



आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश
IFTM University, Moradabad, Uttar Pradesh
NAAC ACCREDITED

Course Structure

&

Syllabus

of

**Diploma
Electrical Engineering**

[Applicable w.e.f. Academic Session - 2022-23]
[As per CBCS guidelines given by UGC]

**UNIVERSITY POLYTECHNIC
DEPARTMENT OF
ELECTRICAL ENGINEERING
IFTM UNIVERSITY, MORADABAD**



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**Study & Evaluation Scheme of
Diploma (Electrical Engineering)**
[Session 2022-23]
(As per CBCS guidelines)

Programme	Diploma (Electrical Engineering)
Course Level	Diploma
Duration	Three Years (Six Semesters) Full Time
Medium of instruction	English/Hindi
Minimum Required Attendance	75%
Maximum Credits	160

<i>Evaluation Scheme:</i>			
	<i>Internal</i>	<i>External</i>	<i>Total</i>
<i>Theory</i>	<i>30</i>	<i>70</i>	<i>100</i>
<i>Practical</i>	<i>30</i>	<i>70</i>	<i>100</i>
<i>Seminar/Industrial Training</i>	<i>100</i>	<i>--</i>	<i>100</i>
<i>Project Reports</i>	<i>60</i>	<i>140</i>	<i>200</i>

Evaluation of Performance

1. **Programmes:** Evaluation of performance of the students in a programme shall be a continuous process based on their performance in the class test, quizzes, assignments and the end semester examinations.

a. Theory papers in semester system (Maximum Marks: 100)

The evaluation will be done through two class test and one end semester examination. This will be in addition to quizzes, assignments, attendance, etc. Each class test will carry a weightage of 10 marks, and the end semester examination will carry a weightage of 70 marks. The remaining 10 marks will be awarded on the basis of attendance and performance in quizzes and assignments.

b. Practical in semester system (Maximum Marks: 100)

In each practical, the student will be required to carry out the number of experiments as specified in the syllabus. Each practical conducted will be assessed by the teacher based on the experiment done during the lab, submission

of the practical file, and understanding of the experiment done, which will carry a weightage of 30 marks. There shall be an end semester practical examination with or without an external examiner which will carry a weightage of 70 marks.

2. **Summer Training, Project, Seminar etc.:** Summer Training, Project, Seminar and other learning-oriented activities shall have associated maximum marks and credits, as stated in the syllabus.

3. **Examination:**

- a. The minimum Grade required to pass in each Theory & Practical paper is 'GRADE D'.
- b. A candidate, in order to pass, minimum CGPA of 4.50 is required in a particular academic year inclusive of both semesters of that academic. And maximum number of Carryover paper permissible for promotion to next academic year are 06 theory / practical / project papers.
- c. There shall be no minimum Grade required to pass in General Proficiency (GP). However, Grade obtained in General Proficiency (GP) shall be included in SGPA.
- d. In case of audit paper, the minimum Grade required to pass is Grade D. However, the Grade obtained in audit paper shall not be included in SGPA.

For further information, examination ordinance of IFTM University can be followed.

A. Objective of the program:

Diploma in Engineering plays a major role of all innovations. It is a program that focused on practical and skills-oriented training. It is a technical course and covers the basics and essentials used with an undergraduate engineering degree. It aims to provide students with technical job related engineering knowledge, scientific skills, mathematical techniques, a good knowledge of English to communicate in the field and ability to apply problem-solving techniques.

There is always a good scope of Diploma in Engineering program as it provides numerous job opportunities from different companies. With the help of this program, there is also a secure and constant growth of career for students. Nowadays, no technical advancement is possible without the help of core branches of Diploma in Engineering i.e. Civil, Computer, Electrical, Electronics, and Mechanical. Syllabus for Diploma in Engineering makes the students to work in variety of engineering sectors. With the help of basic sciences a student of Diploma in Engineering can develop understanding of scientific principles and analytical ability.

Basic sciences courses make a smooth path for the technical courses of Diploma in Engineering. English language course is also incorporated to enhance the communication skills for better job opportunities.

Diploma in Engineering program consists of six semesters that includes teaching of core courses, program electives, seminar/industrial training/project work and open elective courses. The University continuously works with students for making a strong desire and capacity for learning.

After finishing Diploma in Engineering program, students have numerous opportunities in various renowned industries, while some students open their own start-ups. Some students have gone through for B. Tech. to pursue higher studies in the chosen specializations.

Diploma in Engineering holders will have several opportunities in industries like Telecommunication, Automobile and Electronics equipment manufacturing, production, construction in real states etc.

Diploma Mechanical engineers are generally working in manufacturing industries, defense, PWD and Telegraphs etc. Electronic and Communication engineers and Electrical engineers have several opportunities in industries such as electronics, IT, manufacturing, power, transport, construction, telecommunications, research and development, and petrochemicals. Civil engineers are having opportunities in construction of new set up and building in real state.

B. Choice Based Credit System (CBCS)

Choice based credit system (CBCS), provides a learning platform wherein the student or knowledge seeker has the flexibility to choose their course from a list of elective, core and soft skill courses. This is a student-centric approach to achieve his target number of credits as specified by the UGC and adopted by our University.

The following is the course module designed for the Diploma Program:

Core Course (CC): Core courses of Diploma program will provide a foundation approach to Diploma in Engineering, giving students an overview of the field, a basis to build and specialize upon. These core courses are the strong foundation to establish engineering knowledge and provide broad multi-disciplined knowledge can be studied further in depth during the elective phase. The Core courses will provide more practical-based knowledge, case-based lessons and collaborative learning models. It will train the students to analyze, decide, and lead-rather than merely know-while creating a common student experience that can foster deep understanding, develop decision-making ability and contribute to the engineering and community at large. A wide range of Core courses with four credits hours each provides groundwork in the engineering

disciplines: Elementary Physics, Elementary Chemistry, Elementary Mathematics, Elementary Engineering Mechanics, Elementary Mechanical Engineering, Workshop Technology, Computer fundamentals & Programming in C, Basic Electrical & Electronics Engineering, Engineering Drawing Lab, Physics Lab, Chemistry Lab, Workshop Lab, Basic Electrical & Electronics Engineering Lab. The integrated foundation is Diploma in Electronics and Communication Syllabus as per CBCS (2019-20). Diploma is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various business fields. We offer 11 Core courses with 4 credits, 08 Core Course with 01 credit for each during the Diploma Program.

Ability Enhancement Compulsory Course (AECC): As per the guidelines of Choice Based Credit System (CBCS) for all Universities, including the private Universities, the Ability Enhancement Compulsory Course (AECC) is a course designed to develop the ability of students in communication (especially English) and other related courses where they might find it difficult to communicate at a higher level in their prospective job at a later stage due to lack of practice and exposure in the language, etc. Students are motivated to learn the theories, fundamentals and tools of communication which can help them develop and sustain in the corporate environment and culture. We offer 02 AECC with credit 4 in first semester, while in fourth semester student have to pass the course having no credit during the Diploma Program.

Skill Enhancement Course (SEC): General Proficiency, Industrial Training, Seminar, Project are skill enhancement courses in all Semester of Diploma in Engineering Program. These courses are designed so that students gain the industrial knowledge and improve his/her practical skills.

Discipline Specific Course (DSC): These are discipline Specific course that do not have any choice and will be of 4 credits each for theory and 2 credits each for theory subjects related labs. Each student of Diploma in engineering program has to compulsorily pass the discipline Specific course. A wide range of Discipline Specific courses with four credits hours each provides groundwork in the engineering disciplines: Electrical Measurements & Measuring Instruments-I, Transmission & Distribution of Electrical Power, Basic Network Systems, Power Plant Engineering, Elementary Digital Electronics, Introduction to Microprocessors, Electrical Design Drawing & Estimating-I, Electrical Machine-I, Installation, Maintenance and Repair of Electrical Machines, Utilization of Electrical Energy & some of lab courses related to above specific courses etc. The integrated foundation is important for students because it will not only allow them to build upon existing skills, but they can also explore career options in a range of industries, and expand their understanding of various business fields.

Discipline Specific Elective Course (DSE): The discipline specific elective course is chosen to make students specialist or having specialized knowledge of a specific domain like Fundamentals of High Voltage Engineering, Renewable Sources of Energy, Electric Traction, Industrial Control etc. It will be covered in two semesters (V & VI) of Third year of the program relevant to chosen disciplines of compulsory/core courses of the program. The student will have to choose any two elective out of the four DSE offered High Voltage Engineering, Renewable Sources of Energy, Electric Traction, Industrial Control. Each student will have to choose two discipline specific elective courses (DSECs) in all chosen; 1 in Semester V and 1 in Semester VI respectively. Each DSEC will carry 4 credits.

Open Elective courses (DOE): Open electives are additional courses that students may take to meet course requirements beyond their Core Requirements .Open Elective is a powerful tool introduced in the final year of Diploma Engineering syllabus. With the concept of Open Elective a student can study new subjects from other streams or subjects from the same stream but which were not initially available into the main stream curriculum.

