



**DELHI SKILL AND
ENTREPRENEURSHIP UNIVERSITY**

Diploma in Electrical Engineering

Syllabus Document



Effective From Academic Year 2021-22

Program Summary

Diploma in Electrical Engineering is a three-year programme where the students are taught application of electromagnetism and electricity. The course has been designed to provide practical and theoretical knowledge of conventional and emerging areas of electrical engineering. Programme covers the study and application of latest technological changes required to meet the uPComing challenges in the field of electrical engineering. The diploma program in electrical engineering will build a strong foundation for students aspiring for higher education.

Program Vision

To bring in more technical, entrepreneurial and innovative qualities in students for better employability, software skills, effective communication and work ethics. To enhance the technical capabilities of students to cope-up with changing technical demand of markets.

Program Outcome

Students will learn/acquire by the end of the program.

- a) **Basic Knowledge/Skills:** After completion of the course, students are equipped to work in the areas like production, installation, maintenance and servicing of electrical systems. Today the market is beaming with opportunities for an electrical engineer, as electricity has become an indispensable part of human lives. Many government and private organizations will hire engineers that will possess the basic knowledge and skills gained in this course.
- b) **Technical Knowledge/Skills:** Students would be able to demonstrate their knowledge in electrical circuits, electrical machines, power systems, measurements and instrumentation, control system, power electronics, basic knowledge of computers, use of instruments etc.
- c) **Software Skill and Project Skills:** Basic knowledge of computer and electronics engineering with software applications. Communicate effectively in oral/ written format to present the working of their project/product. Implement the skills acquired in the form of projects to solve complex engineering problems.
- d) **Personality Traits and Ethics:** Diploma Electrical Engg. will be motivated, solution oriented, prompt, sincere, with great competence etc.
- e) **Soft Skills:** Effective communication, creative thinking, team work, time management, work ethics, leadership etc.

Credit Scheme

Semester I						
S. No.	Subject Code	Course Titles	Hours/week			Total Credits
			L	T	P	
1	EE-FC101	Applied Mathematics -I	3	1	0	4
2	EE-FC102	Basic Engineering Graphics	0	0	6	3
3	EE-FC103	Basic Engineering Workshop Technology	1	0	4	3
4	EE-PC101	Electrical Engineering Material	3	0	0	3
6	EE-HS101	Face The World Skills - I	-	-	-	3
7	EE-HS102	English Communication - I	2	0	0	2
8	EE-HS103	Sports And Yoga	0	0	2	1
Total			9	1	12	19

NOTE- Syllabus for Applied Mathematics- I, Basic Engineering Graphics, Basic Engineering Workshop Technology, Face the World Skills, English Communication- I, Sports and Yoga are given separately.

Semester II						
S. No.	Subject Code	Course Titles	Hours/week			Total Credits
			L	T	P	
1	EE-HS201	Face The World - II	-	-	-	1
2	EE-HS202	English Communication - II	0	0	2	1
3	EE-PC201	Electrical Workshop - I	0	0	6	3
4	EE-PC202	Electrical Engineering Drawing	0	0	6	3
5	EE-FC201	Applied Mathematics - II	3	1	0	4
6	EE-FC202	Basic Sciences*	4	0	2	5
7	EE-FC203	Elements Of Mechanical Engineering	2	0	2	3
8	EE-SI201	Industry Visit/Field Visit/Seminar	0	0	2	1
Total			9	1	20	21

*Includes Applied Physics and Applied Chemistry of 2.5 credits each

NOTE- Syllabus of Face the World II, English Communication-II, Applied Mathematics-II, Basic Sciences, Industry Visit/Field Visit/ Seminar are given separately.

Semester III						
S. No.	Subject Code	Course Titles	Hours/week			Total Credits
			L	T	P	
1	EE-HS301	Face The World - III	-	-	-	1
2	EE-HS302	English Communication - III	0	0	2	1
3	EE-HS303	Indian Constitution	-	-	-	1
4	EE-HS304	Environmental Studies	-	-	-	1
5	EE-PC301	Electrical Machines - I	3	0	3	4.5
6	EE-PC302	Electrical And Electronic Measurement	3	0	3	4.5
7	EE-PC303	Electrical Circuit	3	0	3	4.5
8	EE-PC304	Electrical Workshop - II	0	0	6	3
Total			9	0	17	20.5

Semester IV						
S. No.	Subject Code	Course Titles	Hours/week			Total Credits
			L	T	P	
1	EE-HS401	Face The World - IV	-	-	-	1
2	EE-HS402	English Communication - IV	0	0	2	1
3	EE-HS403	Human Values	-	-	-	1
4	EE-PC401	Electrical Machines -II	3	0	3	4.5
5	EE-PC402	Electric Power Generation, Transmission And Distribution	3	0	0	3
6	EE-PC403	Control System	3	0	3	4.5
7	EE-OE401	Mooc* (Programming)	0	0	6	3
8	EE-PE401	Elective I	3	0	0	3
Total			12	0	14	21

Elective I: Power electronics and drives; biomass and micro-hydro power plants; electric traction.

Summer Training: After 4th semester, students shall undergo summer training of 4 weeks.

