular course. The COs are evaluated based on the set attainment levels.

Seminar:

Seminar is a part of 7th semester curriculum. The student makes a seminar presentation on a topic of his/her choice and approved by the assigned seminar guide. Seminar presentation is planned for the duration of 25 minutes including a question answering session of 5 to 10 minutes. Seminar is evaluated based on the presentation by the students before an evaluation committee consisting of four faculty members. The committee evaluates seminar based on following parameters.

Relevance: The seminar power point presentation shall be fundamentals oriented and advanced topics in the appropriate branch of engineering with references of latest international journal papers. The significance of the seminar topic and the credibility of references cited are used as parameters to assess the relevance of the seminar.

Presentation: The quality of the presentation and communication skill is assessed by the evaluation committee.

Viva-voce: At the end of the presentation, the assessment panel and the student audience ask questions and seek clarifications on specific issues related to the seminar. The effectiveness of the student's response to these queries is assessed.

Report and Documentation: A bonafide report on seminar is submitted at the end of the semester. This report shall include, in addition to the presentation materials, all relevant supplementary materials along with detailed answers to all the questions asked/clarifications sought during presentation. All references must be given toward the end of the report. Students' ability to comprehend and write effective reports and design documentation is assessed by evaluating the report.

Project:

Project is intended to be a challenge to intellectual and innovative abilities and to give students the opportunity to synthesize and apply the knowledge and analytical skills learned in the different disciplines. The project work has to be started in the seventh semester and to be continued in the eighth semester.

Project – Phase I:

Students are expected to finalize project themes/titles with the assistance of an identified faculty member as project guide during first half of the seventh semester. During phase I, students are required to submit a project plan contains relevance of the project proposed, literature survey, objectives, statement of how the objectives are to be tackled, time schedule and cost estimate. Assessment tool used to evaluate phase I project work is:

Review: A review is conducted at the end of the 7th semester and a project panel will evaluate the work based on various parameters. The significance of the work in societal and environmental context is used to assess the relevance of the project. The knowledge level and presentation skills are evaluated by the panel based on their performance. At the end of the presentation, the assessment panel asks questions and seeks clarifications on specific issues related to the project. The effectiveness of the individual student response to these queries is assessed.

Project – Phase II:

First Review: In first review, the design part of the proposed work is evaluated. The students' communication skill and depth of knowledge in designing is assessed based on presentation and response to questions asked by the review panel.

Second Review: In the second review, percentage of work completed, difficulties faced and how they tackled these difficulties are analyzed to evaluate project progress. The individual involvement in project work is assessed based on response to questions asked by the panel.

Demonstration: Final demonstration is conducted at the end of the semester to evaluate the completeness and perfection of work done. At the end of the demonstration, the assessment panel asks questions and seeks clarifications on specific issues related to various stages of the project. Responses from each student to these queries are assessed.

Evaluation by Guide: Performance of individual student is continuously evaluated by the project guide. Members of a project group shall prepare and submit separate reports. The report shall record all aspects of the work and is evaluated by the project guide.

Process for assessing the quality of the Projects:

The project evaluation committee and the project guide together will analyze the nature of the project and make sure that the work is environment friendly, ensures safety, ethics and cost effective. The

projects are classified into different areas and their relevance to POs and PSOs are identified to ensure its quality.

3.2.2. Record the attainment of Course Outcomes of all courses with respect to set attainment levels: (65)

i) Set Attainment Levels for COs:

Direct Course Outcome Attainment Levels for all Theory courses

(For Session: 2017-18)

| Assessment Method | Level | Attainment Levels |
|-----------------------|-------|--|
| Midterm Examination | 1 | 50% of students scoring more than & equal to 40% marks |
| | 2 | 60% of students scoring more than & equal to 40% marks |
| | 3 | 75% of students scoring more than & equal to 40% marks |
| End sem Examination | 1 | 50% of students scoring more than & equal to 40% marks |
| | 2 | 60% of students scoring more than & equal to 40% marks |
| | 3 | 75% of students scoring more than & equal to 40% marks |
| Continuous Assessment | 1 | 50% of students scoring more than & equal to 50% marks |
| | 2 | 60% of students scoring more than & equal to 50% marks |
| | 3 | 75% of students scoring more than & equal to 50% marks |

(For Sessions: 2018-19 and 2019-20)

| Assessment Method | Level | Attainment Levels |
|-----------------------|-------|--|
| Midterm Examination | 1 | 50% of students scoring more than & equal to 50% marks |
| | 2 | 60% of students scoring more than & equal to 50% marks |
| | 3 | 70% of students scoring more than & equal to 50% marks |
| End sem Examination | 1 | 50% of students scoring more than & equal to 50% marks |
| | 2 | 60% of students scoring more than & equal to 50% marks |
| | 3 | 70% of students scoring more than & equal to 50% marks |
| Continuous Assessment | 1 | 50% of students scoring more than & equal to 50% marks |
| | 2 | 60% of students scoring more than & equal to 50% marks |
| | 3 | 70% of students scoring more than & equal to 50% marks |

Direct Course Outcome Attainment Levels for all Laboratory courses

(For All Sessions: 2017-18, 2018-19 and 2019-20)

| Assessment Method | Level | Attainment Levels |
|----------------------------------|-------|--|
| Continuous / Internal Assessment | 1 | 60% of students scoring more than & equal to 50% marks |
| | 2 | 70% of students scoring more than & equal to 50% marks |
| | 3 | 80% of students scoring more than & equal to 50% marks |
| End sem Examination | 1 | 60% of students scoring more than & equal to 50% marks |
| | 2 | 70% of students scoring more than & equal to 50% marks |
| | 3 | 80% of students scoring more than & equal to 50% marks |

ii) CO Attainment Calculation of a Course:

The Course Outcome (CO) attainment level is discussed in light of the course topics, question papers and student results. There is a more or less uniform distribution of almost all COs in all course assessments. The student's performances define the index for deciding the CO achievement, as to which bandwidth of grades the majority of class stands in. The CO attainments have been calculated for all three academic years (A.Y) 2017-18, 2018-19 and 2019-20 respectively.

The mathematical relations used for calculating the attainment of courses are given as:

Direct Attainment (Theory) = 30% Mid Term assessment + 10% Continuous assessment + 60% End Sem assessment.

Direct Attainment (Practical) = 60% End Sem assessment + 40% Continuous assessment.

Note: Few changes are done in Direct Attainment process for issues pertaining to abrogation of Article 370 in Kashmir valley and COVID-19 pandemic for both Autumn & Spring sessions of academic year 2019-20. The details are as defined and described in section 3.2.1

Indirect Attainment (Theory and Practical) = Course Exit Survey

Overall CO Attainment for all Theory and Lab courses

= **80%** Direct Attainment + **20%** Indirect Attainment

CO Attainment of All courses:

| CO ATTAINMENT for YEAR 2017-18 | | | | | | | | |
|--------------------------------|--|------|------|------|------|------|-----|------|
| CODE | COURSE NAME | CO1 | CO2 | CO3 | CO4 | CO5 | CO6 | AVG |
| PHY-101 | Physics I | 0.9 | 3 | 1.8 | 0.3 | | | 1.50 |
| PHY-101P | Physics Lab - I | 1 | 1.2 | 0.9 | 2 | | | 1.28 |
| CHM-101 | Chemistry I | 2.9 | 2.7 | 2.2 | 1.7 | | | 2.38 |
| CHM-101P | Chemistry I Lab | 2.9 | 2.9 | 2.9 | 2.9 | | | 2.90 |
| MTH-101 | Mathematics I | 2.4 | 2.19 | 2.6 | 1.66 | 1.24 | | 2.02 |
| HSS-101 | Communication Skills & Oral Presentation | 2.08 | 2.11 | 2.08 | 2.09 | | | 2.09 |
| CIV-102 | Engineering Drawing | 1.98 | 2.27 | 1.62 | 2.22 | | | 2.02 |
| IT-101 | Computer Fundamentals & Problem solving | 2.8 | 3 | 2.2 | 2 | | | 2.50 |
| IT-102P | Computer Science Lab | 0.4 | 3 | 3 | 2.8 | 2.8 | | 2.40 |
| WSP-I | Workshop Practice-I | 2.9 | 2.9 | 2.62 | 2.9 | 2.9 | | 2.84 |
| PHY-201 | Physics-II | 1.2 | 2.4 | 0.9 | 0.3 | | | 1.20 |
| PHY-201P | Physics Lab - II | 1 | 0.8 | 0.6 | 0.5 | | | 0.72 |
| CHM-201 | Chemistry II | 2.9 | 2.9 | 2.9 | 2.1 | | | 2.16 |

| | | | | | | | | |
|----------|---|------|------|------|------|------|-----|------|
| CHM-201P | Chemistry Lab-II | 2.8 | 2.8 | 2.7 | 2.8 | | | 2.22 |
| MTH-201 | Mathematics II | 1.97 | 1.47 | 1.9 | 0.75 | 0.75 | | 1.36 |
| HU-201 | Humanities II | 2 | 2.2 | 2.6 | 2.8 | | | 2.40 |
| CIV-201 | Engineering Mechanics | 2.1 | 2.3 | 1.9 | 2.8 | | | 2.27 |
| MEC-201 | Machine Drawing | 2.8 | 2.9 | 2.9 | 1.16 | | | 2.44 |
| CSE-201 | Computer Programming | 1.1 | 2.5 | 1.8 | 1.6 | | | 1.75 |
| CSE-201P | Computer Programming Lab | 1 | 0.6 | 0.8 | 1.9 | | | 1.07 |
| WSP-II | Workshop Practice-II | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | | 2.90 |
| ELE-301 | Basic Electrical Engineering | 2.69 | 2.39 | 2.93 | 2.07 | 1.79 | | 2.37 |
| ELE-301P | Basic Electrical Engineering Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| ECE-301 | Network Analysis and Synthesis | 3 | 3 | 1.6 | 1.6 | | | 2.30 |
| ECE-302 | Electronics-I | 2.6 | 2.4 | 2.1 | 2.4 | | | 2.30 |
| ECE-302P | Electronics-I Lab | 1.2 | 1.9 | 1.6 | 1.4 | | | 1.52 |
| PHY-303 | Electro Magnetic Fields & Waves | 2.9 | 2.9 | 2.9 | 2.2 | | | 2.72 |
| MET-302 | Electrical Engineering Materials | 3 | 2.8 | 2.8 | 2.28 | 2.08 | | 2.59 |
| MTH-305 | Mathematics-III | 2.9 | 2.4 | 1.9 | 1.2 | | | 2.10 |
| MECH-ELE | Thermal Engineering | 2.3 | 2.3 | 2.9 | 1.66 | | | 2.29 |
| ELE-401 | Electrical Machines-I | 2.2 | 2.9 | 2.6 | 1 | | | 2.35 |
| ELE-401P | Electrical Machines-I Lab | 2 | 1.8 | 1.6 | 1.1 | | | 1.62 |
| ELE-402 | Control Systems-I | 2.9 | 2.4 | 1.9 | 1.6 | 1.5 | | 2.06 |
| ELE-403 | Electrical Measurements & Measuring Instruments | 3 | 1.8 | 2 | 1.8 | | | 2.15 |
| ELE-403P | Electrical Measurements & Measuring Instruments Lab | 2.9 | 2.9 | 2.92 | | | | 2.90 |
| ECE-402 | Electronics-II | 2.5 | 2.3 | 2.8 | 2.1 | | | 2.42 |
| ECE-402P | Electronics-II Lab | 1.8 | 1.8 | 2.9 | 2.9 | | | 2.30 |
| CIV-401 | Hydraulics and Hydraulic Machines | 1.2 | 1.9 | 2.2 | 2.5 | | | 1.95 |
| MTH-402 | Mathematics IV | 2.9 | 2.4 | 2.6 | 2.1 | 2.1 | | 2.42 |
| ELE-501 | Power Systems-I | 3 | 1.6 | 0.68 | 2.28 | | | 1.89 |
| ELE-501P | Power Systems-I Lab | 2.8 | 3 | 2.8 | 2.8 | | | 2.85 |
| ELE-502 | Electrical Machines-II | 2.6 | 2.3 | 1.8 | 1.7 | 1.3 | 2.1 | 1.90 |
| ELE-502P | Electrical Machines-II Lab | 2.1 | 1.7 | 1.3 | 1.2 | 0.8 | | 1.42 |
| ELE-503 | Control Systems-II | 2.9 | 2.9 | 1.9 | 1.4 | | | 2.28 |
| ELE-503P | Control Systems-II & VI Lab | 2.8 | 2.3 | 1.73 | | | | 2.27 |