There are 05 open elective courses Industrial Management & Entrepreneurship Development, Disaster Management, Total Quality management, Non Conventional Energy Resources, NCC General. Students have to choose 01 course in semester 5th out of 03 courses (Industrial Management, Disaster Management, NCC General) and 01 course in semester 6th out of 02 courses (Total Quality Management, Non Conventional Energy Resources).

C. Program Outcomes (POs) (What she/he will be able to do at the entry point of industry soon after the Diploma programme)

PO1: Basic knowledge: An ability to apply knowledge of basic mathematics, science and engineering to solve the engineering problems.

PO2: Engineering Tools, Experimentation and Testing: Apply modern engineering tools and appropriate technique to conduct standard tests and measurements.

PO3: 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/receive clear instructions

PO4: 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

PO5: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work

PO6: Environment and sustainability: Understand the impact of the engineering solutions in societal and environmental contexts, and demonstrate the knowledge and need for sustainable development.

PO7: Individual and team work: Function effectively as an individual, and as a member or leader in diverse/multidisciplinary teams.

PO8: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

D. Program Specific Outcomes (PSO) of Electrical Engineering Program:

Students completing this programme will be able to:

PSO1: Diploma engineers will be able to demonstrate knowledge of electrical and electronics engineering.

PSO2: Diploma engineers will demonstrate an ability to identify, formulate and solve industrial, community & research problems.

PSO3: Diploma engineers will demonstrate an ability to analyze and interpret experiments for mathematical modeling and maintenance of the electrical systems.

PSO4: Diploma engineers will demonstrate skills to use modern devices, software and equipment to analyze & solve problems.

PSO5: Diploma engineers will be able to communicate effectively both verbally and in writing.

PSO6: Diploma engineers will be able to understand the impact of Electrical engineering on the society and contemporary issues.

E. Pedagogy & Unique practices adopted:

Our teachers' use of communicative strategies encourages pedagogic practices that are interactive in nature and is more likely to impact on student learning outcomes. Some specific strategies, that promoted this interactive pedagogy includes:

Audio-Visual Based Learning:

It is clear that audio visual aids are important tools for teaching learning process. It helps the teacher to present the lesson effectively and students learn and retain the concepts better and for longer duration. Use of audio-visual aids improves student's critical and analytical thinking. It helps to remove abstract concepts through visual presentation. However, improper and unplanned use of these aids can have negative effect on the learning outcome. Therefore, teachers should be well trained through in-service training to maximize the benefits of using

these aids. The curriculum should be designed such that there are options to activity-based learning through audio-visual aids. In addition, government should fund resources to purchase audio-visual aids in colleges.

Field / Live Projects:

The objective of their training program is to enhance knowledge of the students on any one of the Trending technologies according to the industry standards without which the student degree is a mere degree. This is done by making students work on live projects which equip them with the required skill needed for the corporate world.

Personality Development Program (PDP)

It is conducted by professional trainers/experts from corporates as also by dedicated in-house faculty to actually bring a change in the traits of students in terms of values, behavior and personal growth. It enhances their body language, self-discipline, includes boosting one's confidence, improving language speaking abilities and widening one's scope of knowledge. Following PDP programs are undertaken in the Institute.

Aptitude: Prepare students for placements by enhancing students' understanding in reasoning, numeric aptitudes, language proficiencies and general awareness.

- **Resume Writing:** Trains students about the current trend to present their Personal, Educational & Professional achievements and Strengths in an impressive manner. They learn how to write covering letter through which they can efficiently present their extra information. They also get an exposure to the Social Professional Sites like LinkedIn.
- **Group Discussion:** Help students to improve their ability to understand a topic/idea from different perspectives. They are able to realize its importance as a standard recruitment and selection tool. Students are trained to demonstrate their leadership, team work, oral and body language skills.
- **Personal Interview:** A platform to train students in improving their listening abilities and handling interviewer's questions and answer accordingly so that they are able to remove hesitation and anxiety during placement process.

Student Development Programs (SDP)

SDP has various modules dealing with professional development, Awareness and opinion building, communication and self-presentation etc. The purpose of these modules is to help students grow as individuals, develop the power of critical thinking and, at a material level, secure better placements

Special Guest Lectures (SGL)

Guest lectures are a highly useful medium to provide exceptional knowledge to students, it also adds an extra variety to the classroom routine and universities put a lot of emphasis on the importance of Guest lectures. The Guest lecturers are the “real-world” arriving in the classroom in order to make classes more interesting.

Industrial Visits

Industrial visits are an integral part of Engineering and acknowledgment of technological up gradation. Industrial visit is considered as one of the tactical methods of teaching. The main reason behind this, it lets student to know things practically through interaction, working methods and employment practices. Moreover, it gives exposure from academic point of view. Main aim of industrial visit is to provide an exposure to students about practical working environment. They also provide students a good opportunity to gain full awareness about industrial practices. Through industrial visit students get awareness about new technologies. Technology development is a main factor, about which a students should have a good knowledge. Visiting different companies actually help students to build a good relationship with those companies.

Industry Focused programs:

Industry oriented education is an approach to learning from an industry perspective where core subjects are taught in the context of application of that knowledge to product design, development and operation.

Mentoring scheme:

The new process has been established as Mentoring System”. Each faculty will be the mentor of a group of 20 to 25 students. First, second-, and third-year students will have mentors from the parent department. Departmental faculties will continue to be mentors for the same group of students till their graduation.

HOD: The HOD will,

1. Meet all mentor of his/her department at least once a month to review proper implementation of the system
2. Advice mentors wherever necessary.
3. Initiate administrative action on a student when necessary.
4. Keep the head of the institute informed.

Extracurricular Activities:

In IFTM University, various Co-Curricular and Extra-Curricular activities are regularly conducted along with regular Academic activities and students are continuously inspired and motivated to participate in these various activities to ensure the overall development of the students.

- **Cultural Activities:** The various activities undertaken are – Singing, Dancing, Playing Musical Instruments, Comparing, Skit, Band, Stand-up Comedy, Poetry, Fashion Show etc. These activities help to develop self-confidence, cultural interest, creativity and sense of cooperation among students.

Games & Sports: IFTM strongly believes that a healthy physique leads to a healthy mind. The Institute encourages sports culture and students also reciprocate by actively participating and distinguishing themselves at Sports Meets. IFTM possesses proper playgrounds and hard courts for outdoor sports. In Boys hostels students enjoy the facilities of Gym, badminton, and Table Tennis. The various sports activities undertaken are – cricket, football, basketball, volley ball, carom, chess, badminton, athletics etc. They increase self-esteem & mental alertness among students and promote team spirit. They also lead to balanced mental and physical growth of the students and teach them life skills like discipline, teamwork, leadership, patience, perseverance etc.

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Department of Electrical Engineering
Diploma (Electrical Engineering)
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Cluster of Courses for Diploma (Electrical Engineering) Programme

1. Elementary/Fundamental Science Core Courses (CC)

S. No	Course Code	Subject Name	Credit
1	DPPH-101	Elementary Physics-I	04
2	DPMA-101	Elementary Mathematics -I	04
3	DPCH-101	Elementary Chemistry-I	04
4	DPPH-151	Physics-I Lab	01
5	DPCH-151	Chemistry-I Lab	01
6	DPPH-201	Elementary Physics-II	04
7	DPMA-201	Elementary Mathematics -II	04
8	DPCH-201	Elementary Chemistry-II	04
9	DPPH-251	Physics-II Lab	01
10	DPCH-251	Chemistry – II Lab	01

2. Engineering Science Core Courses (CC)

S. No	Subject Code	Subject Name	Credit
1	DPME-101 / DPME-201	Elementary Engineering Mechanics	04
2	DPCS-101 / DPCS-201	Computer Fundamentals & Programming in C	04
3	DPME-102 / DPME-202	Workshop Technology	04
4	DPEE-101 / DPEE-201	Basic Electrical & Electronics Engineering	04
5	DPME-151 / DPME-251	Engineering Drawing Lab	01
6	DPCS-151 / DPCS-251	Computer Programming Lab	01
7	DPME-152 / DPME-252	Workshop Lab	01
8	DPEE-151 / DPEE-251	Basic Electrical and Electronics Engineering Lab	01
9	DPME-203	Elementary Mechanical Engineering	04

3. Engineering Discipline Specific Core Courses (DSC)

S. No	Subject Code	Subject Name	Credit
1	DPEE-301	Elementary Digital Electronics	04
2	DPEE-302	Basic Network Systems	04
3	DPEE-303	Introduction to Power Electronics	04
4	DPEE-304	Electrical Measurements & Measuring Instruments-I	04
5	DPEE-305	Transmission & Distribution of Electrical Power	04
6	DPEE-351	Digital Electronics Lab	01
7	DPEE-352	Network Systems Lab	01
8	DPEE-353	Power Electronics Lab	01
9	DPEE-354	Electrical Measurement-I Lab	01
10	DPEE-401	Electrical Machine-I	04
11	DPEE-402	Electrical Design Drawing & Estimating-I	04
12	DPEE-403	Introduction to Microprocessors	04
13	DPEE-404	Electrical Measurements & Measuring Instruments-II	04