Semester V						
S. No.	Subject Code	Course Titles	Hours/week			Total Credits
			L	T	P	
1	EE-HS501	Face The World - V	-	-	-	1
2	EE-HS502	English Communication - V	0	0	2	1
3	EE-PC501	Non-Conventional Energy Sources	3	0	3	4.5
4	EE-PC502	Digital Electronics And Microprocessor	3	0	3	4.5
5	EE-OE501	Mooc*	0	0	6	3
6	EE-PE501	Elective II	3	0	0	3
7	EE-SI501	Summer Training	0	0	6	3
Total			9	0	20	20

Elective II: Electrical estimating and contracting; electrical energy management; industrial automation & control; emerging trends in electrical engineering.

Semester VI						
S. No.	Subject Code	Course Titles	Hours/week			Total Credits
			L	T	P	
1	EE-HS601	Face The World - VI	-	-	-	1
2	EE-HS602	English Communication - VI	0	0	2	1
3	EE-HS603	Entrepreneurship And Start-Ups	3	1	0	4
4	EE-PC601	Power System Protection	3	0	3	4.5
5	EE-PC602	Industrial Instrumentation	3	0	3	4.5
6	EE-PE601	Elective III	3	0	0	3
7	EE-PR601	Major Project	0	0	10	5
Total			12	1	18	23

Elective III: Utilization of electrical energy; installation, commissioning and maintenance of electrical equipment; special electrical machines; electric vehicles.



SEMESTER I

EE-PC101 ELECTRICAL ENGINEERING MATERIAL	
SEMESTER I	
Course Code	EE-PC101
Course Title	Electrical Engineering Material
Number of Credits	(L: 3 T: 0 P: 0)
Pre-requisites	10 th class
Course Category	Program Core Courses

Rationale

Electrical engineering materials aim to give an understanding of different kinds of materials used in the manufacturing of electrical equipment. A diploma holder in Electrical Engineering will be involved in manufacturing, repair and maintenance of electrical equipment and systems. Knowledge of various types of materials will help to execute the above mentioned functions. He may also have to decide for an alternative when a particular material is either not readily available in the market or its cost becomes prohibitive.

Learning Outcome

After studying this course, students will be able to:

- Describe the properties, characteristics and limitations of conductors, semiconductors, insulators, dielectrics and magnetic materials etc.
- Select materials for design, manufacturing, commercialization and performance of electrical machines and equipment.
- Establish how failures occur in materials and how to prevent them.

Detailed Contents

UNIT 1. Conducting Materials

(8 Hour)

- Resistivity, Temperature coefficient of resistance, Properties: Electrical, Mechanical, Economical Factor.
- Low resistivity materials: general properties and uses of silver, copper, aluminum, iron and steel.
- Properties and uses of alloys: Brass, Bronze and Eureka.
- Superconductivity.

UNIT 2. Insulating & Dielectric Materials

(8 Hours)

- Purpose of insulation, electrical, visual, mechanical, thermal & chemical properties of insulating materials. Classification of insulating materials into solid, liquid & gas.
- Gaseous Insulating Materials: Properties and applications of air, nitrogen and sulfur hexafluoride (SF-6) gases.

- Liquid Insulating Materials: Properties and applications of transformer oil (mineral oil), synthetic insulating liquid (Pyranol).
- Solid Insulating Materials: Purpose of impregnation, application of impregnated paper, Properties and applications of wood, bakelite, poly-vinyl chloride (PVC), rubber, mica, glass and porcelain.
- Dielectrics: introduction, dielectric constant of permittivity, polarization, dielectric loss.

UNIT 3. Semiconductor Materials

(8 Hours)

- Introduction of semiconductors, atomic structure, energy level and energy band, classification of solids and energy bands, semiconductor materials,
- Properties of semiconductors, bonds in semiconductors, intrinsic semiconductors, extrinsic semiconductors, doping, N-type materials, P- type materials, minority and majority carriers,
- Applications of semiconductor materials.

UNIT 4. Magnetic Materials

(8 Hours)

- Introduction, magnetic flux, flux density, magnetizing force, coercive force, permeability, magnetomotive force, curie point, classification: diamagnetic, paramagnetic and ferromagnetic materials, magnetisation curve, residual magnetism, hysteresis, eddy currents, magnetostriction.
- Soft magnetic materials: applications of wrought iron, silicon-steel, nickel- iron alloys and soft ferrites
- Hard magnetic materials: carbon-steel, tungsten-steel, cobalt-steel, alnico and hard ferrites.
- Application of magnetic material.

UNIT 5. Special Purpose Materials

(7 Hours)

- Working principle, construction and applications of thermocouple.
- Descriptions and applications of bimetals, lead, soldering, fuse, fluorescent and contact materials.

Learning Approach

- Examples to be given for applications of different kinds of electrical materials in electrical equipment and systems.
- Different materials, electronic components and devices in the class should be brought while taking lectures and explaining and making students familiar with them.

References/suggested learning resources

(a) Books

- Electrical Engineering Materials by N Alagappan N Kumar, McGraw Hill Education
- Electrical and Electronic Engineering Materials by S.O. Pillai and Sivakami, New Age International Publishers
- Electrical Engineering Materials by A.J.Dekker, PHI

- Electrical Engineering Materials by G.K. Mithal, Khanna Publishers, New Delhi
- Electrical and Electronics Engineering Materials by G.K. Banerjee, PHI

(b) Open source software and website address

- www.nptel.com, www.mooc.org, <https://swayam.gov.in>
- www.electrical4u.com