| | | | | | | | | |
|-----------|--|------|-----|------|------|------|-----|-------------|
| ELE-504 | Computer Aided Simulation of Electrical Systems | 2.1 | 2.7 | 2.9 | | | | 2.50 |
| ECE-508 | Communication Systems | 2.8 | 2.9 | 2.9 | 2.9 | | | 2.87 |
| ECE-509 | Digital Electronics & Logic Design | 2.7 | 2.6 | 2.8 | 2.8 | | | 2.72 |
| ECE-509P | Digital Electronics & Logic Design Lab | 2.8 | 3 | 2.9 | 3 | | | 2.92 |
| MTH-503 | Mathematics-V | 2.2 | 2.1 | 2.1 | 1.6 | 1.6 | | 1.92 |
| ELE-601 | Power Systems-II | 2.7 | 2.7 | 2.7 | 2.2 | 2.1 | | 2.40 |
| ELE-601P | Power Systems-II Lab | 2.8 | 2.6 | 2.7 | 2.9 | | | 2.75 |
| ELE-602 | Power Electronics | 2 | 2.2 | 2.3 | 2.6 | | | 2.27 |
| ELE-602P | Power Electronics Lab | 3 | 3 | 2.8 | 2.16 | | | 2.70 |
| ELE-603 | Electrical Machine Design | 2.3 | 1.8 | 1.1 | 0.9 | | | 1.52 |
| ELE-604 | Tour and Training | 2 | 1.9 | 2.2 | 2.8 | | | 2.22 |
| ELE-605 | Digital Signal Processing | 2 | 2.2 | 2.2 | 1.6 | 2.2 | | 2.04 |
| ELE-606 | Microprocessors | 2.32 | 3 | 2.52 | | | | 2.61 |
| ELE-606P | Microprocessors Lab | 2.8 | 3 | 3 | | | | 2.90 |
| ELE-701 | Power System Protection | 2.9 | 2.9 | 1.9 | 1.9 | 0.95 | | 2.11 |
| ELE-701P | Power System Protection Lab | 3 | 2.4 | 3 | 3 | | | 2.85 |
| ELE-702 | Advanced Power Electronics | 2.1 | 2.5 | 2.8 | 1.8 | 1.9 | | 2.22 |
| ECE-708 | Electronic Measurements & Instrumentation | 2.8 | 2.8 | 2.6 | 2.3 | | | 2.60 |
| ECE-708P | Electronic Measurements & Instrumentation Lab | 2.9 | 2.9 | 2.9 | 2.9 | | | 2.90 |
| ELE-4/E | Elective I (Selected Topics in Advanced Control) | 2.9 | 2.9 | 2.8 | 2.8 | 2.7 | | 2.82 |
| ELE-15/E | Elective I (Utilization and Traction) | 2.9 | 2.9 | 2.8 | 2.8 | | | 2.85 |
| ELE-704P | Project Preliminary Work / Seminar | 2.9 | 2.8 | | | | | 2.85 |
| HSS-701 | General Management & Economics | 1.3 | 2 | 2.1 | 2.1 | 2.1 | 1.3 | 1.80 |
| ELE-801 | Power Systems-III | 2.8 | 3 | 2.8 | 2.2 | 2 | | 2.56 |
| ELE-18/E | Elective-II/IV (High Voltage Engineering) | 1.8 | 0.6 | 0.4 | 1.3 | | | 1.03 |
| ELE-18/EP | Elective-IV (High Voltage Engineering Lab) | 3 | 3 | 2.8 | 3 | | | 2.95 |
| ELE-803 | Power Station Practice | 2.9 | 2.9 | 2.1 | 1.6 | | | 2.37 |
| ELE-802 | Project | 2.8 | 2.9 | 2.7 | 2.8 | | | 2.80 |
| ELE-11/E | Elective-III (Maintenance & Design of Electrical sub-stations) | 2 | 2.4 | 2.1 | 2.6 | | | 2.27 |

| CO ATTAINMENT for YEAR 2018-19 | | | | | | | | |
|--------------------------------|--|------|------|------|------|------|-----|------|
| CODE | COURSE NAME | CO1 | CO2 | CO3 | CO4 | CO5 | CO6 | AVG |
| PHY-101 | Physics-I | 3 | 2.4 | 2.4 | 0.3 | | | 2.03 |
| PHY-101P | Physics Lab - I | 2 | 1.8 | 1.6 | 1.2 | | | 1.65 |
| CHM-101 | Chemistry I | 2.9 | 2.4 | 2.9 | 1.67 | | | 2.46 |
| CHM-101P | Chemistry I Lab | 2.9 | 2.9 | 2.9 | 2.88 | | | 2.89 |
| MTH-101 | Mathematics I | 2.6 | 2.9 | 2.6 | 2.1 | 2.2 | | 2.48 |
| HSS-101 | Communication Skills & Oral Presentation | 2.6 | 2.8 | 2.6 | 2.8 | | | 2.80 |
| CIV-102 | Engineering Drawing | 1.25 | 1.23 | 1.22 | 0.7 | | | 1.10 |
| IT-101 | Computer Fundamentals & problem solving Techniques | 2.8 | 3 | 2.2 | 2 | | | 2.50 |
| IT-102P | Computer Fundamentals & problem solving Techniques Lab | 0.4 | 3 | 3 | 2.8 | 2.8 | | 2.40 |
| WSP-I | Workshop Practice-I | 2 | 2.1 | 2.2 | 2.4 | | | 2.17 |
| PHY-201 | Physics-II | 3 | 2.4 | 2.4 | 0.3 | | | 2.03 |
| PHY-201P | Physics Lab - II | 2 | 1.8 | 1.6 | 1.2 | | | 1.65 |
| CHM-201 | Chemistry II | 2.9 | 2.4 | 2.9 | 2.1 | | | 2.57 |
| CHM-201P | Chemistry Lab-II | 2.7 | 2.8 | 2.8 | 2.8 | | | 2.77 |
| MTH-201 | Mathematics II | 1.9 | 1.9 | 2.1 | 1.6 | 1.7 | | 1.84 |
| HSS-201 | Introduction to Social Science | 2.67 | 1.93 | 2.67 | 2.18 | 1.94 | | 2.27 |
| CIV-201 | Engineering Mechanics | 2.06 | 2.56 | 1.08 | 2.32 | 2.8 | | 2.16 |
| MEC-201 | Machine Drawing | 2.9 | 2.9 | 2.4 | 1.7 | | | 2.40 |
| CSE-201 | Computer Programming | 2 | 2.1 | 2.2 | 2.6 | | | 2.22 |
| CSE-201P | Computer Programming Lab | 1.8 | 1.2 | 1.4 | 1.6 | | | 1.50 |
| WSP-II | Workshop Practice-II | 2 | 2.2 | 2.4 | 2.6 | | | 2.30 |
| ELE-301 | Basic Electrical Engineering | 1.97 | 2.39 | 3.17 | 1.59 | 2.27 | | 2.27 |
| ELE-301P | Basic Electrical Engineering Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| ECE-301 | Network Analysis and Synthesis | 3 | 3 | 1.6 | 1.6 | | | 2.30 |
| ECE-302 | Electronics-I | 2.9 | 2.9 | 2.9 | 2.8 | | | 2.87 |
| ECE-302P | Electronics-I Lab | 1.9 | 1.4 | 1.8 | 1.6 | | | 1.67 |
| PHY-303 | Electro Magnetic Fields & Waves | 2.4 | 2.2 | 1.5 | 1.3 | | | 1.85 |
| MET-302 | Electrical Engineering Materials | 1.72 | 1.61 | 1.46 | 1.08 | 1.11 | | 1.39 |
| MTH-305 | Mathematics-III | 2.2 | 2.4 | 2.4 | 2.1 | | | 2.27 |
| MECH-ELE | Thermal Engineering | 2.9 | 2.4 | 2.2 | 2.1 | | | 2.40 |
| ELE-401 | Electrical Machines-I | 2.9 | 1.3 | 1.3 | 1 | | | 1.63 |
| ELE-401P | Electrical Machines-I Lab | 2 | 2.2 | 2.1 | 2.4 | | | 2.10 |
| ELE-402 | Control Systems-I | 1.9 | 2.9 | 1.7 | 1.18 | 1.54 | | 1.84 |
| ELE-403 | Electrical Measurements & Measuring Instruments | 2.9 | 2.1 | 2.9 | 2 | | | 2.47 |

| | | | | | | | | |
|----------|---|------|------|------|------|------|-----|-------------|
| ELE-403P | Electrical Measurements & Measuring Instruments Lab | 3 | 3 | 1.56 | | | | 2.52 |
| ECE-402 | Electronics-II | 2.5 | 2.3 | 2.8 | 2.1 | | | 2.42 |
| ECE-402P | Electronics-II Lab | 2.3 | 2.3 | 2.9 | 2.4 | | | 2.47 |
| CIV-401 | Hydraulics and Hydraulic Machines | 1.8 | 2.4 | 2.2 | 2.8 | | | 2.30 |
| MTH-402 | Mathematics IV | 2.2 | 2.2 | 2.2 | 0.7 | 0.7 | | 1.60 |
| ELE-501 | Power Systems-I | 3 | 2.76 | 1.84 | 1.6 | 1.36 | | 2.11 |
| ELE-501P | Power Systems-I Lab | 2.8 | 3 | 3 | 2.8 | | | 2.90 |
| ELE-502 | Electrical Machines-II | 2 | 2.2 | 2.1 | 2.9 | | | 2.30 |
| ELE-502P | Electrical Machines-II Lab | 1.9 | 1.8 | 2.2 | 1.8 | | | 1.75 |
| ELE-503 | Control Systems-II | 1.9 | 1.9 | 1.2 | 1.1 | | | 1.52 |
| ELE-503P | Control Systems-II & VI Lab | 2.8 | 2.3 | 2.7 | | | | 2.60 |
| ELE-504 | Computer Aided Simulation of Electrical Systems | 2.5 | 2.8 | 2.8 | | | | 2.60 |
| ECE-508 | Communication Systems | 2.8 | 2.9 | 2.9 | 2.9 | | | 2.87 |
| ECE-509 | Digital Electronics & Logic Design | 2 | 1.6 | 2.3 | 1.8 | | | 1.92 |
| ECE-509P | Digital Electronics & Logic Design Lab | 2.8 | 3 | 2.9 | 3 | | | 2.92 |
| MTH-503 | Mathematics-V | 2.9 | 1.3 | 1.3 | 1 | 1 | | 1.50 |
| ELE-601 | Power Systems-II | 2.36 | 2.49 | 2.5 | 2.23 | 2.06 | | 2.32 |
| ELE-601P | Power Systems-II Lab | 2.7 | 2.7 | 2.5 | 2.8 | | | 2.67 |
| ELE-602 | Power Electronics | 2.4 | 1.2 | 2.4 | 1.9 | 1.9 | | 1.96 |
| ELE-602P | Power Electronics Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| ELE-603 | Electrical Machine Design | 2.3 | 1.8 | 1.1 | 0.9 | | | 1.52 |
| ELE-604 | Tour and Training | 2.8 | 2.8 | 2.8 | | | | 2.80 |
| ELE-605 | Digital Signal Processing | 2 | 2.2 | 2.2 | 1.8 | 2.08 | | 2.00 |
| ELE-606 | Microprocessors | 2.28 | 2.32 | 2.76 | | | | 2.45 |
| ELE-606P | Microprocessors Lab | 3 | 2.8 | 3 | | | | 2.90 |
| ELE-701 | Power System Protection | 3 | 3 | 2.76 | 2 | 1.8 | | 2.50 |
| ELE-701P | Power System Protection Lab | 3 | 2.6 | 3 | 3 | | | 2.90 |
| ELE-702 | Advanced Power Electronics | 2.3 | 2.6 | 2.1 | 1.9 | 1.9 | | 2.16 |
| ELE-703 | Power Systems-III | 1.46 | 2.9 | 2.2 | 2 | 2.8 | | 2.27 |
| ECE-708 | Electronic Measurements & Instrumentation | 2.8 | 2.8 | 2.6 | 2.3 | | | 2.62 |
| ECE-708P | Electronic Measurements & Instrumentation Lab | 2.9 | 2.9 | 2.9 | 2.8 | | | 2.80 |
| ELE-704 | Power Station Practice | 2.4 | 1.9 | 1.7 | 1.6 | | | 1.90 |
| ELE-3/E | Elective I (Selected Topics in Advanced Control) | 2.9 | 2.9 | 2.4 | 2.8 | 1.7 | | 2.54 |
| ELE-11/E | Elective I (Utilization and Traction) | 2.9 | 2.9 | 2.8 | 2.8 | | | 2.85 |
| ELE-706P | Project Preliminary Work / Seminar | 2.9 | 2.8 | | | | | 2.85 |
| HSS-801 | General Management & Economics | 1.2 | 2.9 | 2.1 | 2.1 | 1.3 | 1.3 | 1.80 |
| ELE-803 | High Voltage Engineering | 2 | 2.6 | 1.1 | 1.6 | | | 1.80 |

| | | | | | | | | |
|----------|--|-----|-----|-----|-----|---|--|-------------|
| ELE-803P | High Voltage Engineering Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| ELE-802 | Project | 2.9 | 2.8 | 2.7 | 2.7 | | | 2.75 |
| ELE-1-14 | Elective-III (Maintenance & Design of Electrical sub-stations) | 2 | 2 | 1.5 | 1.5 | 2 | | 1.80 |