14	DPEE-405	Industrial Electronics & Control	04
15	DPEE-451	Electrical Machine-I Lab	01
16	DPEE-452	Electrical Design Drawing & Estimating-I Lab	01
17	DPEE-453	Microprocessor Lab	01
18	DPEE-454	Electrical Measurement-II Lab	01
19	DPEE-501	Electrical Machine-II	04
20	DPEE-502	Electrical Design Drawing & Estimating-II	04
21	DPEE-503	Utilization of Electrical Energy	04
22	DPEE-551	Electrical Machine-II Lab	01
23	DPEE-552	Electrical Design Drawing & Estimating-II Lab	01
24	DPEE-601	Installation, Maintenance and Repair of Electrical Machines	04
25	DPEE-602	Switch Gear and Protection	04
26	DPEE-603	Power Plant Engineering	04
27	DPEE-651	Installation, Maintenance and Repair of Electrical Machines Lab	01
28	DPEE-652	Power System Lab	01

4. Discipline Elective Core Courses (DSC)

S. No	Subject Code	Subject Name	Credit
1	DPEE-504	Fundamentals of High Voltage Engineering	04
2	DPEE-505	Control of Electrical Machines	04
3	DPEE-604	Electric Traction	04
4	DPEE-605	Process Control & Instrumentation	04

5. Open Elective Course (inter disciplinary) (DOE)

S. No	Subject Code	Subject Name	Credit
1	DOEC-051	Industrial Management & Entrepreneurship Development	04
2	DOCE-051	Disaster Management	04
3	NCC-01	NCC General	04
4	DOME-061	Total Quality Management	04
5	DOEE-061	Non-Conventional Energy Resources	04

6. Ability Enhancement Compulsory Course (AECC)

S. No	Subject Code	Subject Name	Credit
1	FEC-101	Fundamentals of English Communication	04
2	PSC-401	Professional Communication	00

7. Project/Seminar/Summer or Industrial Training (SEC)

S. No	Subject Code	Subject Name	Credit
1	DPEE-553	Industrial Training	01
2	DPEE-554	Seminar	01
3	DPEE-653	Project	04
4	DPGP-101	General Proficiency	01
5	DPGP-201	General Proficiency	01
6	DPGP -301	General Proficiency	01
7	DPGP -401	General Proficiency	01
8	DPGP -501	General Proficiency	01
9	DPGP -601	General Proficiency	01

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STUDY AND EVALUATION SCHEME
YEAR I, SEMESTER-I

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
				L	T	P	Mid Term Exam			External Exam		
							CT	AS +AT	Total			
THEORY												
1.	CC-01	DPPH-101	Elementary Physics-I	3	1	0	20	10	30	70	100	4
2.	CC-02	DPMA-101	Elementary Mathematics -I	3	1	0	20	10	30	70	100	4
3.	CC-03	DPCH-101	Elementary Chemistry-I	3	1	0	20	10	30	70	100	4
4.	CC-04	DPME-101 / DPCS-101	Elementary Engineering Mechanics / Computer Fundamentals & Programming in C	3	1	0	20	10	30	70	100	4
5.	CC-05	DPME-102 / DPEE-101	Workshop Technology / Basic Electrical & Electronics Engineering	3	1	0	20	10	30	70	100	4
6.	AECC-01	FEC-101	Fundamentals of English Communication	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
7.	CC-06	DPME-151/ DPCS-151	Engineering Drawing Lab / Computer Programming Lab	0	0	2	-	-	30	70	100	1
8.	CC-07	DPPH-151	Physics-I Lab	0	0	2	-	-	30	70	100	1
9.	CC-08	DPCH-151	Chemistry-I Lab	0	0	2	-	-	30	70	100	1
10.	CC-09	DPME-152 / DPEE-151	Workshop Lab / Basic Electrical and Electronics Engineering Lab	0	0	2	-	-	30	70	100	1
11.	SEC-01	DPGP-101	General Proficiency	-	-	-	-	-	100	-	100	1
TOTAL				18	06	08	-	-	-	-	1100	29

Abbreviation: CC- Core Course, AECC - Ability Enhancement Compulsory Course, SEC - Skill Enhancement Course

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STUDY AND EVALUATION SCHEME
YEAR I, SEMESTER-II

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
				L	T	P	Mid Term Exam			External Exam		
							CT	AS +AT	Total			
THEORY												
1.	CC-10	DPPH-201	Elementary Physics-II	3	1	0	20	10	30	70	100	4
2.	CC-11	DPMA-201	Elementary Mathematics -II	3	1	0	20	10	30	70	100	4
3.	CC-12	DPCH-201	Elementary Chemistry-II	3	1	0	20	10	30	70	100	4
4.	CC-13	DPME-203	Elementary Mechanical Engineering	3	1	0	20	10	30	70	100	4
5.	CC-14	DPEE-201 / DPME-202	Basic Electrical & Electronics Engineering / Workshop Technology	3	1	0	20	10	30	70	100	4
6.	CC-15	DPME-201 / DPCS-201	Elementary Engineering Mechanics / Computer fundamentals & Programming in C	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
7.	CC-16	DPPH-251	Physics-II Lab	0	0	2	-	-	30	70	100	1
8.	CC-17	DPEE-251 / DPME-252	Basic Electrical and Electronics Engineering Lab / Workshop Lab	0	0	2	-	-	30	70	100	1
9.	CC-18	DPCS -251/ DPME-251	Computer Programming Lab / Engineering Drawing Lab	0	0	2	-	-	30	70	100	1
10.	CC-19	DPCH-251	Chemistry – II Lab	0	0	2	-	-	30	70	100	1
11.	SEC-02	DPGP-201	General Proficiency	-	-	-	-	-	100	-	100	1
TOTAL				18	06	08	-	-	-	-	1100	29

Abbreviation: CC- Core Course, SEC - Skill Enhancement Course

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STUDY AND EVALUATION SCHEME
YEAR II, SEMESTER-III

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
							Mid Term Exam			External Exam		
				L	T	P	CT	AS +AT	Total			
THEORY												
1.	DSC-01	DPEE-301	Elementary Digital Electronics	3	1	0	20	10	30	70	100	4
2.	DSC-02	DPEE-302	Basic Network Systems	3	1	0	20	10	30	70	100	4
3.	DSC-03	DPEE-303	Introduction to Power Electronics	3	1	0	20	10	30	70	100	4
4.	DSC-04	DPEE-304	Electrical Measurements & Measuring Instruments-I	3	1	0	20	10	30	70	100	4
5.	DSC-05	DPEE-305	Transmission & Distribution of Electrical Power	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
6.	DSC-06	DPEE-351	Digital Electronics Lab	0	0	2	-	-	30	70	100	1
7.	DSC-07	DPEE-352	Network Systems Lab	0	0	2	-	-	30	70	100	1
8.	DSC-08	DPEE-353	Power Electronics Lab	0	0	2	-	-	30	70	100	1
9.	DSC-09	DPEE-354	Electrical Measurement-I Lab	0	0	2	-	-	30	70	100	1
10.	SEC-03	DPGP-301	General Proficiency	-	-	-	-	-	100	-	100	1
TOTAL				15	05	08	-	-	-	-	1000	25

Abbreviation: DSC- Discipline Specific Course, SEC - Skill Enhancement Course

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STUDY AND EVALUATION SCHEME
YEAR II, SEMESTER-IV

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
							Mid Term Exam			External Exam		
				L	T	P	CT	AS +AT	Total			
THEORY												
1.	DSC-10	DPEE-401	Electrical Machine-I	3	1	0	20	10	30	70	100	4
2.	DSC-11	DPEE-402	Electrical Design Drawing & Estimating-I	3	1	0	20	10	30	70	100	4
3.	DSC-12	DPEE-403	Introduction to Microprocessors	3	1	0	20	10	30	70	100	4
4.	DSC-13	DPEE-404	Electrical Measurements & Measuring Instruments-II	3	1	0	20	10	30	70	100	4
5.	DSC-14	DPEE-405	Industrial Electronics & Control	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
6.	DSC-15	DPEE-451	Electrical Machine-I Lab	0	0	2	-	-	30	70	100	1
7.	DSC-16	DPEE-452	Electrical Design Drawing & Estimating-I Lab	0	0	2	-	-	30	70	100	1
8.	DSC-17	DPEE-453	Microprocessor Lab	0	0	2	-	-	30	70	100	1
9.	DSC-18	DPEE-454	Electrical Measurement-II Lab	0	0	2	-	-	30	70	100	1
10.	SEC-04	DPGP-401	General Proficiency	-	-	-	-	-	100	-	100	1
TOTAL				18	06	08	-	-	-	-	1000	25

Ability Enhancement Compulsory Course

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
							Mid Term Exam			External Exam		
				L	T	P	CT	AS +AT	Total			
1.	AECC-02	PSC-401	Professional Communication	3	1	0	20	10	30	70	100	0

Note: Industrial Training of 4 – 6 weeks after IV Semester, which will be evaluated in V Semester

Abbreviation: DSC- Discipline Specific Course, AECC - Ability Enhancement Compulsory Course, SEC - Skill Enhancement Course

IFTM UNIVERSITY, MORADABAD
Department of Electrical Engineering
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(w.e.f. session 2022-2023)

STUDY AND EVALUATION SCHEME
YEAR III, SEMESTER-V

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
				L	T	P	Mid Term Exam			External Exam		
							CT	AS +AT	Total			
THEORY												
1.	DSC-19	DPEE-501	Electrical Machine-II	3	1	0	20	10	30	70	100	4
2.	DSC-20	DPEE-502	Electrical Design Drawing & Estimating-II	3	1	0	20	10	30	70	100	4
3.	DSC-21	DPEE-503	Utilization of Electrical Energy	3	1	0	20	10	30	70	100	4
Departmental Elective (Select any one)												
4.	DSE-01	DPEE-504	Fundamentals of High Voltage Engineering	3	1	0	20	10	30	70	100	4
	DSE-02	DPEE-505	Control of Electrical Machines									
Open Elective (Select any one)												
5.	DOE-01	DOEC-051	Industrial Management & Entrepreneurship Development	3	1	0	20	10	30	70	100	4
	DOE-02	DOCE-051	Disaster Management									
	DOE-03	NCC-01	NCC General	-	-	-	-	-	-	-	-	-
PRACTICALS/ PROJECT												
6.	DSC-22	DPEE-551	Electrical Machine-II Lab	0	0	2	-	-	30	70	100	1
7.	DSC-23	DPEE-552	Electrical Design Drawing & Estimating-II Lab	0	0	2	-	-	30	70	100	1
8.	SEC-05	DPEE-553	Industrial Training	0	0	2	-	-	100	-	100	1
9.	SEC-06	DPEE-554	Seminar	0	0	2	-	-	100	-	100	1
10.	SEC-07	DPGP-501	General Proficiency	-	-	-	-	-	100	-	100	1
TOTAL				15	05	08	-	-	-	-	1000	25

Abbreviation: DSC- Discipline Specific Course, SEC - Skill Enhancement Course, DSE - Discipline Specific Elective Course, DOE- Open Elective Courses

IFTM UNIVERSITY, MORADABAD
Department of Electrical Engineering
Diploma (Electrical Engineering)
(w.e.f. session 2022-2023)

STUDY AND EVALUATION SCHEME
YEAR III, SEMESTER-VI

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
				L	T	P	Mid Term Exam			External Exam		
							CT	AS +AT	Total			
THEORY												
1.	DSC-24	DPEE-601	Installation, Maintenance and Repair of Electrical Machines	3	1	0	20	10	30	70	100	4
2.	DSC-25	DPEE-602	Switch Gear and Protection	3	1	0	20	10	30	70	100	4
3.	DSC-26	DPEE-603	Power Plant Engineering	3	1	0	20	10	30	70	100	4
Departmental Elective (Select any one)												
4.	DSE-03	DPEE-604	Electric Traction	3	1	0	20	10	30	70	100	4
	DSE-04	DPEE-605	Process Control & Instrumentation									
Open Elective (Select any one)												
5.	DOE-03	DOME-061	Total Quality Management	3	1	0	20	10	30	70	100	4
	DOE-04	DOEE-061	Non-Conventional Energy Resources									
PRACTICALS/ PROJECT												
6.	DSC-27	DPEE-651	Installation, Maintenance and Repair of Electrical Machines Lab	0	0	2	-	-	30	70	100	1
7.	DSC-28	DPEE-652	Power System Lab	0	0	2	-	-	30	70	100	1
8.	SEC-08	DPEE-653	Project	0	0	8	-	-	60	140	200	4
9.	SEC-09	DPGP-601	General Proficiency	-	-	-	-	-	100	-	100	1
TOTAL				15	05	12	-	-	-	-	1000	27

Abbreviation: DSC- Discipline Specific Course, SEC - Skill Enhancement Course, DSE - Discipline Specific Elective Course, DOE- Open Elective Courses

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (I Semester)
(w.e.f. session 2022-2023)
DPPH-101: Elementary Physics-I

Objective: This aim of this course is to impart knowledge in basic concepts of physics like unit, dimension, work, energy and power etc. and their applications.

UNIT-I **(8 Sessions)**

Unit and Dimensions

Physical quantities, Fundamental and derived units, Systems of unit (CGS, MKS and SI units), Dimensions and dimensional formulae of physical quantities (area, volume, velocity, acceleration, momentum, force, impulse, work, power, energy, surface tension, coefficient of viscosity and strain) , Dimensional equations and their uses with examples, Limitations of dimensional analysis.

UNIT-II **(10 Sessions)**

Force and Motion

Scalar and vector quantities - examples, addition and multiplication of vectors, scalar product and vector product of vectors, Force, resolution and composition of forces – resultant, friction, law of friction and type of friction, Newton's Laws of motion – concept of momentum, determination of force equation from Newton's second law of motion, Newton's third law of motion Conservation of momentum, impulse and impulsive forces, simple numerical problems, Circular motion (Definition), Relation between linear and angular velocity and linear acceleration and angular acceleration , Centripetal force (derivation) and centrifugal force Banking of roads, Definition of torque ,Planetary Motion, Newton's law of gravitation, Kepler's law of planetary motion, Escape velocity (derivation)

UNIT-III **(8 Sessions)**

Work, Power and Energy

Work: definition and its units, Work done against friction in moving an object on horizontal and inclined plane (incorporating frictional forces),
Power: definitions and its units, calculation of power in simple cases,
Energy: Definitions and its units: Types: Kinetic energy and Potential energy, with examples and their derivation.

UNIT-IV **(8 Sessions)**

Temperature and its measurement

Difference between heat and temperature on the basis of K.E. of Molecules, Principles of measurement of temperature and different scales of temperature, Transfer of Heat, Modes of transfer of heat (conduction, convection and radiation with examples), Coefficient of thermal conductivity, Properties of heat radiation. Prevost's theory of heat exchange, Laws of black body radiations: Stefan's law, Kirchoff's law, Wien's law.

UNIT-V **(10 Sessions)**

Properties of Matter

Elasticity, stress and strain, Different types of modulus of elasticity, Surface tension- its units, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension, Fluid motion, stream line and turbulent flow, Viscosity and coefficient of viscosity.

Course Outcomes:

Students completing this course will be able to:

- CO1: Identify different systems of units and convert units from one system to another as well as conversant with practical units.
- CO2: Represent physical quantities as scalar and vectors, applying physical laws and concept of linear and circular motion in everyday life.
- CO3: Differentiate between work, energy and power.
- CO4: Express physical work in terms of heat and temperature; measure temperature in various processes on different scales. Distinguish between conduction, convection and radiations
- CO5: Understand the concept of elasticity, surface tension pressure and laws governing moment of fluid.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	3	2	3	2	2	1	1
CO 2	3	3	3	2	3	1	2	1
CO 3	3	3	3	3	2	1	1	2
CO 4	3	3	3	3	2	2	1	1
CO 5	3	3	3	2	3	1	1	2

Suggested Readings:

1. Concept of Physics, Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Prakashan, Jalandhar

Website Sources:

- <https://thefactfactor.com>
- <https://i1.dainikbhaskar.com>
- <https://hplgit.github.io>
- <https://worldwidescience.org>
- <https://courses.lumenlearning.com>
- <https://www.machinedesign.com>
- <http://teacher.pas.rochester.edu>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (I Semester)
(w.e.f. session 2022-2023)
DPMA – 101: ELEMENTARY MATHEMATICS-I

Objective: - The main aims of this course are to understand basics and applications of algebra, determinants, vectors, trigonometry and complex numbers. The focus of these topics in field to impart their knowledge in particular area of engineering branches and Comprehensive knowledge of basic mathematics.

UNIT – 1 **(12 Sessions)**

Series : AP and GP; Sum of n terms, Partial fractions, Exponential and Logarithmic series, Binomial theorem for positive, Negative and fractional index (without proof) Application of Binomial theorem, Permutation & combination.

UNIT – 2 **(10 Sessions)**

Determinants: Elementary properties of determinants of order 2 and 3, Consistency and solution of system of algebraic equation by Cramer's rule, Matrices, Type of matrix, Properties (addition, subtraction, multiplication, adjoint, inverse) of matrix.

UNIT – 3 **(10 Sessions)**

Vector algebra: Dot and Cross product, Scalar and vector triple product, Application to work done, Moment of a force.

UNIT – 4 **(10 Sessions)**

Trigonometry: Relation between sides and angles of a triangle, Statement of various formulae showing relationship between sides and angles of a triangle, trigonometrically equations, Inverse trigonometric function.