| CO ATTAINMENT for YEAR 2019-20 | | | | | | | | |
|---------------------------------------|--------------------------------------|------------|------------|------------|------------|------------|------------|-------------|
| CODE | COURSE NAME | CO1 | CO2 | CO3 | CO4 | CO5 | CO6 | AVG |
| EET-101 | Basic Electrical Engineering | 0.64 | 0.84 | 0.84 | 0.64 | 0.84 | | 0.76 |
| EEL-101 | Basic Electrical Engineering Lab | 1.1 | 1.8 | 0.6 | 0.5 | | | 1.00 |
| CYT-100 | Engineering Chemistry | 3 | 3 | 3 | 3 | | | 3.00 |
| CYL-100 | Engineering Chemistry Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| ITT-101 | Computer Programming | 2.04 | 2.04 | 2.5 | 2.04 | 1.08 | | 1.94 |
| ITL-100 | Computer Programming Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| HUL-100 | BASIC ENGLISH & COMMUNICATION SKILLS | 2.6 | 2.6 | 2.8 | 2.6 | | | 2.65 |
| CIP-100 | ENGINEERING DRAWING | 2.9 | 2.9 | 2.2 | 2.1 | | | 2.52 |
| MAL-100 | MATHEMATICS I | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | | 2.90 |
| PHY-100 | ENGINEERING PHYSICS | 2 | 1.9 | 2.2 | 2.4 | 2 | | 2.10 |
| MEL-100 | ELEMENTS OF MECHANICAL ENGINEERING. | 2.8 | 3 | 3 | 1.84 | | | 2.66 |
| CIT-100 | ENGINEERING MECHANICS | 3 | 3 | 3 | 3 | | | 3.00 |
| CYL-101 | ENVIRONMENTAL STUDIES | 2.9 | 2.9 | 2.9 | 2.8 | | | 2.80 |
| MAL-101 | MATHEMATICS II | 3 | 3 | 3 | 3 | 3 | | 3.00 |
| HUP-100 | LANGUAGE LABORATORY | 2.64 | 2.66 | 2.64 | 2.9 | | | 2.71 |
| PHP-100 | PHYSICS LABORATORY | 1.1 | 0.9 | 1.2 | 0.6 | | | 0.95 |
| WSP-100 | WORKSHOP PRACTICE | 2.9 | 2.9 | 2.9 | 2.9 | | | 2.90 |
| ELE-301 | Basic Electrical Engineering | 2.8 | 1.35 | 2.21 | 2.25 | 1.55 | | 2.03 |
| ELE-301P | Basic Electrical Engineering Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| ECE-301 | Network Analysis and Synthesis | 3 | 1.5 | 0.6 | 0.6 | | | 1.40 |
| ECE-302 | Electronics-I | 2 | 2.2 | 2.5 | 2.6 | | | 2.30 |
| ECE-302P | Electronics-I Lab | 2 | 1.9 | 1.8 | 1.6 | | | 1.80 |
| PHY-303 | Electro Magnetic Fields & Waves | 3 | 3 | 3 | 3 | 3 | | 3.00 |
| MET-302 | Electrical Engineering Materials | 2.04 | 2.32 | 2.32 | 1.4 | 1.6 | | 1.93 |
| MTH-305 | Mathematics-III | 2.9 | 2.9 | 2.9 | 2.8 | | | 2.87 |

| | | | | | | | | |
|----------|---|------|------|------|------|-----|--|-------------|
| MECH-ELE | Thermal Engineering | 2.9 | 2.9 | 2.9 | 2.8 | | | 2.87 |
| ELE-401 | Electrical Machines-I | 2.9 | 2.9 | 2.9 | 2.8 | | | 2.87 |
| ELE-401P | Electrical Machines-I Lab | 1.8 | 2 | 1.8 | 2.2 | | | 1.95 |
| ELE-402 | Control Systems-I | 2.4 | 2.9 | 1.9 | 1.8 | 2.2 | | 2.24 |
| ELE-403 | Electrical Measurements & Measuring Instruments | 3 | 3 | 2 | 2 | | | 2.50 |
| ELE-403P | Electrical Measurements & Measuring Instruments Lab | 3 | 3 | 1.56 | | | | 2.52 |
| ECE-402 | Electronics-II | 2 | 2.2 | 2.3 | 2.1 | | | 2.15 |
| ECE-402P | Electronics-II Lab | 2.3 | 2.3 | 2.9 | 2.4 | | | 2.47 |
| CIV-401 | Hydraulics and Hydraulic Machines | 1.2 | 2 | 2.2 | 2 | | | 1.87 |
| MTH-402 | Mathematics IV | 3 | 3 | 3 | 3 | 3 | | 3.00 |
| ELE-501 | Power Systems-I | 2 | 2.3 | 2.2 | 2.1 | 2 | | 2.12 |
| ELE-501P | Power Systems-I Lab | 2.8 | 2.8 | 2.8 | 2.8 | | | 2.80 |
| ELE-502 | Electrical Machines-II | 2 | 2.2 | 2.8 | 2.4 | 2.1 | | 2.30 |
| ELE-502P | Electrical Machines-II Lab | 1.9 | 1.2 | 1.4 | 1.8 | | | 1.57 |
| ELE-503 | Control Systems-II | 2.8 | 2.9 | 1.2 | 1.1 | | | 2.00 |
| ELE-503P | Control Systems-II & VI Lab | 2.8 | 2.8 | 2.2 | | | | 2.60 |
| ELE-504 | Computer Aided Simulation of Electrical Systems | 2.8 | 2.7 | 2.9 | | | | 2.80 |
| ECE-508 | Communication Systems | 2.8 | 2.9 | 2.9 | 2.9 | | | 2.87 |
| ECE-509 | Digital Electronics & Logic Design | 2.5 | 2.5 | 1.2 | 1.6 | | | 1.95 |
| ECE-509P | Digital Electronics & Logic Design Lab | 2.8 | 3 | 2.9 | 3 | | | 2.90 |
| MTH-503 | Mathematics-V | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | | 2.90 |
| ELE-601 | Power Systems-II | 2 | 2.1 | 1.9 | 1.8 | 2.6 | | 2.08 |
| ELE-601P | Power Systems-II Lab | 2.78 | 2.8 | 2.9 | 2.8 | | | 2.80 |
| ELE-602 | Power Electronics | 2.5 | 3 | 2.6 | 3 | 2.3 | | 2.60 |
| ELE-602P | Power Electronics Lab | 3 | 3 | 3 | 3 | | | 3.00 |
| ELE-603 | Electrical Machine Design | 2.45 | 2.92 | 2.91 | 2.87 | | | 2.78 |
| ELE-604 | Tour and Training | 2 | 2.4 | 2.2 | 2.6 | | | 2.30 |
| ELE-605 | Digital Signal Processing | 2.7 | 3 | 2.7 | 2.3 | 1.8 | | 2.50 |
| ELE-606 | Microprocessors | 3 | 2.8 | 2.8 | | | | 2.86 |
| ELE-606P | Microprocessors Lab | 2.8 | 3 | 3 | | | | 2.86 |
| ELE-701 | Power System Protection | 3 | 3 | 2.7 | 2 | 2 | | 2.54 |
| ELE-701P | Power System Protection Lab | 3 | 3 | 2.6 | 3 | | | 2.90 |
| ELE-702 | Advanced Power Electronics | 0.8 | 2.7 | 3 | 2.7 | 0.4 | | 1.90 |

| | | | | | | | | |
|----------|---|-----|-----|------|-----|-----|-----|-------------|
| ELE-703 | Power Systems-III | 1.4 | 2.9 | 2.2 | 2 | 2.8 | | 2.26 |
| ECE-708 | Electronic Measurements & Instrumentation | 2.5 | 2.3 | 2.3 | 1.7 | | | 2.20 |
| ECE-708P | Electronic Measurements & Instrumentation Lab | 2.9 | 3 | 2.9 | 2.8 | | | 2.90 |
| ELE-704 | Power Station Practice | 2.9 | 2.2 | 1.4 | 2.1 | | | 2.10 |
| ELE-11/E | Elective I (Utilization and Traction) | 2.8 | 2.8 | 2.8 | 1.9 | | | 2.57 |
| ELE-706P | Project Preliminary Work / Seminar | 2.9 | 2.8 | | | | | 2.85 |
| HSS-801 | General Management & Economics | 1.2 | 2.9 | 2.1 | 2.1 | 1.3 | 1.3 | 1.80 |
| ELE-803 | High Voltage Engineering | 2 | 2.6 | 1.15 | 1.6 | | | 1.80 |
| ELE-803P | High Voltage Engineering Lab | 2 | 1.2 | 1.5 | 1.8 | | | 1.60 |
| ELE-802 | Project | 2.7 | 2.8 | 2.8 | 2.7 | | | 2.75 |
| ELE-13/E | Elective-II/III (Electric Drives) | 3 | 3 | 2.9 | 2.9 | 2.9 | | 2.94 |
| ELE-7/E | Elective-II/III (System Planning & Load Forecasting) | 2 | 2 | 2.2 | 2.5 | | | 2.17 |
| ELE-3/E | Elective II/III (Selected Topics in Advanced Control) | 2.9 | 2.9 | 2.8 | 2.8 | 2.8 | | 2.84 |

3.3 ATTAINMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES (75)

3.3.1. Describe assessment tools and processes used for measuring the attainment of each Program Outcome and Program Specific Outcomes (10)

PO / PSO Assessment Rubrics:

- Theory and Laboratory Courses:**

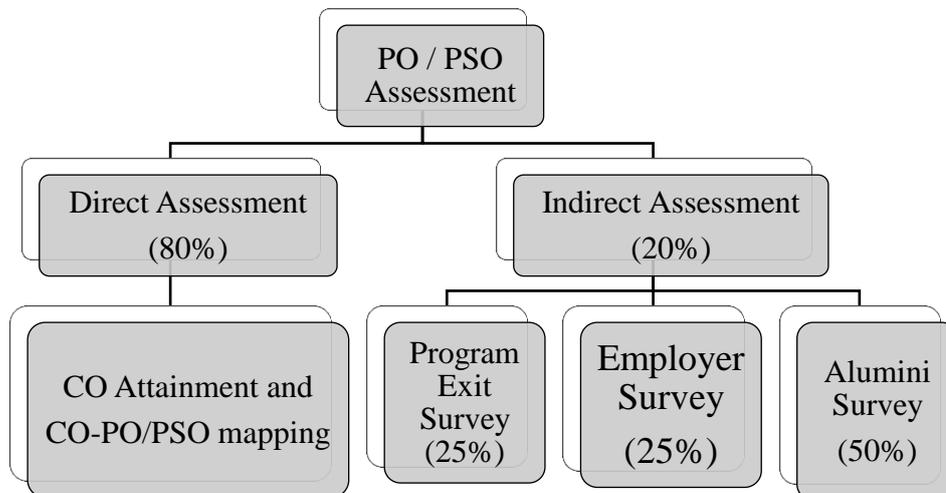


Figure C. 3.3.1

PO / PSO Assessment Tools:

PO / PSO assessment is done by giving 80% weightage to direct assessment and 20% weightage to indirect assessment. Direct assessment is based on overall CO attainment and CO-PO/PSO mapping. Indirect assessment is done through program exit survey, alumni survey and employer survey. Program exit survey and employer survey are given a weightage of 25% each and alumni survey is given a weightage of 50%.

The various assessment tools used to evaluate POs / PSOs and the frequency with which the assessment processes are carried out are listed in below mentioned Table.

Table 3.3.1 Assessment tools used for evaluation of PO and PSO attainment

| PO and PSO ASSESSMENT TOOLS | | | | | | |
|-------------------------------------|--------------------------------------|-------------------------------|------------------------------|--------------------|----------------------------------|------------------------|
| | | Course Type | | Assessment Methods | Frequency | |
| | | Direct (80% weightage) | Overall CO Attainment | Theory | | Mid-Term Exam |
| | Assignments | | | | Twice/Thrice per course | |
| | End Sem Exam | | | | Once per course | |
| Laboratory Examination | | | | Daily Performance | Every lab session | |
| | | | | End Sem Exam | Once per course | |
| Seminar (7th Sem) | | | | Presentation | Once per semester | |
| Project | Phase I (7th sem) | | | | Review | Once per course |
| | | | | | Review | Once/ Twice per course |
| | Phase II (8th sem) | | | | Demonstration / Final Evaluation | Once per semester |
| | | | | | Evaluation by Guide | Continuous evaluation |
| Indirect method | | Course Exit Survey | Once per course | | | |
| Indirect (20% weightage) | Surveys | Program Exit Survey | | | Once a year | |
| | | Employer Survey | | | Once in two years | |
| | | Alumni Survey | | | Once a year | |

Quality / relevance of assessment tools and processes:**(i) Direct Assessment Tools and Process:**

Direct CO Assessment tools described in section 3.2.1 are used for the direct assessment of POs and PSOs. The attainment of each PO corresponding to a particular course is determined from the

attainment values obtained for each course outcome related to that PO and the CO-PO mapping values. Similarly, the values of PSO attainment are also determined.

(ii) Indirect Assessment Tools and process:

Indirect assessment is done through program exit survey, alumni survey and employer survey where program exit survey and employer survey are given a weightage of 25% each and alumni survey are given a weightage of 50%.

Program Exit Survey:

An exit survey is conducted for students who have graduated out of the department for that year. The questionnaire format in the exit survey form to evaluate the attainment of POs and PSOs is given in section (a) and the relation of POs & PSOs with each question is given in section (b).

(a) Questionnaire Format

Assessment of Abilities, Skills, and Attributes acquired at NIT SRINAGAR

Please rate each of the following items in terms how well your education at NIT SRINAGAR prepared you for them.

| Sl. No | Overall, are you satisfied with: | Extremely Satisfied | Satisfied | Somewhat Satisfied |
|--------|--|---------------------|-----------|--------------------|
| 1 | Basic knowledge in mathematics, science, Engineering and humanities. | | | |
| 2 | Ability to identify, design, analyze and solve Electrical engineering problems. | | | |
| 3 | Design/development of complex engineering problems and their solutions | | | |
| 4 | Conduct investigations of Complex Problems | | | |
| 5 | Demonstrate the ability to apply advanced technologies to solve contemporary and new Problems. | | | |
| 6 | Awareness to apply engineering solutions in Global, national, and societal contexts. | | | |
| 7 | Understanding professional engineering solutions in societal and environmental contexts | | | |
| 8 | Understanding of professional and ethical Responsibilities | | | |
| 9 | Ability to function as an effective member in multi-disciplinary teams | | | |
| 10 | Proficiency in the English language in both communicative and technical forms | | | |
| 11 | Demonstrate the ability to choose and apply appropriate resource management techniques | | | |
| 12 | Capable of self-education and a clear understanding of the value of updating their professional knowledge to engage in life-long Learning. | | | |
| | Program aids in securing jobs in the fields of | | | |

| | | | | |
|----|--|--|--|--|
| 13 | design, research, manufacturing, safety, quality, sales and service | | | |
| 14 | The program enhances creative and imaginative Skills required in Mechanical Engineering domain. | | | |
| 15 | The program helps to progress through advanced degree or certificate programs | | | |
| 16 | The program helps in innovative and entrepreneurship activities with high professional standards | | | |

(b) Relation of POs and PSOs with questionnaire:

| | | | | | | | | | | | | |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| Questions | Q1 | Q2 | Q3 | Q4 | Q5 | Q6 | Q7 | Q8 | Q9 | Q10 | Q11 | Q12 |

| | | | |
|-----------|-----------|------|------|
| PSOs | PSO1 | PSO2 | PSO3 |
| Questions | Q13 & Q14 | Q15 | Q16 |

(c) Evaluation Process:

The questionnaire consists of 16 questions which are relevant for assessing each PO and PSO. The first 12 questions correspond to the 12 POs and the remaining 4 questions are for PSOs (Questions 13 & 14 are used to evaluate PSO 1, Question 15 is used to evaluate PSO 2 and Question 16 is used to evaluate PSO 3). Each question is having 3 options, namely, extremely satisfied, satisfied and somewhat satisfied, which is given marks 3, 2 and 1 respectively. The survey results are tabulated and the average values corresponding to each PO and PSO are calculated.