UNIT – 5 **(10 Sessions)**

Complex numbers, Representation, Modulus and amplitude De-moiver's theorem and its application in solving algebraic equations, Mod, Function and its properties.

Course Outcomes:

Students completing this course will be able to:

CO1: Demonstrate basic knowledge of AP and GP; Sum of n terms, Exponential and Logarithmic series and also understands the basic concept of factorial notion in permutation, combination and binomial theorem.

CO2: To find area of triangle to understand properties to simplify determinants to solve system of equations using matrices.

CO3: Familiar with the basic concepts of scalar product, vector product, Triple products and multiple products.

CO4: To understand basics and applications of trigonometry in field to impart their knowledge and comprehensive of basic mathematics.

CO5: This course enables the students to learn the concept of imaginary numbers and gives awareness about algebra of complex numbers.

PO-CO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	2	2	1	1
CO2	3	3	3	2	3	1	3	2
CO3	3	3	3	3	2	3	3	2
CO4	3	3	3	3	2	3	1	2
CO5	3	3	3	2	3	1	3	2

Suggested Readings:

1. R.D. Sharma: Mathematics (I& II-XI), Dhanpat Rai Publication, Delhi.
2. B.S. Grewal: Engg. Mathematics, khanna Publishers, New Delhi.
3. H.R. Luthra: Applied Mathematics, Bharat Bharti Prakashan & Co. Meerut.
4. Kailash Sinha: Applied Mathematics, Nav Bharat Publication, Meerut.
5. A Text Book of Mathematics (XI & XII) NCERT.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

IFTM UNIVERSITY, MORADABAD
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Diploma (EE) - I Year (I Semester)
(w.e.f. session 2022-2023)
DPCH 101: ELEMENTARY CHEMISTRY-I

Objectives: This course will equip students with the necessary knowledge to understand chemistry at the most fundamental level to understand the periodic properties of different elements, various concepts of electrochemistry, chemical kinetics and colloidal solutions.

UNIT-I

(08 Sessions)

STRUCTURE OF ATOM: Basic concepts of atomic structure, Matter wave concept, Schrodinger wave equation (excluding derivation) Quantum number, Heisenberg's Uncertainty Principle, Shapes of orbitals.

CHEMICAL BONDING: Basic concepts, Hydrogen bonding, Valence bond theory, Hybridization, VSEPR theory, Molecular orbital theory as applied to diatomic homonuclear molecules of first and second period elements, Co-ordination bond.

SOLID STATE: Types of solids (Amorphous and Crystalline), Classification (Molecular, Ionic, Covalent, Metallic), Band theory of solids (Conductors, Semiconductors and Insulators), types of Crystals, FCC, BCC, Crystal imperfection.

UNIT-II

(08 Sessions)

PERIODIC CLASSIFICATION OF ELEMENTS: Classification of elements (s, p, d and f block elements), Modern Periodic law, Periodic properties: Ionization energy electro negativity, Electron affinity.

UNIT-III

(08 Sessions)

ELECTRO CHEMISTRY: Arrhenius Theory of electrolytic dissociation, Transport number, Electrolytic conductance, Ostwald dilution law. Concept of Acid and bases: Bronsted, Arrhenius and Lewis theory. pH. Buffer solutions, Indicators, Solubility product, Common ion effect with their applications, Redox reactions, Electrode potential (Nernst Equation), Electro-chemical cells (Galvanic and Electrolytic). EMF of a cell and free energy change. Standard electrode potential, Electro chemical series and its applications., Laclanche's or dry cell, Acid storage cell (Lead accumulator) and Alkali stroge cell (Edison accumulator), Solar cell (Photovoltaic cell), Numerical problems based on topics.

UNIT-IV

(08 Sessions)

CHEMICAL KINETICS: Introduction, rate of reaction, rate constant order and molecularity of reaction. Activation energy, Zero order First order and Second order (when initial concentration of both the reacrants are same) reactions.

CATALYSIS: Definition, Characteristics of catalytic reactions, Catalytic promoters and poison, Autocatalysis and Negative catalysis, Theory of catalysis, Application.

UNIT-V

(08 Sessions)

COLLOIDS: Colloids and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electro dialysis. Properties of colloidal solution with special reference to adsorption, Brownian Movement, tyndal effect, Electrophoresis and coagulation. Gold number, Application of colloids.

Course Outcomes:

Upon successful completion of this course students should be able to:

CO1: Describe atomic structure, concept of matter-wave chemical bonding and solid state

CO2: Describe the periodic table as a list of elements to demonstrate trends in their physical and chemical properties.

CO3: Understand the concept of conductance and electrochemistry as well as determine the EMF of the cells.

CO4: Evaluate rate constant of a reaction as well as understand theories of reaction rates.

CO5: Apply the concepts of sol, gel and emulsions to various solutions.

PO-CO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	3	2	2	1	1
CO2	3	3	3	2	3	1	3	2
CO3	2	3	3	2	2	3	1	3
CO4	3	3	2	3	2	3	1	2
CO5	3	2	3	2	3	1	3	3

Suggested Readings:

1. Inorganic Chemistry by J.E. Huheey
2. Basic Inorganic Chemistry by Cotton and Wilkinson
3. Modern Electrochemistry by J.O. M. Bockris and A.K.N.Reddy
4. Advanced Physical Chemistry by Atkins
5. Introduction to Electrochemistry by S. Glasstone

Website Sources:

- <https://www.internetchemistry.com/>
- <http://www.chemguide.co.uk/>
- <https://freebookcentre.net/>
- Chemical Elements.com

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (I Semester)
(w.e.f. session 2022-2023)
DPME 101/DPME 201: ELEMENTARY ENGINEERING MECHANICS

Objective:

The primary objectives of elementary engineering mechanics course are to help the student develop this ability to visualize. This is so vital to problem formulation purpose of the study of elementary engineering mechanics. To develop the capacity to predict the effects of force and motion while carrying out the creative design functions of engineering.

UNIT I

(08 Sessions)

Introduction: Mechanics and its utility. Concept of scalar and vector quantities. Effect of a force. Tension & compression. Rigid body. Principle of physical independence of force. Principle of transmissibility of a force.

UNIT II

(08 Sessions)

System of Forces: Concept of co-planer and non-co-planer forces including parallel forces. Concurrent and non-concurrent forces. Resultant force. Equilibrium of forces. Law of parallelogram of forces. Law of triangle of forces and its converse. Law of polygon of forces. Solution of simple engineering problems by analytical and graphical methods such as simple wall crane, jib crane and other structures. Determination of resultant of any number of forces in one plane acting upon a particle, conditions of equilibrium of co-planer concurrent force system.

UNIT III

(08 Sessions)

Moment & couple: Concept of Varignon's theorem. Generalized theorem of moments. Application to simple problems on levers-Bell crank lever, compound lever, steel yard, beams and wheels, lever safety valve, wireless mast, moment of a couple; Properties of a couple ; Simple applied problems such as pulley and shaft.

UNIT IV

(08 Sessions)

General Condition of Equilibrium: General condition of equilibrium of a rigid body under the action of co-planer forces, statement of force law of equilibrium, moment law of equilibrium, application of above on body.

Friction: Types of friction: statically, limiting and dynamical friction, statement of laws of sliding friction, Coefficient of friction, angle of friction; problems on equilibrium of a body resting on a rough inclined plane, simple problems on friction. Conditions of sliding and toppling.

UNIT V

(08 Sessions)

Stresses and strains: Concept of stress and strain. Concept of various types of stresses and strains. Definitions of tension, compression shear, bending, torsion. Concept of volumetric and lateral strains, Poisson's ratio. Changes in dimensions and volume of a bar under direct load (axial and along all the three axes). Ultimate stress, working stress. Elasticity, Hook's law, load deformation diagram for mild steel and cast iron. Definition of modulus of elasticity, yield point, modulus of rigidity and bulk Modulus. Stresses and strains for homogeneous materials and composite sections.

Course Outcomes:

Students completing this course will be able to:

CO1: Makes the students able to recognize different force systems, moments and couples.

CO2: The ability to draw Free Body Diagram and label the reactions to it & makes the students' abilities to apply equilibrium equations in statics.

CO3: The ability to understand Newton's law in motion, and recognize different kinds of particle motions.

CO4: The ability to find the moment and the couple.

CO5: Acquire knowledge about stress and strain and how to find in different parts in different conditions.

PO-CO Mapping (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	2	3	3	2	1
CO2	3	2	3	1	2	2	2	3
CO3	3	2	1	2	3	1	1	3
CO4	3	2	3	1	2	2	2	3
CO5	3	2	1	2	1	2	3	3

Suggested Reading:

1. Engineering Mechanics by Irving H. Shames, Prentice-Hall
2. Mechanics of Solids by Abdul Mubeen, Pearson Education Asia.
3. Mechanics of Materials by E.P.Popov, Prentice Hall of India Private Limited.
4. Engineering Mechanics by R.K Bansal
5. Applied Mechanics by J.K.Kapoor, Bharat BhartiPrakashan.

Website Sources:

- www.onlinecourses.nptel.ac.in
- www.pdfdrive.com/engineering-mechanics-books.html
- https://en.wikibooks.org/wiki/Engineering_Mechanics
- <http://library.iitj.ac.in/sp/subjects/guide.php?subject=ERL>

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DPCS 101/ DPCS 201: COMPUTER FUNDAMENTALS AND PROGRAMMING IN C

Objective: To study about understanding of basic concepts of computer fundamentals, operating system, primary and secondary memory in detail, peripheral devices and basic concepts of C programming language.

UNIT I **(09 Sessions)**

Introduction to Computer: Definition, Characteristics, Generation of Computers, Capabilities and Limitations, Introduction to Operating System, Concept of Bios, Booting Files, Basic Components of a Computer System-Control Unit, ALU, Input/output functions and characteristics. Memory Introduction, Classifications- Volatile Memory and Non- Volatile, Flash Memory, ROM, RAM, EPROM, PROM, EEPROM other types of memory.

UNIT II **(07 Sessions)**

Input/output and storage Units: Computer Keyboard, Pointing Devices: Mouse, Trackball, Touch Panel, and Joystick, Light Pen, Scanners, Various types of Monitors, Touch-sensitive screens, Optical Recognition System, Pen based systems, Digitizers, MICR, OCR, OMR, Bar-code Reader, digital camera. Hard Copy Devices:- Impact and Non- Impact Printers- Daisy Wheel, Dot Matrix, Line Printer, Chain Printer, Comb Printers, Non Impact Printers- DeskJet, Laser Printer, Thermal Transfer Printer, Barcode Printers, Electro static printers and plotters, High Level Language and Low-Level Language, Firmware, Compiler, Interpreter and Assembler.

UNIT III **(12 Sessions)**

Introduction and Features of “C” language: The structure of “C” program , Identifiers and Keywords, Constants, Variables, Scope of variables, Typedef, Type Conversion, Arithmetic Operators, Library Functions, Input/output Statements, getchar(), Puchar(), scanf, printf, Compound statements and block. Relational Operators, Logical Operators, Bitwise Operators, Unary Operators, if-else Statement, Operators, Switch statement, go to statement and Label, Iteration statements: For Loop, While Loop, Do While Loop, Nested Loop, Continue and Break statements.

UNIT IV **(06 Sessions)**

Array and Structures: Declaration, Concept of One Dimensional and Multi Dimensional arrays, Defining Structure, Declaration of Structure Variable, Accessing Structure members, nesting of structures, Array of structures.

UNIT V **(08 Sessions)**

Difference between Union and Structure: Functions: Need of “C” function, User Defined and Library Functions, Prototype of Function, Call by Value, Call by Reference, Nesting of Functions, Recursion, Array as Function Argument, Structure as Function Argument.

Course Outcomes:

CO1: Understand about basic computer fundamental and its major components.

CO2: To gain the knowledge about input and output devices.

CO3: Understanding the features of the C language, keyword, data type and statements in C

CO4: Understand about array and structure in detail

CO5: Gain the knowledge of functions in C language, union and structure

PO-CO Mapping (Please write 3,2,1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	1	2	2	2	3
CO2	3	2	1	2	1	2	3	3
CO3	3	2	1	2	3	1	1	3
CO4	3	2	3	1	2	2	2	3
CO5	3	2	1	2	3	3	2	1

Suggested Readings:

1. Computer Fundamentals B. Ram
2. Computer fundamentals P.K Sinha (BPB Publications)
3. Programming in Ansi C E. balagurusamy (3rd edition McGraw Hill)

Website Sources:

- https://www.tutorialspoint.com/computer_fundamentals/index.htm
- <https://www.javatpoint.com/computer-fundamentals-tutorial>
- <https://www.w3schools.in/c-tutorial/>
- <https://www.geeksforgeeks.org/difference-between-input-and-output-devices/>
- [https://en.wikipedia.org/wiki/C_\(programming_language\)](https://en.wikipedia.org/wiki/C_(programming_language))
- <https://www.cprogramming.com/>

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Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)
DPME 102/DPME 202: WORKSHOP TECHNOLOGY

Objective: The subject aims at imparting knowledge and skill components in the field of basic workshop technology. It deals with different hand and machine tools required for manufacturing simple metal components and articles. The primary objectives of this subject are to understand how different objects can be made from the given raw material by using different mechanical machines and tools.

UNIT I **(08 sessions)**

GENERAL INTRODUCTION: Scope of subject "Workshop Technology" in engineering. Different shop activities and broad division of the shops on the basis of nature of work done such as (i) Wooden Fabrication (Carpentry) (ii) Metal Fabrication (shaping and Forming, Smithy, Sheet metal and Joining-welding, Riveting, Fitting and Plumbing.

UNIT II **(08 sessions)**

CARPENTRY: Timber, seasoning of timber, types of seasoning. Common Carpentry Tools-Their classification, size, specification (name of the parts and use only)., Fundamental wood working operations, Marking & Measuring, Holding & Supporting, Cutting & Sawing, Drilling & Boring, Turning, Jointing;

UNIT III **(08 sessions)**

METAL FABRICATION: Metal Shaping-Smithy: Operations involved (concept only. Tools and equipment used (Names, size, specification for identification only). Defects likely to occur during and after operations their Identification and Remedy. Defects due to wrong operation, wrong tool and wrong heating. Safety of Personnel, Equipment & Tools to be observed. Sheet metal working: Tools and Operations involved (Names and concept only); Sheet metal joints - Lap, seam, Locked seam, hemp, wire edge, cup or circular, Flange, angular and cap. Common defects -Their identification and remedy. Defects due to wrong operation or wrong tool. Safety of Personnel, Equipment & Tools to be observed.

Metal Joining During Fabrication: Permanent Joining-Welding methods-Forge welding, gas welding (high and low pressure-oxyacetylene welding, types of flames. Electric Arc welding- D.C. & A.C., Connected tools, operation, materials and safety measures. Soldering & Brazing:

Familiarity with the use of Various Tools Used in Mechanical Engineering Workshop: Marking & Measuring, Holding Tools. Cutting Tools.

Hack saw (Fixed and Adjustable frame), chisels. Finishing tools-Files. Drills and Allied Tools. Miscellaneous Tools.

UNIT IV **(08 sessions)**

MACHINE SHOP: Introduction to machine tools viz lathe, drilling machine, shaper and planer simple line and block diagram of components and their functions. Brief concept of NC and CNC machines.

UNIT V **(08 sessions)**

Foundry: Basic idea of types of sands, patterns, moulds, furnaces and simple green sand moulding process.

Course Outcomes:

Students completing this course will be able to:

CO1: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.

CO2: Ability to design and model different prototypes in the carpentry trade such as Cross lap joint, Dove tail joint.

CO3: Ability to design and model various basic prototypes in the trade of Welding such as Lap joint, Lap Tee joint, Edge joint, Butt joint and Corner joint.

CO4: Acquire “Hands on” training and practice to students for use of various tools, devices and machines.

CO5: Understand the Metal casting Techniques and basic structure of products.

PO-CO Mapping (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	1	2	2	2	3
CO2	3	2	3	2	1	2	3	2
CO3	2	3	1	2	3	1	1	2
CO4	3	2	3	3	2	2	2	3
CO5	3	3	1	2	3	1	3	1

Suggested Reading:

1. Manufacturing Process by- B.S Raghuvanshi (Dhanpat Rai & Co.)
2. Elementary Workshop Technology by- S.K Hazra Chaudhary (Media Promoters)
3. Workshop Practice by- S.K Garg (University Science Press)
4. Elementary Workshop Technology by J.K. Kapoor, Bharat Bharti Prakashan.

Website Sources:

- www.onlinecourses.nptel.ac.in
- <https://www.pdfdrive.com/introduction-to-basic-manufacturing-processes-and-workshop-technology-e33408290.html>
- https://books.google.co.in/books/about/Workshop_Technology.html?id=m6lDDAAAQBAJ&redir_esc=y

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)

DPEE 101/ DPEE 201: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Objective: The objective of this course is to provide an understanding of basic terms related to the electrical and electronics engineering. It provides knowledge of basic elements used in electrical and electronics circuits, to develop the capability of analyzing and design simple electrical networks, an understanding of basic principle of various network theorems, an introductory knowledge of single phase and three phase AC supply, an introductory knowledge of semiconductor materials and devices manufactured by them like a PN junction diode and Bipolar Junction Transistor.

UNIT I

(08 Sessions)

Basic Terminology & Their Concepts : Current, EMF, Potential difference, Resistance, Resistivity, & their units, Variation of resistance with temperature, Series & parallel connection of resistors, conductors and insulators, Electrical power & energy, Concept of inductance & mutual inductance, mutually induced emf and its role in electric circuits. Energy stored in an inductor, Concept of capacitor, parallel plate capacitor & its capacitance, energy stored in a capacitor, Dielectric and its influence on the capacitance of a capacitor. Charging & discharging of capacitor. Simple numerical problems

UNIT II

(08 Sessions)

D.C. Circuits: Kirchoff's laws-KCL & KVL, simple numerical problems.