Employer Survey:

Feedback is taken at a frequency of once in two years from the employers who had given jobs to our graduates. The questionnaire format in the employer survey form to evaluate attainment of POs and PSOs is given in section (a) and the relation of POs & PSOs with each question is given in section(b)

(a) Questionnaire Format:

Rate the NIT SRINAGAR graduates working in your organization using the following criterion. Put a tick mark (√)

Knowledge, Skills, Abilities, Attitude and other Attributes expected out of NIT SRINAGAR graduates

| Sl. No | Overall, are you satisfied with: | Extremely Satisfied | Satisfied | Somewhat Satisfied |
|--------|--|---------------------|-----------|--------------------|
| 1 | Capacity for development and analysis of engineering problems and formulation of appropriate solutions, retaining professional and ethical responsibilities. | | | |
| 2 | Aptitude for self-education, ability to learn new skills and a clear appreciation for the value of lifelong | | | |

| | | | | |
|---|---|--|--|--|
| | learning to update professional Knowledge | | | |
| 3 | Understanding professional engineering solutions for sustainable development and their application in global, national and societal contexts. | | | |
| 4 | Competence for acquiring new skills and applying them in research and development | | | |
| 5 | Fundamental knowledge in mathematics and science and professional fluency in English both communicative and technical forms | | | |
| 6 | Dexterity in the differentiation of management techniques and possession of leadership skills that enable the successful function of multi-disciplinary teams | | | |

(b) Relation of POs and PSOs with questionnaire:

| POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----------|--------|-----|-----|-----|--------|-----|-----|-----|-----|------|------|------|
| Questions | Q1& Q5 | Q1 | Q3 | Q4 | Q2& Q4 | Q3 | Q3 | Q1 | Q6 | Q5 | Q6 | Q2 |

| PSOs | PSO1 | PSO2 | PSO3 |
|-----------|----------------|--------|----------------|
| Questions | Q1, Q2, Q3, Q4 | Q2, Q4 | Q1, Q3, Q5, Q6 |

(c) Evaluation Process:

The questionnaire consists of 6 questions. These questions are relevant for assessing each PO and PSO. If multiple questions satisfy a PO, then their average is taken. A similar procedure is followed for PSOs also. Each question is having 3 options namely, extremely satisfied, satisfied and somewhat satisfied, which is given marks 3, 2 and 1 respectively. These marks are tabulated and the average values corresponding to each PO and PSO are determined.

Alumni Survey:

Feedback is taken from alumni. The questionnaire format in the alumni survey form to evaluate attainment of POs and PSOs is given in section (a) and the relation of POs & PSOs with each question is given in section (b).

(a) Questionnaire Format:

Assessment of Knowledge, Skills, Abilities, Attitude, and attributes acquired at NIT SRINAGAR.

Please rate each of the following Knowledge, skills, abilities, attitudes (K, S, A) or attribute in terms how well NIT SRINAGAR inculcated them in your education.

| Sl. No | Overall, are you satisfied with: | Extremely Satisfied | Satisfied | Somewhat Satisfied |
|--------|--|---------------------|-----------|--------------------|
| 1 | Basic knowledge in mathematics, science, Engineering and humanities. | | | |
| 2 | Ability to identify, formulate and analyze Engineering problems. | | | |
| 3 | Design/development of complex engineering problems and their solutions | | | |
| 4 | Conduct investigations of Complex Problems | | | |
| 5 | Demonstrate the ability to apply advanced technologies to solve contemporary and new problems. | | | |
| 6 | Understanding professional engineering solutions in societal and environmental contexts | | | |
| 7 | Awareness to apply engineering solutions in global, national, and societal contexts. | | | |
| 8 | Understanding of professional and ethical responsibilities. | | | |
| 9 | Ability to function as an effective member in multi-disciplinary teams | | | |
| 10 | Proficiency in the English language in both communicative and technical forms | | | |
| 11 | Demonstrate the ability to choose and apply appropriate resource management techniques | | | |
| 12 | Capable of self-education and a clear understanding of the value of updating their professional knowledge to engage in life-long learning. | | | |
| 13 | Program aids in securing jobs in the fields of design, research, manufacturing, safety, quality, sales and service | | | |
| 14 | The program enhances creative and imaginative skills required in Electrical Engineering domain. | | | |
| 15 | The program helps to progress through advanced degree or certificate programs | | | |
| 16 | The program helps in innovative and entrepreneurship activities with high professional standards | | | |

(b) Relation of POs and PSOs with questionnaire:

| POs | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| Questions | Q1 | Q2 | Q3 | Q4 | Q5 | Q7 | Q6 | Q8 | Q9 | Q10 | Q11 | Q12 |

| PSOs | PSO1 | PSO2 | PSO3 |
|-----------|-----------|------|------|
| Questions | Q13 & Q14 | Q15 | Q16 |

(c) Evaluation Process:

The questionnaire consists of 16 questions which are relevant for assessing each PO and PSO. The first 12 questions are used to evaluate the 12 POs and the remaining 4 questions are for evaluating PSOs (Questions 13 & 14 are used to evaluate PSO 1, Question 15 is used to evaluate PSO 2 and Question 16 is used to evaluate PSO 3). Each question is having 3 options, namely, extremely

satisfied, satisfied and somewhat satisfied, which is given marks 3, 2, and 1 respectively. These marks are tabulated and the average value is shown.

3.3.2. Provide results of evaluation of each PO and PSO: (65)

PO Attainment

Achieving the target will help the graduates to meet the Programme Educational Objectives. The CO attainment levels have been studied for a span of three academic years (A.Y), 2017-18, 2018-19 and 2019-20 graduate batches. The PO attainment from each course is computed using the relation between the weightages linking CO and PO as presented in section 3.1.2.1 and is given as

$$\text{PO Attainment} = \text{CO Attainment} \times W/3$$

Where W is obtained from CO-PO mapping as shown in 3.1.2.1

Table 3.3.2.1 (a) PO Attainment of all courses for A.Y. 2017-18

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Physics-I | 1.50 | 1.47 | 1.40 | 0.75 | 0.90 | | | | | | | 0.50 |
| Physics Lab - I | 1.55 | 0.87 | 0.97 | | 1.72 | | | | | | | 1.52 |
| Chemistry I | 1.90 | 1.72 | 1.12 | | 1.50 | 1.00 | 1.35 | | 0.60 | 1.45 | 1.50 | 1.75 |
| Chemistry I Lab | 2.40 | 1.40 | | | 2.40 | 1.90 | 2.15 | | | 1.23 | 1.90 | 1.15 |
| Mathematics-I | 1.17 | 1.36 | 1.20 | 1.42 | 1.25 | 0.74 | | | | | | |
| Communication Skills & Oral Presentation | | | | | | | | | 1.57 | 1.74 | 1.57 | |
| Engineering Drawing | 2.53 | 2.52 | 2.52 | 2.52 | 1.29 | 1.23 | 1.48 | 1.68 | | | 2.53 | 1.68 |
| Computer Fundamentals & Problem Solving Techniques | 2.22 | 1.09 | 0.36 | | 0.85 | | | | | | | 1.72 |
| Computer Fundamentals & Problem Solving Techniques Lab | 1.55 | 0.87 | 0.97 | | 1.72 | | | | | | | 1.52 |
| Workshop Practices-I | 2.77 | 0.92 | 0.92 | | 1.85 | 1.85 | 1.85 | 1.85 | 2.77 | 1.85 | | 2.77 |
| Physics-II | 1.20 | 1.18 | 1.08 | 0.60 | 0.68 | | | | | | | 0.40 |
| Physics Lab - II | 2.40 | 1.40 | | | 2.40 | 1.90 | 2.15 | | | 1.23 | 1.90 | 1.15 |
| Chemistry II | 2.07 | 1.64 | 1.89 | 0.97 | 1.21 | 0.89 | 2.28 | 0.97 | 0.97 | 1.95 | | 1.64 |
| Chemistry Lab-II | 2.33 | 1.87 | 1.64 | | | 1.63 | 1.87 | | | 1.40 | 1.17 | 1.17 |
| Mathematics II | 1.38 | 1.07 | 1.19 | 0.89 | 0.56 | | | | | | | |
| Introduction to Social Science | | | | | | | | | 1.46 | 1.55 | 1.76 | |
| Engineering Mechanics | 2.30 | 2.30 | 1.35 | 1.66 | | 1.52 | 1.23 | | | | | |
| Machine Drawing | 1.60 | 1.49 | 1.34 | 0.85 | 0.89 | 1.55 | 0.58 | | | | 0.85 | 1.23 |
| Computer Programming | 0.80 | 2.40 | 2.20 | | 2.25 | | | | | | | |
| Computer Programming Lab | 1.87 | 1.52 | 1.65 | | 1.20 | 1.80 | | | | | | 1.10 |
| Workshop Practices-II | 2.93 | 0.97 | 0.97 | | 1.95 | 1.95 | 1.95 | 1.95 | 2.93 | 1.95 | | 2.93 |
| Basic Electrical Engineering | 2.14 | 1.29 | 1.37 | 1.76 | 0.99 | | | | | | 1.73 | 1.10 |
| Basic Electrical Engineering Lab | 2.25 | 2.25 | | 1.75 | | 2.50 | 2.00 | | | | 2.25 | |
| Network Analysis and Synthesis | 2.30 | 2.30 | 2.30 | 1.90 | 1.80 | 0.37 | 1.40 | 0.50 | 0.75 | 1.25 | 0.75 | 2.30 |
| Electronics-I | 2.20 | 1.80 | 2.00 | 1.80 | | 0.95 | 1.40 | | | | 0.60 | 2.40 |
| Electronics-I Lab | 2.75 | 1.98 | | 1.75 | | 2.75 | 1.72 | | | | 1.97 | |

| | | | | | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Electro Magnetic Fields & Waves | 2.78 | 2.34 | 1.85 | 1.42 | 2.53 | | | | | | | | |
| Electrical Engineering Materials | 2.10 | 1.96 | 1.78 | 1.11 | 1.21 | 1.87 | 0.88 | | | | | 1.11 | 1.64 |
| Mathematics-III | 1.58 | 1.68 | 1.52 | 1.66 | | | | | | | 0.71 | 0.00 | 0.81 |
| Thermal Engineering | 2.40 | 1.80 | 1.80 | | 1.70 | 1.60 | 1.40 | 1.60 | | | | 2.10 | 1.60 |
| Electrical Machines-I | 1.96 | 1.96 | | 1.47 | | 2.37 | 1.55 | | | | | 1.96 | |
| Electrical Machines-I Lab | 2.75 | 1.98 | | 1.75 | | 2.75 | 1.72 | | | | | 1.97 | |
| Control Systems-I | 2.39 | 2.25 | 2.39 | 1.99 | 2.00 | 1.04 | 2.20 | 1.04 | 1.99 | 1.41 | 1.34 | 2.39 | |
| Electrical Measurements & Measuring Instruments | 2.35 | 2.27 | 2.02 | 1.60 | 0.84 | 2.27 | 2.02 | | | | | 2.27 | 1.68 |
| Electrical Measurements & Measuring Instruments Lab | 2.15 | 2.03 | 1.78 | 1.40 | 0.76 | 2.03 | 1.78 | | | | | 2.03 | 1.52 |
| Electronics-II | 2.01 | 2.03 | 1.60 | 0.72 | | | | | | 1.23 | | | 1.88 |
| Electronics-II Lab | 2.37 | 2.37 | 2.37 | 2.37 | 2.37 | | | | | | | | 2.37 |
| Hydraulics and Hydraulic Machines | 2.75 | 1.98 | | 1.75 | | 2.75 | 1.72 | | | | | 1.97 | |
| Mathematics IV | 1.82 | 2.10 | 1.93 | | | | | | | 0.82 | | | 0.37 |
| Power Systems-I | 1.37 | 1.81 | 1.37 | 0.79 | 0.31 | 0.60 | 1.10 | | | | | 0.14 | 1.50 |
| Power Systems-I Lab | 2.62 | 1.67 | 0.47 | 0.47 | 0.47 | 1.20 | 1.93 | | | | | | 0.47 |
| Electrical Machines-II | 2.01 | 1.69 | 2.01 | 0.89 | 1.10 | 0.67 | 0.22 | | | | | | 1.34 |
| Electrical Machines-II Lab | 1.98 | 1.42 | 2.13 | 0.95 | 0.71 | 0.71 | | | | 1.42 | | | 1.42 |
| Control Systems-II | 2.31 | 1.94 | 1.82 | 1.82 | 1.82 | 1.41 | 0.56 | 0.28 | 1.29 | 0.89 | 0.52 | 1.90 | |
| Control Systems-II & VI Lab | 2.30 | 1.85 | 1.79 | 1.47 | 1.47 | 1.22 | 1.45 | 0.96 | 1.65 | 1.47 | 0.68 | 1.79 | |
| Computer Aided Simulation of Electrical Systems | 1.38 | 1.57 | 1.42 | 0.71 | 0.90 | 0.14 | 0.52 | 0.33 | 1.38 | 1.23 | 1.42 | 1.24 | |
| Communication Systems | 2.65 | 2.41 | 2.18 | 1.92 | 2.65 | 1.20 | 1.69 | 0.47 | 1.44 | 0.71 | 1.44 | 2.17 | |
| Digital Electronics & Logic Design | 2.50 | 2.53 | 2.30 | 1.88 | 2.10 | | | | | | | 1.83 | 2.75 |
| Digital Electronics & Logic Design Lab | 2.92 | 1.95 | 2.48 | 2.48 | | | | | 1.94 | 1.94 | | 1.22 | |
| Mathematics-V | 1.57 | 1.21 | 1.57 | | | | | | | | | 0.67 | 0.00 |
| Power Systems-II | 1.73 | 1.88 | 1.84 | 1.53 | 1.69 | | | | | | | | 1.30 |
| Power Systems-II Lab | 1.39 | 2.09 | 1.35 | 1.55 | 1.54 | | | | | | | | 0.93 |
| Power Electronics | 1.43 | 1.70 | 1.34 | 1.65 | 1.01 | | | | | | | | 1.10 |
| Power Electronics Lab | 2.08 | 1.83 | 1.99 | 1.33 | 0.41 | 1.33 | | | 2.24 | | | 2.49 | 1.58 |
| Electrical Machine Design | 1.03 | 1.11 | 1.03 | 1.23 | 0.90 | | | | | | | 0.76 | 0.52 |
| Tour and Training | 2.79 | 1.86 | 1.81 | 1.97 | 2.14 | | 1.97 | | 0.84 | 1.33 | 1.81 | 1.53 | |
| Digital Signal Processing | 2.16 | 1.28 | 1.11 | 1.67 | 1.30 | 0.96 | | | | | | 1.55 | 0.70 |
| Microprocessors | 2.32 | 1.03 | 1.80 | 1.54 | 1.80 | 1.03 | 0.26 | | | | 0.26 | 1.28 | 1.28 |
| Microprocessors Lab | 2.90 | 1.60 | 1.60 | 2.30 | 2.90 | 1.00 | | | | 1.00 | 2.00 | 1.00 | |
| Power System Protection | 2.14 | 1.85 | 1.65 | 1.33 | 0.77 | 1.85 | 1.79 | | | | | 1.85 | 1.41 |
| Power System Protection Lab | 2.85 | 1.90 | | 1.95 | | 2.85 | 2.45 | | | | | 1.90 | |
| Advanced Power Electronics | 2.28 | 2.28 | 1.65 | 0.17 | 0.32 | 0.13 | 0.63 | | | | | | 1.52 |
| Electronic Measurements & Instrumentation | 2.00 | 2.00 | 2.20 | 0.40 | | 0.20 | | | | 0.20 | 0.20 | 0.20 | 1.10 |
| Electronic Measurements & Instrumentation Lab | 2.15 | 2.03 | 1.78 | 1.40 | 0.76 | 2.03 | 1.78 | | | | | 2.03 | 1.52 |
| Elective I (Selected Topics in Advanced Control) | 2.85 | 2.85 | 2.47 | 1.91 | 2.09 | 0.96 | 2.60 | 2.55 | 1.19 | 1.90 | 2.20 | 2.32 | |
| Elective I (Utilization and Traction) | 2.19 | 1.93 | 1.69 | 1.95 | 1.44 | 2.43 | 2.43 | 1.44 | | | | 1.62 | 1.70 |
| Project Preliminary Work / Seminar | 1.93 | 1.46 | 1.95 | | | 0.97 | | | | | | 1.95 | 1.93 |
| General Management & | | 1.27 | 0.57 | | | 0.38 | 0.50 | 0.24 | 0.70 | | | 1.42 | 1.84 |

| | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Economics | | | | | | | | | | | | |
| Power Systems-III | 2.39 | 1.58 | 1.40 | 2.38 | 0.85 | 1.04 | | | | | 1.98 | 1.22 |
| Elective-II (High Voltage Engineering) | 1.10 | 0.70 | 0.70 | 0.50 | 0.70 | 0.40 | 0.10 | | | | | 0.70 |
| Elective-II P (High Voltage Engineering Lab) | 2.70 | 2.00 | 2.00 | 1.50 | 1.00 | 1.00 | | | 2.00 | | | 2.00 |
| Power Station Practice | 2.24 | 2.18 | 1.94 | 1.56 | 0.81 | 2.18 | 1.94 | | | | 2.18 | 1.62 |
| Project | 2.34 | 2.32 | 1.86 | 2.22 | 1.65 | | 0.99 | 2.83 | 1.89 | 0.94 | 1.89 | |
| Elective-III (Maintenance & Design of Electrical sub-stations) | 1.73 | 1.49 | 1.24 | 1.22 | 0.62 | | | | 0.63 | | | 0.63 |
| Direct Assessment | 2.19 | 1.89 | 1.73 | 1.52 | 1.40 | 1.44 | 1.52 | 1.11 | 1.36 | 1.03 | 1.47 | 1.48 |
| Program Exit Survey | 1.98 | 1.85 | 2.02 | 1.77 | 1.72 | 1.83 | 1.77 | 1.87 | 1.87 | 1.92 | 2.02 | 2.08 |
| Alumni | 2.14 | 1.83 | 1.68 | 1.53 | 1.19 | 1.24 | 1.51 | 1.67 | 1.23 | 1.20 | 1.72 | 1.55 |
| Employer | 2.19 | 1.94 | 1.78 | 1.62 | 1.20 | 1.54 | 1.55 | 1.87 | 1.50 | 1.27 | 1.86 | 1.56 |
| Indirect Attainment | 2.11 | 1.86 | 1.79 | 1.61 | 1.32 | 1.46 | 1.59 | 1.77 | 1.46 | 1.40 | 1.83 | 1.68 |
| Direct Attainment (80%) | 1.75 | 1.51 | 1.38 | 1.21 | 1.12 | 1.15 | 1.22 | 0.89 | 1.09 | 0.82 | 1.18 | 1.18 |
| Indirect Attainment (20%) | 0.42 | 0.37 | 0.36 | 0.32 | 0.26 | 0.29 | 0.32 | 0.35 | 0.29 | 0.28 | 0.37 | 0.34 |
| Overall PO/PSO Attainment | 2.18 | 1.89 | 1.74 | 1.54 | 1.38 | 1.45 | 1.54 | 1.24 | 1.38 | 1.10 | 1.55 | 1.52 |

Table 3.3.2.1 (b) PO Attainment of all courses for A.Y. 2018-19

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Physics-I | 2.03 | 2.00 | 1.75 | 0.88 | 1.08 | | | | | | | 0.68 |
| Physics Lab - I | 2.40 | 1.40 | | | 2.40 | 1.90 | 2.15 | | | 1.23 | 1.90 | 1.15 |
| Chemistry I | 2.29 | 1.56 | 1.21 | | | | | | | 1.52 | | 1.90 |
| Chemistry I Lab | 2.43 | 1.45 | | | 2.43 | 1.94 | 2.18 | | | 1.30 | 1.93 | 1.21 |
| Mathematics-I | 1.39 | 1.68 | 1.50 | 1.73 | 1.54 | 0.88 | | | | | | |
| Communication Skills & Oral Presentation | | | | | | | | | 2.07 | 2.27 | 2.05 | |
| Engineering Drawing | 1.11 | 1.11 | 1.11 | 1.11 | 0.74 | 0.74 | 0.74 | 0.00 | 1.11 | 1.11 | 0.74 | 0.74 |
| Computer Fundamentals & Problem Solving Techniques | 2.17 | 1.09 | 0.75 | | 0.81 | | | | | | | 1.69 |
| Computer Fundamentals & Problem Solving Techniques Lab | 1.55 | 0.87 | 0.97 | | 1.72 | | | | | | | 1.52 |
| Workshop Practices-I | 2.92 | 0.97 | 0.97 | | 1.95 | 1.95 | 1.95 | 1.95 | 2.92 | 1.95 | | 2.92 |
| Physics-II | 2.03 | 2.00 | 1.75 | 0.88 | 1.08 | | | | | | | 0.98 |
| Physics Lab - II | 2.60 | 1.70 | 1.80 | 2.02 | 2.40 | 1.90 | 2.15 | | | 1.23 | 1.90 | 1.15 |
| Chemistry II | 1.94 | 1.56 | 1.80 | 0.89 | 1.12 | 0.89 | 2.11 | 0.89 | 0.89 | 1.94 | | 1.56 |
| Chemistry Lab-II | 2.36 | 1.88 | 1.64 | | | 1.64 | 1.88 | | | 1.39 | 1.26 | 1.18 |
| Mathematics II | 1.90 | 1.51 | 1.65 | 1.23 | 0.75 | | | | | | | |
| Introduction to Social Science | | | 1.78 | | | 1.35 | 1.11 | 1.19 | 1.73 | 1.78 | 0.97 | 1.78 |
| Strength of Materials | 2.77 | 2.77 | 1.32 | 1.51 | 0.00 | 1.43 | 1.18 | | | | | |
| Machine Drawing | 2.14 | 1.24 | 1.41 | 1.73 | 1.01 | | | | | | 1.73 | 1.10 |
| Computer Programming | 2.70 | 2.00 | 2.00 | | 1.20 | | | | | | | |
| Computer Programming Lab | 2.40 | 1.80 | 1.80 | | 1.70 | 1.60 | 1.40 | 1.60 | | | 2.10 | 1.60 |
| Workshop Practices-II | 2.93 | 0.97 | 0.97 | | 1.95 | 1.95 | 1.95 | 1.95 | 2.93 | 1.95 | | 2.93 |
| Basic Electrical Engineering | 2.14 | 1.24 | 1.41 | 1.73 | 1.01 | | | | | | 1.73 | 1.10 |
| Basic Electrical Engineering Lab | 2.25 | 2.25 | | 1.75 | | 2.50 | 2.00 | | | | 2.25 | |
| Network Analysis and Synthesis | 2.30 | 2.30 | 2.30 | 1.90 | 1.80 | 0.37 | 1.40 | 0.50 | 0.75 | 1.25 | 0.75 | 2.30 |

| | | | | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|------|------|------|
| Electronics-I | 3.00 | 2.25 | 2.50 | 2.25 | | 2.50 | 2.00 | | | | 0.75 | 3.00 |
| Electronics-I Lab | 1.56 | 2.03 | 1.78 | 1.40 | 0.76 | 2.03 | 1.78 | | | | 2.03 | 1.52 |
| Electro Magnetic Fields & Waves | 1.88 | 1.64 | 1.25 | 0.94 | 1.67 | | | | | | | |
| Electrical Engineering Materials | 1.60 | 1.49 | 1.34 | 0.85 | 0.89 | 1.55 | 0.58 | | | | 0.85 | 1.23 |
| Mathematics-III | 1.73 | 1.91 | 1.71 | 1.72 | | | | | | 0.77 | | 0.77 |
| Thermal Engineering | 2.40 | 1.80 | 1.80 | | 1.70 | 1.60 | 1.40 | 1.60 | | | 2.10 | 1.60 |
| Electrical Machines-I | 1.23 | 1.23 | | 0.87 | | 1.64 | 0.96 | | | | 1.64 | |
| Electrical Machines-I Lab | 1.80 | 1.80 | | 1.37 | | 2.05 | 1.57 | | | | 1.80 | |
| Control Systems-I | 2.05 | 1.97 | 2.05 | 1.65 | 1.82 | 0.95 | 1.94 | 0.78 | 1.65 | 1.31 | 1.13 | 2.05 |
| Electrical Measurements & Measuring Instruments | 2.15 | 2.03 | 1.78 | 1.40 | 0.76 | 2.03 | 1.78 | | | | 2.03 | 1.52 |
| Electrical Measurements & Measuring Instruments Lab | 2.35 | 2.27 | 2.02 | 1.60 | 0.84 | 1.91 | 2.02 | | | | 2.27 | 1.68 |
| Electronics-II | 1.59 | 1.72 | 1.68 | 1.41 | 1.55 | | | | | | | 1.22 |
| Electronics-II Lab | 1.59 | 1.72 | 1.68 | 1.41 | 1.55 | | | | | | | 1.22 |
| Hydraulics and Hydraulic Machines | 1.52 | 1.71 | 1.51 | 0.76 | 0.95 | 0.19 | 0.57 | 0.38 | 1.52 | 1.33 | 1.51 | 1.33 |
| Mathematics IV | 1.30 | 1.40 | 1.25 | | | | | | | 0.58 | | 0.29 |
| Power Systems-I | 1.53 | 1.92 | 1.53 | 1.00 | 0.38 | 0.71 | 1.21 | | | | 0.15 | 1.53 |
| Power Systems-I Lab | 2.65 | 1.68 | 0.47 | 0.47 | 0.47 | 1.22 | 1.93 | | | | | 0.47 |
| Electrical Machines-II | 1.86 | 1.54 | 1.40 | 0.77 | 1.05 | 0.62 | 0.15 | | | | | 1.24 |
| Electrical Machines-II Lab | 2.92 | 1.95 | 2.48 | 2.48 | | | | | | | 1.22 | |
| Control Systems-II | 1.70 | 1.40 | 1.37 | 1.37 | 1.37 | 1.11 | 0.48 | 0.24 | 0.97 | 0.59 | 0.40 | 1.43 |
| Control Systems-II & VI Lab | 2.30 | 1.85 | 1.79 | 1.47 | 1.47 | 1.22 | 1.45 | 0.96 | 1.65 | 1.47 | 0.68 | 1.79 |
| Computer Aided Simulation of Electrical Systems | 1.52 | 1.71 | 1.51 | 0.76 | 0.95 | 0.19 | 0.57 | 0.38 | 1.52 | 1.33 | 1.51 | 1.33 |
| Communication Systems | 2.65 | 2.41 | 2.18 | 1.92 | 2.65 | 1.20 | 1.69 | 0.47 | 1.44 | 0.71 | 1.44 | 2.17 |
| Digital Electronics & Logic Design | 2.17 | 2.15 | 1.91 | 0.94 | 1.71 | | | | | | 1.50 | 2.40 |
| Digital Electronics & Logic Design Lab | 2.92 | 1.95 | 2.48 | 2.48 | | | | 1.94 | 1.94 | | 1.22 | |
| Mathematics-V | 1.28 | 1.05 | 1.17 | | | | | | | | 0.58 | |
| Power Systems-II | 1.59 | 1.72 | 1.68 | 1.41 | 1.55 | | | | | | | 1.22 |
| Power Systems-II Lab | 1.38 | 2.03 | 1.36 | 1.56 | 1.49 | | | | | | | 0.91 |
| Power Electronics | 1.50 | 1.25 | 1.59 | 1.09 | 0.70 | 1.09 | 1.76 | 1.84 | 1.25 | 1.67 | | 1.25 |
| Power Electronics Lab | 2.25 | 2.00 | 2.25 | 1.50 | 0.50 | 1.50 | | | 2.50 | | 2.75 | 1.75 |
| Electrical Machine Design | 2.11 | 2.00 | 1.76 | 1.40 | 0.75 | 2.00 | 1.76 | | | | 2.00 | 1.50 |
| Tour and Training | 2.66 | 1.77 | 1.72 | 1.88 | 2.03 | | 1.88 | | 0.77 | 1.24 | 1.72 | 1.46 |
| Digital Signal Processing | 1.96 | 1.27 | 1.13 | 1.68 | 1.28 | 0.98 | | | | | 1.54 | 0.98 |
| Microprocessors | 2.50 | 1.10 | 2.20 | 1.70 | 2.00 | 1.10 | 0.30 | | 0.30 | 1.40 | 1.30 | 2.20 |
| Microprocessors Lab | 2.90 | 1.60 | 1.60 | 2.30 | 2.90 | 1.00 | | | | 1.00 | 2.00 | 1.00 |
| Power System Protection | 2.14 | 1.85 | 1.65 | 1.33 | 0.77 | 1.85 | 1.79 | | | | 1.85 | 1.41 |
| Power System Protection Lab | 2.60 | 2.60 | 2.35 | 1.90 | 0.95 | 2.60 | 2.35 | | | | 2.60 | 1.9 |
| Advanced Power Electronics | 2.20 | 2.20 | 1.60 | 0.20 | 0.30 | 0.10 | 0.60 | | | | | 1.40 |
| Power Systems-III | 2.11 | 1.34 | 1.25 | 2.16 | 0.59 | 0.95 | | | | | 1.91 | 1.10 |
| Electronic Measurements & Instrumentation | 2.00 | 2.00 | 2.20 | 0.40 | | 0.20 | | | 0.20 | 0.20 | 0.20 | 1.10 |
| Electronic Measurements & Instrumentation Lab | 1.38 | 2.03 | 1.36 | 1.56 | 1.49 | | | | | | | 0.91 |
| Power Station Practice | 1.80 | 1.40 | 1.53 | 1.23 | 0.64 | 1.74 | 1.54 | | | | 1.74 | 1.29 |
| Elective I (Utilization and Traction) | 2.19 | 1.93 | 1.69 | 1.95 | 1.44 | 2.43 | 2.43 | 1.44 | | | 1.62 | 1.70 |

| | | | | | | | | | | | | |
|--|------|------|------|------|------|------|------|------|------|------|------|------|
| Project Preliminary Work / Seminar | 1.90 | 1.44 | 1.92 | | | 0.95 | | | | | 1.92 | 1.90 |
| General Management & Economics | | 1.41 | 0.70 | | | 0.29 | 0.54 | 0.23 | 0.57 | | 1.28 | 1.84 |
| High Voltage Engineering | 1.90 | 1.25 | 1.25 | 0.75 | 1.25 | 0.65 | 0.25 | | | | | 1.25 |
| High Voltage Engineering Lab | 2.00 | 2.00 | 1.50 | 1.00 | 1.00 | | | 2.00 | | | 2.00 | 3.00 |
| Project | 2.40 | 2.36 | 1.91 | 2.23 | 1.65 | | 0.94 | 2.98 | 1.99 | 0.93 | 1.99 | |
| Elective I (Selected Topics in Advanced Control) | 2.23 | 2.14 | 1.40 | 1.87 | 0.35 | 1.81 | 1.46 | 0.82 | 1.31 | 1.11 | 0.59 | 2.39 |
| Elective-III (Renewable source of electrical energy) | 1.48 | 1.81 | 1.48 | 1.15 | 0.38 | 1.10 | 1.45 | 0.73 | | | 0.39 | 0.54 |
| Elective-III (Maintenance & Design of Electrical sub-stations) | 1.73 | 1.49 | 1.24 | 1.22 | 0.62 | | | | 0.63 | | | 0.63 |
| Direct Assessment | 2.02 | 1.79 | 1.65 | 1.43 | 1.25 | 1.34 | 1.42 | 0.96 | 1.27 | 1.06 | 1.51 | 1.44 |
| Program Exit Survey | 1.96 | 1.94 | 1.75 | 1.81 | 1.75 | 1.83 | 1.96 | 2.02 | 2.08 | 1.94 | 1.79 | 2.08 |
| Alumni | 2.25 | 2.20 | 1.85 | 1.70 | 1.75 | 1.90 | 1.95 | 1.90 | 2.05 | 2.25 | 2.05 | 2.20 |
| Employer | 2.01 | 1.96 | 1.61 | 1.63 | 1.11 | 1.59 | 1.53 | 1.57 | 1.55 | 1.46 | 1.39 | 1.55 |
| Indirect Attainment | 2.12 | 2.08 | 1.77 | 1.71 | 1.59 | 1.81 | 1.85 | 1.85 | 1.93 | 1.97 | 1.82 | 2.01 |
| Direct Attainment (80%) | 1.62 | 1.43 | 1.32 | 1.14 | 1.00 | 1.07 | 1.14 | 0.77 | 1.01 | 0.85 | 1.20 | 1.15 |
| Indirect Attainment (20%) | 0.42 | 0.42 | 0.35 | 0.34 | 0.32 | 0.36 | 0.37 | 0.37 | 0.39 | 0.39 | 0.36 | 0.40 |
| Overall PO/PSO Attainment | 2.04 | 1.84 | 1.67 | 1.49 | 1.32 | 1.43 | 1.51 | 1.14 | 1.40 | 1.24 | 1.57 | 1.56 |

Table 3.3.2.1 (c) PO Attainment of all courses for A.Y. 2019-2020

| Course | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|--------------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|
| Basic Electrical Engineering | 2.00 | 1.28 | 1.32 | 1.56 | 0.88 | 1.04 | 0.60 | 0.60 | | 0.60 | 1.04 | 1.00 |
| Basic Electrical Engineering Lab | 2.25 | 2.25 | | 1.75 | | 2.50 | 2.00 | | | | 2.25 | |
| Engineering Chemistry | 2.00 | 2.25 | 2.00 | 1.00 | | 1.25 | 2.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.25 |
| Engineering Chemistry Lab | 2.50 | 2.00 | 2.50 | 1.00 | | 1.50 | 2.00 | 1.00 | 1.00 | 2.00 | 2.00 | 2.50 |
| Computer Programming | 1.87 | 1.94 | 1.81 | | 1.87 | | | | | | 1.30 | |
| Computer Programming Lab | 1.75 | 3.00 | 3.00 | 2.00 | 0.50 | | | | 0.50 | | | 2.50 |
| BASIC ENGLISH & COMMUNICATION SKILLS | | | | | | | | | 1.58 | 2.72 | 1.36 | 1.14 |
| ENGINEERING DRAWING | 2.50 | 2.50 | 2.50 | 2.50 | 2.70 | 2.70 | 1.70 | | 2.50 | 2.50 | 1.70 | 1.70 |
| MATHEMATICS I | 1.17 | 1.56 | 1.56 | | | | | | | | | |
| PHYSICS II | 2.03 | 2.00 | 1.75 | 0.88 | 1.08 | | | | | | | 0.68 |
| ELEMENTS OF MECHANICAL ENGINEERING. | 2.70 | 1.80 | 1.80 | | 0.20 | | | | | 1.80 | | 2.70 |
| ENGINEERING MECHANICS | 3.00 | 2.00 | 2.00 | | | | | | | 2.00 | | 3.00 |
| ENVIRONMENTAL STUDIES | 2.66 | 2.42 | 2.91 | | 1.69 | 2.66 | 2.91 | | | 1.94 | 1.45 | 2.18 |
| MATHEMATICS II | 2.40 | 1.80 | 2.40 | | | | | | | | 0.60 | 0.60 |
| LANGUAGE LABORATORY | | | | | | | | | 2.77 | 2.71 | 2.77 | 1.85 |
| PHYSICS LABORATORY | 1.50 | 1.25 | | 1.75 | | 2.50 | 2.00 | | | | 2.25 | |
| WORKSHOP PRACTICE | 2.92 | 0.97 | 0.97 | | 1.95 | 1.95 | 1.95 | 1.95 | 2.92 | 1.95 | | 2.92 |
| Basic Electrical Engineering | 1.95 | 1.25 | 1.17 | 1.49 | 0.91 | | | | | | 1.44 | 0.92 |
| Basic Electrical Engineering Lab | 2.25 | 2.25 | | 1.75 | | 2.50 | 2.00 | | | | 2.25 | |
| Network Analysis and Synthesis | 2.30 | 2.30 | 2.30 | 1.90 | 1.80 | 0.37 | 1.40 | 0.50 | 0.75 | 1.25 | 0.75 | 2.30 |
| Electronics-I | 1.90 | 1.51 | 1.65 | 1.23 | 0.75 | | | | | | | |

| | | | | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|------|------|------|
| Electronics-I Lab | 2.75 | 1.98 | | 1.75 | | 2.75 | 1.72 | | | | 1.97 | |
| Electro Magnetic Fields & Waves | 3.00 | 2.50 | 2.00 | 2.50 | 2.75 | | | | | | | |
| Electrical Engineering Materials | 1.60 | 1.49 | 1.34 | 0.85 | 0.89 | 1.55 | 0.58 | | | | 0.85 | 1.23 |
| Mathematics-III | 2.17 | 2.41 | 2.17 | 2.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.97 | 0.00 | 0.97 |
| Thermal Engineering | 2.91 | 2.18 | 2.18 | | 1.94 | 1.93 | 1.70 | 1.94 | | | 2.87 | 1.94 |
| Electrical Machines-I | 1.23 | 1.23 | | 0.87 | | 1.64 | 0.96 | | | | 1.64 | |
| Electrical Machines-I Lab | 2.25 | 2.25 | | 1.75 | | 2.50 | 2.00 | | | | 2.25 | |
| Control Systems-I | 1.86 | 1.78 | 1.86 | 1.46 | 1.64 | 1.00 | 1.75 | 0.72 | 1.48 | 1.19 | 1.13 | 1.09 |
| Electrical Measurements & Measuring Instruments | 2.35 | 2.27 | 2.02 | 1.60 | 0.84 | 1.91 | 2.02 | | | | 2.27 | 1.68 |
| Electrical Measurements & Measuring Instruments Lab | 2.35 | 2.27 | 2.02 | 1.60 | 0.84 | 1.91 | 2.02 | | | | 2.27 | 1.68 |
| Electronics-II | 1.94 | 1.56 | 1.80 | 0.89 | 1.12 | 0.89 | 2.11 | 0.89 | 0.89 | 1.94 | | 1.56 |
| Electronics-II Lab | 1.75 | 0.98 | | 1.75 | | 1.45 | 1.72 | | | | 1.97 | |
| Hydraulics and Hydraulic Machines | 2.15 | 2.03 | 1.78 | 1.40 | 0.76 | 2.03 | 1.78 | | | | 2.03 | 1.52 |
| Mathematics IV | 2.40 | 1.80 | 2.40 | | | | | | | | 1.00 | |
| Power Systems-I | 1.10 | 1.41 | 1.10 | 0.70 | 0.26 | 0.57 | 1.40 | | | | 0.09 | 1.15 |
| Power Systems-I Lab | 2.57 | 1.63 | 0.47 | 0.47 | 0.47 | 1.17 | 1.87 | | | | | 0.47 |
| Electrical Machines-II | 1.72 | 1.39 | 1.31 | 0.73 | 0.90 | 0.57 | 0.15 | | | | | 1.15 |
| Electrical Machines-II Lab | 1.15 | 1.03 | 0.78 | 1.40 | 0.76 | 2.03 | 1.78 | | | | 2.12 | 1.52 |
| Control Systems-II | 2.04 | 1.71 | 1.57 | 1.57 | 1.56 | 1.22 | 0.40 | 0.20 | 1.12 | 0.83 | 0.44 | 1.70 |
| Control Systems-II & VI Lab | 2.62 | 2.07 | 2.06 | 1.68 | 1.74 | 1.43 | 1.18 | 0.80 | 1.82 | 1.74 | 0.55 | 1.24 |
| Computer Aided Simulation of Electrical Systems | 1.71 | 1.53 | 1.71 | 1.52 | 0.76 | 0.95 | 0.19 | 0.57 | 0.37 | 1.53 | 1.33 | 1.52 |
| Communication Systems | 2.65 | 2.41 | 2.18 | 1.92 | 2.65 | 1.20 | 1.69 | 0.47 | 1.44 | 0.71 | 1.44 | 2.17 |
| Digital Electronics & Logic Design | 1.19 | 1.07 | 0.83 | 0.23 | 0.79 | | | | | | 1.10 | 1.19 |
| Digital Electronics & Logic Design Lab | 2.92 | 1.95 | 2.48 | 2.48 | | | | 1.94 | 1.94 | | 1.22 | |
| Mathematics-V | 2.34 | 1.76 | 2.34 | | | | | | | | 0.98 | |
| Power Systems-II | 1.43 | 2.15 | 1.46 | 1.58 | 1.60 | | | | | | | 0.96 |
| Power Systems-II Lab | 1.43 | 2.15 | 1.46 | 1.58 | 1.60 | | | | | | | 0.96 |
| Power Electronics | 2.36 | 2.36 | 2.36 | 0.79 | 1.57 | | | 0.79 | | | 2.36 | 0.79 |
| Power Electronics Lab | 2.25 | 2.00 | 2.25 | 1.50 | 0.50 | 1.50 | | | 2.50 | | 2.75 | 1.75 |
| Electrical Machine Design | 2.55 | 2.58 | 2.38 | 1.90 | 0.93 | 2.58 | 2.38 | | | | 2.58 | 1.86 |
| Tour and Training | 2.77 | 1.84 | 1.78 | 1.97 | 2.20 | | 1.97 | | 0.81 | 1.31 | 1.78 | 1.52 |
| Digital Signal Processing | 2.33 | 1.53 | 1.38 | 1.93 | 1.49 | 1.18 | | | | | 1.81 | 1.20 |
| Microprocessors | 2.87 | 1.24 | 2.53 | 1.87 | 2.20 | 1.30 | 0.31 | | | 0.33 | 1.60 | 1.60 |
| Microprocessors Lab | 2.90 | 1.60 | 1.60 | 2.30 | 2.90 | 1.00 | | | | 1.00 | 2.00 | 1.00 |
| Power System Protection | 2.22 | 2.33 | 2.01 | 1.67 | 0.97 | 2.21 | 1.88 | | | | 2.21 | 1.69 |
| Power System Protection Lab | 2.70 | 2.65 | 2.4 | 1.90 | 0.95 | 2.65 | 2.40 | | | | | 2.75 |
| Advanced Power Electronics | 2.00 | 2.00 | 1.30 | 0.20 | 0.20 | | 0.60 | | | | | 1.30 |
| Power Systems-III | 2.11 | 1.34 | 1.25 | 2.16 | 0.59 | 0.95 | | | | | 1.91 | 1.10 |
| Electronic Measurements & Instrumentation | 1.55 | 1.63 | 1.75 | 0.63 | 0.00 | 0.80 | 0.00 | 0.00 | 0.80 | 0.80 | 0.80 | 0.83 |
| Electronic Measurements & Instrumentation Lab | 1.72 | 1.39 | 1.31 | 0.73 | 0.90 | 0.57 | 0.15 | | | | | 1.15 |
| Power Station Practice | 2.07 | 1.94 | 1.70 | 1.34 | 0.73 | 1.94 | 1.70 | | | | 1.94 | 1.46 |
| Elective I (Electric drives) | 2.25 | 2.25 | | 1.75 | | 2.50 | 2.00 | | | | 2.25 | |
| Elective I (Utilization and Traction) | 1.64 | 0.38 | 1.15 | 0.37 | 0.45 | 0.94 | 1.79 | 0.45 | | | 0.83 | 1.26 |

| | | | | | | | | | | | | |
|---|------|------|------|------|------|------|------|------|------|------|------|------|
| Project Preliminary Work / Seminar | 1.93 | 1.45 | 1.94 | | | 0.96 | | | | | 1.94 | 1.93 |
| General Management & Economics | | 1.41 | 0.47 | | | 0.29 | | 0.24 | | 0.57 | 1.28 | 1.84 |
| High Voltage Engineering | 2.90 | 1.90 | 1.90 | 1.20 | 1.90 | 1.00 | 0.50 | | | | | 1.90 |
| Project | 2.36 | 2.38 | 1.90 | 2.22 | 1.66 | | 0.97 | 2.80 | 1.86 | 0.93 | 1.86 | |
| Elective-II/III (Electric Drives) | 2.21 | 2.08 | 2.21 | 1.90 | 1.93 | 2.06 | 2.09 | 2.06 | 2.12 | 2.19 | 2.08 | 2.20 |
| Elective-III (System Planning & Load Forecasting) | 1.73 | 1.88 | 1.84 | 1.53 | 1.69 | | | | | | | 1.30 |
| Elective II (Selected Topics in Advanced Control) | 2.89 | 2.50 | 1.93 | 2.12 | 0.97 | 2.64 | 2.57 | 1.20 | 1.93 | 2.25 | 2.40 | 2.70 |
| Direct Assessment | 2.13 | 1.81 | 1.73 | 1.49 | 1.16 | 1.46 | 1.38 | 0.71 | 1.16 | 1.13 | 1.60 | 1.41 |
| Program Exit Survey | 2.09 | 2.00 | 1.70 | 1.84 | 1.84 | 1.91 | 1.80 | 1.86 | 2.07 | 2.11 | 1.95 | 2.16 |
| Alumni | 2.19 | 2.00 | 1.89 | 1.77 | 1.81 | 1.89 | 2.02 | 2.04 | 2.09 | 2.09 | 2.06 | 2.17 |
| Employer | 2.38 | 2.31 | 2.54 | 2.23 | 2.27 | 2.54 | 2.54 | 2.31 | 2.23 | 2.46 | 2.23 | 2.31 |
| Indirect Attainment | 2.21 | 2.08 | 2.01 | 1.90 | 1.93 | 2.06 | 2.10 | 2.06 | 2.12 | 2.19 | 2.08 | 2.20 |
| Direct Attainment (80%) | 1.70 | 1.45 | 1.39 | 1.19 | 0.93 | 1.17 | 1.10 | 0.57 | 0.93 | 0.91 | 1.28 | 1.13 |
| Indirect Attainment (20%) | 0.44 | 0.42 | 0.40 | 0.38 | 0.39 | 0.41 | 0.42 | 0.41 | 0.42 | 0.44 | 0.42 | 0.44 |
| Overall PO/PSO Attainment | 2.15 | 1.86 | 1.79 | 1.57 | 1.31 | 1.58 | 1.52 | 0.98 | 1.35 | 1.34 | 1.69 | 1.57 |

PSO Attainment

Achieving the target will help the graduates to meet the Programme Educational Objectives. The CO attainment levels have been studied for a span of three academic years (A.Y) 2017-18, 2018-19 and 2019-20 graduate batches. The PSO attainment from each course is computed using the relation between the weightages linking CO and PSO as presented in section 3.1.2.2 and is given as

$$\text{PSO Attainment} = \text{CO Attainment} \times W/3$$

Where W is obtained from CO-PSO mapping as shown in 3.1.2.2

Table 3.3.2.2 (a) PSO Attainment of all courses for A.Y. 2017-18

| Course | PSO1 | PSO2 | PSO3 |
|--|------|------|------|
| Physics-I | | | |
| Physics Lab - I | 0.76 | | 0.76 |
| Chemistry I | 1.92 | 1.75 | 1.35 |
| Chemistry I Lab | 2.40 | 2.40 | 1.40 |
| Mathematics-I | 1.20 | 1.41 | 0.71 |
| Communication Skills & Oral Presentation | | | |
| Engineering Drawing | 2.52 | 1.68 | 1.68 |
| Computer Fundamentals & Problem Solving Techniques | 2.40 | 1.65 | 1.21 |
| Computer Fundamentals & Problem Solving Techniques Lab | 0.76 | 0.00 | 0.76 |
| Workshop Practices-I | 1.85 | 0.92 | 0.92 |
| Physics-II | | | |
| Physics Lab - II | 2.40 | 2.40 | 1.40 |
| Chemistry II | 1.83 | 2.13 | 1.16 |
| Chemistry Lab-II | 2.10 | 2.34 | 1.87 |
| Mathematics II | 0.87 | 1.04 | 0.46 |
| Introduction to Social Science | | | |
| Engineering Mechanics | 1.52 | 0.86 | 1.64 |

| | | | |
|---|------|------|------|
| Machine Drawing | 1.94 | 1.54 | 1.49 |
| Computer Programming | 1.60 | 1.60 | |
| Computer Programming Lab | 1.80 | 1.65 | 1.38 |
| Workshop Practices-II | 1.95 | 0.97 | 0.97 |
| Basic Electrical Engineering | 1.09 | 0.84 | 1.43 |
| Basic Electrical Engineering Lab | 2.00 | 2.25 | 1.00 |
| Network Analysis and Synthesis | 2.30 | 2.30 | 2.30 |
| Electronics-I | 2.40 | 2.40 | 1.80 |
| Electronics-I Lab | 1.72 | 2.75 | 0.88 |
| Electro Magnetic Fields & Waves | | | |
| Electrical Engineering Materials | 2.59 | 2.07 | 1.96 |
| Mathematics-III | 1.21 | 1.93 | 0.71 |
| Thermal Engineering | 2.40 | 1.40 | 2.40 |
| Electrical Machines-I | 1.82 | 1.96 | 0.78 |
| Electrical Machines-I Lab | 1.72 | 2.75 | 0.88 |
| Control Systems-I | 1.59 | 1.74 | 0.80 |
| Electrical Measurements & Measuring Instruments | 1.68 | 2.27 | 0.84 |
| Electrical Measurements & Measuring Instruments Lab | 1.52 | 2.03 | 0.76 |
| Electronics-II | 1.44 | 2.06 | 0.82 |
| Electronics-II Lab | 2.37 | 2.37 | |
| Hydraulics and Hydraulic Machines | 1.72 | 2.75 | 0.88 |
| Mathematics IV | 1.48 | 1.89 | 0.82 |
| Power Systems-I | 1.56 | 1.86 | 1.42 |
| Power Systems-I Lab | 2.13 | 1.42 | 1.18 |
| Electrical Machines-II | 2.01 | 2.01 | 0.67 |
| Electrical Machines-II Lab | 2.13 | 2.13 | 0.71 |
| Control Systems-II | 1.54 | 1.82 | 0.77 |
| Control Systems-II & VI Lab | 0.96 | 1.34 | 1.02 |
| Computer Aided Simulation of Electrical Systems | 1.23 | 1.42 | 0.52 |
| Communication Systems | 2.66 | 2.65 | 2.42 |
| Digital Electronics & Logic Design | 2.10 | 2.16 | 2.31 |
| Digital Electronics & Logic Design Lab | 1.94 | 2.92 | 1.94 |
| Mathematics-V | 1.02 | 1.61 | 0.77 |
| Power Systems-II | 0.82 | 1.69 | 1.69 |
| Power Systems-II Lab | 1.86 | 1.86 | 1.89 |
| Power Electronics | 1.90 | 1.85 | 1.54 |
| Power Electronics Lab | 1.99 | 1.40 | 1.84 |
| Electrical Machine Design | 0.75 | 0.76 | 0.52 |
| Tour and Training | 1.86 | 1.86 | |
| Digital Signal Processing | 1.37 | 1.46 | 1.55 |
| Microprocessors | 2.06 | 2.06 | 2.06 |
| Microprocessors Lab | 2.90 | 2.90 | 2.60 |
| Power System Protection | 1.41 | 1.61 | 0.77 |
| Power System Protection Lab | 1.90 | 2.65 | 0.95 |
| Advanced Power Electronics | 2.28 | 1.52 | 0.76 |
| Electronic Measurements & Instrumentation | 1.80 | 1.80 | 2.60 |
| Electronic Measurements & Instrumentation Lab | 1.52 | 2.03 | 0.76 |
| Elective I (Selected Topics in Advanced Control) | 2.85 | 2.85 | 2.47 |
| Elective I (Utilization and Traction) | 1.70 | 1.94 | 1.69 |
| Project Preliminary Work / Seminar | 1.95 | 0.49 | 1.93 |
| General Management & Economics | | 1.84 | |
| Power Systems-III | 1.62 | 1.03 | 1.69 |

| | | | |
|--|-------------|-------------|-------------|
| Elective-II (High Voltage Engineering) | 1.10 | 1.10 | 0.40 |
| Elective-II P (High Voltage Engineering Lab) | 3.00 | 3.00 | 1.00 |
| Power Station Practice | 1.62 | 2.18 | 0.81 |
| Project | 1.89 | 1.89 | 1.89 |
| Elective-III (Maintenance & Design of Electrical sub-stations) | 1.24 | 1.24 | 0.62 |
| Direct Assessment | 1.81 | 1.95 | 1.36 |
| Program Exit Survey | 1.91 | 2.05 | 1.97 |
| Alumni | 1.85 | 1.81 | 1.48 |
| Employer | 1.90 | 2.02 | 1.30 |
| Indirect Attainment | 1.88 | 1.92 | 1.56 |
| Direct Attainment (80%) | 1.44 | 1.56 | 1.09 |
| Indirect Attainment (20%) | 0.38 | 0.38 | 0.31 |
| Overall PO/PSO Attainment | 1.82 | 1.95 | 1.40 |

Table 3.3.2.2 (a) PSO Attainment of all courses for A.Y. 2018-19

| Course | PSO1 | PSO2 | PSO3 |
|--|------|------|------|
| Physics-I | | | |
| Physics Lab - I | 2.40 | 2.40 | 1.40 |
| Chemistry I | 1.46 | 0.84 | 1.80 |
| Chemistry I Lab | 2.43 | 2.43 | 1.46 |
| Mathematics-I | 1.39 | 1.62 | 0.84 |
| Communication Skills & Oral Presentation | | | |
| Engineering Drawing | 1.11 | 1.11 | 1.11 |
| Computer Fundamentals & Problem Solving Techniques | 2.10 | 1.63 | 1.19 |
| Computer Fundamentals & Problem Solving Techniques Lab | 0.76 | 0.00 | 0.76 |
| Workshop Practices-I | 1.95 | 0.97 | 0.97 |
| Physics-II | | | |
| Physics Lab - II | 2.60 | 2.40 | 1.50 |
| Chemistry II | 1.74 | 2.01 | 1.11 |
| Chemistry Lab-II | 2.12 | 2.36 | 1.88 |
| Mathematics II | 1.15 | 1.32 | 0.63 |
| Introduction to Social Science | | | |
| Strength of Materials | 1.44 | 0.84 | 1.62 |
| Machine Drawing | 1.12 | 0.86 | 1.39 |
| Computer Programming | 1.35 | 1.35 | |
| Computer Programming Lab | 2.40 | 1.40 | 2.40 |
| Workshop Practices-II | 1.95 | 0.97 | 0.97 |
| Basic Electrical Engineering | 1.12 | 0.86 | 1.39 |
| Basic Electrical Engineering Lab | 2.00 | 2.25 | 1.00 |
| Network Analysis and Synthesis | 2.30 | 2.30 | 2.30 |
| Electronics-I | 3.00 | 3.00 | 2.25 |
| Electronics-I Lab | 1.52 | 2.03 | 0.76 |
| Electro Magnetic Fields & Waves | | | |
| Electrical Engineering Materials | 1.94 | 1.54 | 1.49 |
| Mathematics-III | 1.33 | 1.94 | 0.77 |
| Thermal Engineering | 2.40 | 1.40 | 2.40 |
| Electrical Machines-I | 1.34 | 1.47 | 0.55 |
| Electrical Machines-I Lab | 1.60 | 1.80 | 0.80 |
| Control Systems-I | 1.37 | 1.49 | 0.68 |

| | | | |
|--|-------------|-------------|-------------|
| Electrical Measurements & Measuring Instruments | 1.52 | 2.03 | 0.76 |
| Electrical Measurements & Measuring Instruments Lab | 1.68 | 2.27 | 0.84 |
| Electronics-II | 0.78 | 1.56 | 1.56 |
| Electronics-II Lab | 0.78 | 1.56 | 1.56 |
| Hydraulics and Hydraulic Machines | 1.33 | 1.52 | 0.57 |
| Mathematics IV | 0.96 | 1.55 | 0.58 |
| Power Systems-I | 1.67 | 1.90 | 1.51 |
| Power Systems-I Lab | 2.17 | 1.45 | 1.20 |
| Electrical Machines-II | 1.86 | 1.86 | 0.62 |
| Electrical Machines-II Lab | 1.94 | 2.92 | 1.94 |
| Control Systems-II | 1.13 | 1.26 | 0.57 |
| Control Systems-II & VI Lab | 0.96 | 1.34 | 1.02 |
| Computer Aided Simulation of Electrical Systems | 1.33 | 1.52 | 0.57 |
| Communication Systems | 2.66 | 2.65 | 2.42 |
| Digital Electronics & Logic Design | 1.70 | 1.66 | 1.91 |
| Digital Electronics & Logic Design Lab | 1.94 | 2.92 | 1.94 |
| Mathematics-V | 0.73 | 1.30 | 0.58 |
| Power Systems-II | 0.78 | 1.56 | 1.56 |
| Power Systems-II Lab | 1.82 | 1.82 | 1.80 |
| Power Electronics | 1.67 | 1.18 | 1.47 |
| Power Electronics Lab | 2.25 | 1.50 | 2.00 |
| Electrical Machine Design | 1.50 | 2.00 | 0.75 |
| Tour and Training | 1.77 | 1.77 | |
| Digital Signal Processing | 1.39 | 1.45 | 1.56 |
| Microprocessors | 2.20 | 2.20 | 2.10 |
| Microprocessors Lab | 2.90 | 2.90 | 2.60 |
| Power System Protection | 1.41 | 1.61 | 0.77 |
| Power System Protection Lab | 2.00 | 2.60 | 0.95 |
| Advanced Power Electronics | 2.20 | 1.40 | 0.70 |
| Power Systems-III | 1.38 | 1.02 | 1.54 |
| Electronic Measurements & Instrumentation | 1.80 | 1.80 | 2.60 |
| Electronic Measurements & Instrumentation Lab | 1.82 | 1.82 | 1.80 |
| Power Station Practice | 1.29 | 1.74 | 0.64 |
| Elective I (Utilization and Traction) | 1.70 | 1.94 | 1.69 |
| Project Preliminary Work / Seminar | 1.92 | 0.48 | 1.90 |
| General Management & Economics | | 1.84 | |
| High Voltage Engineering | 1.90 | 1.90 | 0.65 |
| High Voltage Engineering Lab | | 3.00 | 1.00 |
| Project | 1.89 | 1.89 | 1.89 |
| Elective I (Selected Topics in Advanced Control) | 1.88 | 2.14 | 2.08 |
| Elective-III (Renewable source of electrical energy) | 1.64 | 1.81 | 1.48 |
| Elective-III (Maintenance & Design of Electrical sub-stations) | 1.24 | 1.24 | 0.62 |
| Direct Assessment | 1.67 | 1.79 | 1.35 |
| Program Exit Survey | 1.88 | 1.94 | 1.85 |
| Alumni | 1.92 | 1.95 | 1.75 |
| Employer | 1.73 | 1.82 | 1.57 |
| Indirect Attainment | 1.86 | 1.92 | 1.73 |
| Direct Attainment (80%) | 1.34 | 1.43 | 1.08 |
| Indirect Attainment (20%) | 0.37 | 0.38 | 0.35 |
| Overall PO/PSO Attainment | 1.71 | 1.81 | 1.43 |

Table 3.3.2.2 (a) PSO Attainment of all courses for A.Y. 2019-20

| Course | PSO1 | PSO2 | PSO3 |
|---|------|------|------|
| Basic Electrical Engineering | 0.92 | 0.56 | 1.12 |
| Basic Electrical Engineering Lab | 2.00 | 2.25 | 1.00 |
| Engineering Chemistry | 2.25 | 2.25 | 1.75 |
| Engineering Chemistry Lab | 2.00 | 2.00 | 1.70 |
| Computer Programming | | | |
| Computer Programming Lab | | | |
| BASIC ENGLISH & COMMUNICATION SKILLS | | | |
| ENGINEERING DRAWING | 2.50 | 2.50 | 2.50 |
| MATHEMATICS I | 1.94 | 1.94 | 0.97 |
| PHYSICS II | | | |
| ELEMENTS OF MECHANICAL ENGINEERING. | 2.70 | 1.80 | 2.70 |
| ENGINEERING MECHANICS | 3.00 | 2.00 | 2.00 |
| ENVIRONMENTAL STUDIES | 2.19 | 1.46 | 1.93 |
| MATHEMATICS II | 1.60 | 2.40 | 1.20 |
| LANGUAGE LABORATORY | | | |
| PHYSICS LABORATORY | 2.00 | 2.25 | 1.00 |
| WORKSHOP PRACTICE | 1.95 | 0.97 | 0.97 |
| Basic Electrical Engineering | 0.89 | 0.91 | 1.33 |
| Basic Electrical Engineering Lab | 2.00 | 2.25 | 1.00 |
| Network Analysis and Synthesis | 2.30 | 2.30 | 2.30 |
| Electronics-I | 1.15 | 1.32 | 0.63 |
| Electronics-I Lab | 1.72 | 2.75 | 0.88 |
| Electro Magnetic Fields & Waves | | | |
| Electrical Engineering Materials | 0.94 | 1.54 | 1.49 |
| Mathematics-III | 1.69 | 2.42 | 0.97 |
| Thermal Engineering | 2.91 | 1.70 | 2.91 |
| Electrical Machines-I | 1.34 | 1.47 | 0.55 |
| Electrical Machines-I Lab | 2.00 | 2.25 | 1.00 |
| Control Systems-I | 1.25 | 1.39 | 0.82 |
| Electrical Measurements & Measuring Instruments | 1.68 | 2.27 | 0.84 |
| Electrical Measurements & Measuring Instruments Lab | 1.68 | 2.27 | 0.84 |
| Electronics-II | 1.74 | 2.01 | 1.11 |
| Electronics-II Lab | 1.72 | 2.75 | 0.88 |
| Hydraulics and Hydraulic Machines | 1.52 | 2.03 | 0.76 |
| Mathematics IV | 1.60 | 2.40 | 1.20 |
| Power Systems-I | 1.18 | 1.39 | 1.08 |
| Power Systems-I Lab | 2.10 | 1.40 | 1.17 |
| Electrical Machines-II | 1.72 | 1.72 | 0.57 |
| Electrical Machines-II Lab | 1.52 | 2.03 | 0.76 |
| Control Systems-II | 1.36 | 1.61 | 0.68 |
| Control Systems-II & VI Lab | 1.11 | 1.50 | 1.18 |
| Computer Aided Simulation of Electrical Systems | 1.39 | 1.33 | 0.57 |
| Communication Systems | 2.66 | 2.65 | 2.42 |
| Digital Electronics & Logic Design | 0.79 | 0.61 | 0.83 |
| Digital Electronics & Logic Design Lab | 1.94 | 2.92 | 1.94 |
| Mathematics-V | 1.56 | 2.34 | 1.17 |
| Power Systems-II | 1.91 | 1.91 | 1.92 |
| Power Systems-II Lab | 1.91 | 1.91 | 1.92 |

| | | | |
|---|-------------|-------------|-------------|
| Power Electronics | 2.36 | 1.57 | 1.57 |
| Power Electronics Lab | 2.25 | 1.50 | 2.00 |
| Electrical Machine Design | 1.86 | 2.58 | 0.93 |
| Tour and Training | 1.84 | 1.84 | |
| Digital Signal Processing | 1.67 | 1.73 | 1.87 |
| Microprocessors | 2.53 | 2.53 | 2.53 |
| Microprocessors Lab | 2.90 | 2.90 | 2.60 |
| Power System Protection | 1.69 | 2.21 | 0.97 |
| Power System Protection Lab | 1.95 | 1.95 | 2.75 |
| Advanced Power Electronics | 2.00 | 1.30 | 0.60 |
| Power Systems-III | 1.38 | 1.02 | 1.54 |
| Electronic Measurements & Instrumentation | 1.03 | 1.09 | 1.75 |
| Electronic Measurements & Instrumentation Lab | 1.72 | 1.72 | 0.57 |
| Power Station Practice | 1.46 | 1.94 | 0.73 |
| Elective I (Electric drives) | 2.00 | 2.25 | 1.00 |
| Elective I (Utilization and Traction) | 1.26 | 1.40 | 1.15 |
| Project Preliminary Work / Seminar | 1.94 | 0.49 | 1.93 |
| General Management & Economics | | | |
| High Voltage Engineering | 2.90 | 2.90 | 1.00 |
| Project | 1.90 | 1.90 | 1.90 |
| Elective-II/III (Electric Drives) | 2.02 | 2.02 | 2.02 |
| Elective-III (System Planning & Load Forecasting) | 0.82 | 1.69 | 1.69 |
| Elective II (Selected Topics in Advanced Control) | 2.12 | 2.50 | 2.31 |
| Direct Assessment | 1.72 | 1.86 | 1.31 |
| Program Exit Survey | 1.77 | 1.84 | 1.84 |
| Alumni | 1.99 | 1.98 | 1.94 |
| Employer | 2.35 | 2.27 | 2.37 |
| Indirect Attainment | 2.03 | 2.02 | 2.02 |
| Direct Attainment (80%) | 1.38 | 1.49 | 1.05 |
| Indirect Attainment (20%) | 0.41 | 0.40 | 0.40 |
| Overall PO/PSO Attainment | 1.78 | 1.89 | 1.45 |

Overall PO Attainment:

| Assessment Year | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----------------|------|------|------|------|------|------|------|------|------|------|------|------|
| 2017-18 | 2.18 | 1.89 | 1.74 | 1.54 | 1.38 | 1.45 | 1.54 | 1.24 | 1.38 | 1.10 | 1.55 | 1.52 |
| 2018-19 | 2.04 | 1.84 | 1.67 | 1.49 | 1.32 | 1.43 | 1.51 | 1.14 | 1.40 | 1.24 | 1.57 | 1.56 |
| 2019-20 | 2.15 | 1.86 | 1.79 | 1.57 | 1.31 | 1.58 | 1.52 | 0.98 | 1.35 | 1.34 | 1.69 | 1.57 |

Overall PSO Attainment:

| Assessment Year | PSO1 | PSO2 | PSO3 |
|-----------------|------|------|------|
| 2017-18 | 1.82 | 1.95 | 1.40 |
| 2018-19 | 1.71 | 1.81 | 1.43 |
| 2019-20 | 1.78 | 1.89 | 1.45 |

SUMMARY:

| Sub-criterion | Max. Score | Claimed Score |
|----------------------|-------------------|----------------------|
| 3.1 | 25 | 25 |
| 3.2 | 75 | 75 |
| 3.3 | 75 | 75 |
| Total | 175 | 175 |

Marks claimed: 175 out of 175