Network Theorems- Thevenin's theorem, Norton's theorem, Superposition & Maximum power transfer Theorem, Simple numerical problems based on them

UNIT III

(08 Sessions)

A.C. Circuits: Instantaneous value, RMS value, Peak value, Average value. Form factor & peak factor of a sine wave. Concept of phase, phase difference & phasor representation of ac voltage & current, R-L, R-C, R-L-C circuits, Active & Reactive power, power factor Simple numerical problems.

Poly-phase Systems: Advantages of a 3 phase system over single phase system, Star & Delta connections & their conversion, Relationship between phase & line values of currents and voltages, Power in 3 phase system

UNIT IV

(08 Sessions)

Magnetic Circuits: Magnetic circuit concepts- magnetic field intensity, magneto motive force, magnetic flux density, Permeability, Reluctance, Determination of Ampere turns, Kirchoff's Law for magnetic circuit, Analogy between magnetic and electric circuits, Composite magnetic circuits, B-H characteristics, Hysteresis loss

UNIT V

(08 Sessions)

Semiconductors: Classification of solids- conductors, Insulators & semiconductors, Intrinsic & Extrinsic semiconductors, P-N junction- biasing, VI characteristics of a diode.

Bipolar Junction Transistors: Biasing, working of NPN & PNP transistor, Transistor configurations- common emitter, common base common collector configurations and their characteristics, Transistor as an Amplifier, Simple numerical problems, Transistor as a switch-use of transistor as a switch for logic gates.

Combinational logic circuits: Logic gates- AND, OR, NOT, Exclusive OR, NAND & NOR gates with their truth tables

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the various types of electrical and electronics circuits.

CO2: Solve a simple type of electrical network problems.

CO3: Understand the concept of single phase and three phase AC supply and also the superiority of three phase supply over single phase supply.

CO4: Understand the concept of magnetic field and how it is utilized.

CO5: Understanding of applications of semiconductor materials and other devices based on them.

PO-CO Mapping (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	3	1	2	2	2	3
CO2	3	2	1	2	1	2	3	3
CO3	3	2	1	2	3	1	1	3
CO4	3	2	3	1	2	2	2	3
CO5	3	2	1	2	3	3	2	1

Suggested Readings:

1. Electrical Engineering by Ashfaq Hussain, Dhanpat Rai & Co.
2. Electrical Engineering by J.S. Katre. Tech. Max Publications.
3. Electrical Engineering vol.-1. By B.L. Thareja-Technical Publications.
4. Basic Electrical Engineering by I.J. Nagarath, Tata McGraw Hill
5. Electrical and Electronics Engineering by S.K. Sahdev

Web Resources:

- www.engineering.nyu.edu
- www.elprocus.com/basics-of-network-theorems-in-electrical-engineering/
- www.electricalclassroom.com
- www.electronics-tutorials.ws/electromagnetism
- <https://nptel.ac.in/courses/108/108/108108076/>

IFTM UNIVERSITY, MORADABAD
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Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)

FEC 101: FUNDAMENTALS OF ENGLISH COMMUNICATION

Objectives: The objectives of Fundamentals of English Communication are:

- To develop knowledge and understanding of grammar.
- To develop abilities to make use of the grammar in own writing English.
- To enhance competencies in writing paragraph, gist or abstract/précis of the passage in own words/ language and in writing letters and applications of different kinds.
- To increase understanding and recall of what is read and listen including facts and main idea.

UNIT I: Basic Applied Grammar and Usage **(06 Sessions)**

The Sentences: Kinds of Sentences; Subject and Predicate
Phrases & Clauses, Idioms & Proverbs

UNIT II: Basic Applied Grammar Continued **(08 Sessions)**

Nouns: Kinds; Singular/Plural; Gender; Possession
Pronouns: Kinds; Usage
Adjectives: Kinds; Degrees of Comparison; Usage
Determiners: Kinds, Usage of Adjectives and Determiners

UNIT III: Basic Applied Grammar Continued **(08 Sessions)**

Articles: Kinds, Omission of Articles, Repetition of Articles, Spotting the Errors
Verbs: Kinds-Transitive and Intransitive, Finite and Non-Finite Verbs
Tenses: Kinds; Usage

UNIT IV: Basic Applied Grammar Continued **(06 Sessions)**

Adverbs: Kinds; Position of Adverbs; Usage
Prepositions: Kinds; Correct Usage, Fill in the Blanks
Conjunctions: Kinds, Conversion of Compound to Complex Sentences and Vice-versa
Interjections: Definition and Types

UNIT V: Comprehension and Précis Writing **(10 Sessions)**

Reading Comprehension
Précis Writing: Techniques of Précis Writing and Exercises
Formal Letter Writing: Leave Application (for different reasons), Application for Fee
Concession and Invitation (for family and friends)

Course Outcomes:

The students completing this course will be able to:

CO1: Have thorough knowledge of kinds and parts of sentences and to use idioms and proverbs in day to day communication.

CO2: Use Noun, Pronoun, Adjective and determiners correctly.

CO3: Have knowledge of using Articles, Verbs and Tenses and to correct the sentences.

CO4: Frame different kinds of Sentences: double/ compound and complex using Adverb and Preposition and to express strong feelings and emotions in the words.

CO5: Write answer correctly and precisely on the basis of Reading comprehension and to write the letters and applications for different reasons.

PO-CO Mapping (Please write 3,2,1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	2	3	3	2	1
CO2	3	2	1	2	1	2	3	3
CO3	2	3	3	2	3	2	1	2
CO4	3	2	3	1	2	2	2	3
CO5	3	3	1	2	3	1	1	3

Suggested Readings:

1. Professional Communication by Malti Agarwal, Krishna Publications.
2. High School English Grammar & Composition by Wren & Martin, S. Chand & Company LTD., New Delhi.

Website Sources:

- www.wikipedia.org
- www.english-grammar.org
- www.perfect-english-grammar.com
- www.sucesscds.net
- www.grammarly.com

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)
DPME 151/DPME 251: ENGINEERING DRAWING LAB

Objective:

- To get the primary concept of Engineering Drawing.
- To know about equipments in Engineering Drawing.
- To know various signs, lines and dimensions.
- To know about the Principles of Projection: Orthographic Projections, Isometric Projection.

1. Drawing, instruments and their uses.

- 1.1 Introduction to various drawing, instruments.
- 1.2 Correct use and care of Instruments.
- 1.3 Sizes of drawing sheets and their layouts.

2. (a) Lettering Techniques

Printing of vertical and inclined, normal single stroke capital letters.

Printing of vertical and inclined normal single stroke numbers. Stencils and their use. **(1 Sheet)**

(b) Introduction to Scales Necessity and use, R F Types of scales used in general engineering drawing. Plane, diagonal and chord scales. **(1 Sheet)**

3. Conventional Presentation :

Thread (Internal and External), Welded joint, Types of lines, Conventional representation of materials, Conventional representation of machine parts. **(2 Sheet)**

4.(a) Principles of Projection

Orthographic, Pictorial and perspective. Concept of horizontal and vertical planes. Difference between I and III angle projections. Dimensioning techniques. **(1 Sheet)**

(b) Projections of points, lines and planes. **(1 Sheet)**

5.(a) Orthographic Projections of Simple Geometrical Solids Edge and axis making given angles with the reference planes. Face making given angles with reference planes. Face and its edge making given angles with reference planes.

(b) Orthographic views of simple composite solids from their isometric views.

(c) Exercises on missing surfaces and views **(3 Sheet)**

6. Section of Solids Concept of sectioning Cases involving cutting plane parallel to one of the reference planes and perpendicular to the others. Cases involving cutting plane perpendicular to one of the reference planes and inclined to the others plane, true shape of the section **(1 Sheet)**

7. Isometric Projection. **(2 Sheet)**

Isometric scale Isometric projection of solids.

8. ORTHOGRAPHIC PROJECTION OF MACHINE PARTS: **(2 Sheet)**

Nut and Bolt, Locking device, Wall bracket

Course Outcome:

After successful completion of this course, students will able to

CO1: A clear conception and appreciation of the shape, size, proportion and design.

CO2: Learning how to draw the shapes, angles and lines and others which is essential for engineer.

CO3: Develop student's imagination and ability to represent the shape size and specifications of physical objects.

CO4: Understand the main idea of using dimension for engineering drawing.

CO5: Explain the principle of projection and sectioning.

Suggested Reading:

1. Engineering Drawing by- B. Agrawal and C.M. Agrawal (McGraw Hill Education (India) Pvt. Ltd.)
2. Engineering Drawing by K. Venkata Reddy (BS Publication).
3. Engineering Drawing by R. K. Dhawan (S Chand Publication)

Website Sources:

- https://www.google.co.in/books/edition/Engineering_Drawing/VRf-AwAAQBAJ?hl=en&gbpv=1&printsec=frontcover
- <https://www.engbookspdf.com/Drawing/textbook-of-engineering-drawing-second>
- https://www.google.co.in/books/edition/A_Textbook_of_Engineering_Drawing_In_Fir/vTd3cJ91-RwC?hl=en&gbpv=1&printsec=frontcover

IFTM UNIVERSITY, MORADABAD
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Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)
DPCS 151 / DPCS 251: COMPUTER PROGRAMMING LAB

Objective: To study about understanding of basic concept of Windows Operating System, understanding of the fundamentals of programming such as data types, keywords, variables, array, structure, conditional and iterative execution, methods, etc.

List of Experiments:

Introduction to GUI using Windows Operating System, DOS Commands, Introduction to Word, Introduction to MS-Excel.

1. WAP in C to print your name.
2. WAP in C for adding, subtraction, multiplication & division of two numbers.
3. WAP in C to calculate the area of a circle, rectangle and triangle.
4. WAP to Convert Celsius to Fahrenheit.
5. WAP to find out whether the given year is a leap year or not.
6. WAP in C to find whether the given number is even or odd.
7. WAP to use switch statement display Monday to Sunday.
8. WAP to print table of given number.

Course Outcomes:

Students after this course will be able to:

CO1: Understand about GUI using windows operating system and DOS commands.

CO2: To understand how to write and execute C programs.

CO3: Execute statements in C language

CO4: Implement C programs with the help of array, structure and nesting of structure.

CO5: Execute C programs with the help of functions.

Suggested Readings:

1. Computer Fundamentals B. Ram
2. Computer fundamentals P.K Sinha (BPB Publications)
3. Programming in Ansi C E. balagurusamy (3rd edition McGraw Hill)

Website Sources:

- <https://www.programiz.com/c-programming#introduction>
- <https://www.javatpoint.com/c-programming-language-tutorial>
- <https://www.w3schools.in/c-tutorial/>
- <https://www.tutorialspoint.com/cprogramming/index.htm>[https://en.wikipedia.org/wiki/C_\(programming_language\)](https://en.wikipedia.org/wiki/C_(programming_language))
- <https://www.cprogramming.com/>

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Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)
DPPH-151: Physics Lab - I

Objective: The main goal of this course is to share the knowledge to the students about the experiments so that students will get a better understanding of the concepts studied by them in the theory course and correlate with experimental observations.

LIST OF EXPERIMENTS:

(20 Sessions)

1. To find the surface tension of a liquid by Jaeger's method.
2. To find volume of solid cylinder and hollow cylinder using a Vernier caliper.
3. To determine the atmospheric pressure at a place using Fortin's Barometer.
4. To determine the thickness of glass strip and radius of curvature of a concave surface using a spherometer.
5. To determine the time period of simple pendulum and plot a graph between l & t
6. To determine the acceleration due to gravity with the help of a Bar Pendulum.
7. To determine the coefficient of viscosity of water with the help of Poiseuille method.
8. Verify parallelogram Law of forces.
9. To determine the modulus of rigidity (η) of the material of wire with the help of torsional pendulum using the inertia table
10. To find the thickness of wire using a screw gauge.

Course Outcomes:

Students completing this course will be able to:

CO1: Use the different measuring devices and meters to record the data with precision

CO2: Measurement of surface tension, volume and atmospheric pressure.

CO3: Determine coefficient of viscosity and modulus of rigidity

CO4: Measurement of thickness of wire.

CO5: Apply the various procedures and techniques for the experiments.

Suggested Readings:

1. Concept of Physics, Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Prakashan, Jullandhar

Website sources:

- <http://dspace.wbpublibnet.gov.in>
- <https://www.scribd.com>
- <http://www.brainkart.com>
- <https://dkpandey.weebly.com>
- <https://images.topperlearning.com>

IFTM UNIVERSITY, MORADABAD
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Diploma (EE) - I Year (I Semester)
(w.e.f. session 2022-2023)
DPCH 151: CHEMISTRY-I LAB

Objectives: The objective of this course is to give knowledge to the students about the chemical experiments. Students will be able to use standard laboratory equipment, modern instrumentation, and classical techniques to carry out experiments. Students will know and follow the proper procedures and regulations for safe handling and use of chemicals.

LIST OF PRACTICALS

1. To analyze inorganic mixture for two acid and basic radicals from following radicals

A. Basic Radicals:

NH₄⁺, Pb⁺⁺, Cu⁺⁺, Bi⁺⁺⁺, Cd⁺⁺, As⁺⁺⁺, Sb⁺⁺⁺, Sn⁺⁺, Al⁺⁺⁺, Fe⁺⁺⁺, Cr⁺⁺⁺,

Mn⁺⁺, Zn⁺⁺, Co⁺⁺, Ni⁺⁺, Ba⁺⁺, Sr⁺⁺, Ca⁺⁺, Mg⁺⁺

B. Acid Radicals: CO₃⁻⁻, S⁻⁻, SO₃⁻⁻, CH₃COO⁻, NO₂⁻, NO₃⁻, Cl⁻, Br⁻, I⁻, SO₄⁻⁻

2. To determine the percentage of available Chlorine in the supplied sample of Bleaching powder.

3. To determine the total hardness of water sample in terms of CaCO₃ by EDTA titration method using Eriochroma black-T indicator.

4. To determine the strength of given HCl solution by titration against NaOH solution using Phenolphthalein as indicator.

5. To determine the Chloride content in supplied water sample by using Mohr's methods.

6. Determination of temporary hardness of water sample by O- Hener's method.

Course outcomes:

Students completing this course will able to:

CO1: Demonstrate laboratory techniques in chemistry, including analysis of acidic and basic radicals, bleaching powder, hardness and chloride content in water sample.

CO2: Demonstrate the ability to safely and effectively perform experiments, using proper glassware set-up, handling of hazardous chemicals, and following the prescribed experimental procedures.

Suggested Readings:

1. Practical Chemistry - Giri, Bajpai and Pandey, S. Chand & Co. Ltd., New Delhi.

2. Laboratory Manual In Organic Chemistry, R.K. Bansal, Willey Eastern.

3. Experimental Organic Chemistry, Vol. I And II, P.R. Singh, D.S. Gupta And K.S. Bajpai, Tata Mc- graw Hill.

4. Instrumental Methods of Chemical Analysis G.W. Ewing Mc Graw Hill.

5. Experiments In General Chemistry, N.R. Rado And U.C. Agarwal, Eastern Press.

Web Sources:

- <https://www.acs.org/content/acs/en/education/students/highschool/chemistryclubs/activities/simulations.html>
- <http://www.chem.ox.ac.uk/vrchemistry/>

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Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)
DPME 152 / DPME 252: WORKSHOP LAB

Objective:

1. To understand how different objects can be made from the given raw material by using different mechanical tools.
2. To introduce students to the basic concepts of manufacturing via shaping, forming, machining
3. To develop a knowledge of appropriate parameters to be operations used for various machining.
4. To develop a knowledge of workshop practice and basic use of machine tools and workshop equipment.

1. Carpentry Shop:

EX-1 Introduction & demonstration of tools used in carpentry shop

EX-2 Planning and sawing practice

EX-3 Making of lap joint

EX-4 Making of mortise and tenon joint

Ex-5 Making of bridle joint

EX-6 Making of dovetail joint

Ex-7 Making of any one utility article such as wooden picture frame, hanger, peg, name plate, etc.

2. Sheet Metal Working and Soldering Shop:

EX-1 Introduction & demonstration of tools used in Sheet metal working shop.

EX-2 Cutting, shearing and bending of sheet.

EX-3 To prepare a soap case by the metal sheet.

EX-4 To make a funnel with thin sheet and to solder the seam of the same.

EX-5 To make a cylinder and to solder the same.

EX-6 Preparation of different type of joints such as Lap joint-single seam, double seam. Hemp and wired joints.

EX-7 Study and sketch of various types of stakes/anvil.

EX-8 To braze small tube/conduit joints.

3. Fitting Shop :

EX-1 Introduction & demonstration of tools used in Fitting Shop.

EX-2 Hack sawing and chipping of M.S. flat.

EX-3 Filing and squaring of chipped M.S. job.

EX-4 Filing on square or rectangular M.S. piece.

EX-5 Making bolt & nut by tap and die set.

Ex-6 To drill a hole in M.S. Plate and tapping the same to create threads as per need.

EX-7 Utility article-to prepare a screw driver or paper weight, double open mouth spanner for 18" hexagonal head of a bolt.

4. Plumbing Shop:

EX-1 Cutting and threading practice for using socket, elbow and tee etc. and to fit it on wooden practice board.

EX-2 Study of-bib cock, cistern or stop cock, wheel valve and gate valve etc.

5. Smithy Shop :

EX-1 Study & Sketch of Tools used in smithy shop.

EX-1 To prepare square or rectangular piece by the M.S.rod.

EX-2 To braze M.S. Flats/Tipped tools on M.S. shank.

EX-3 To make a screw driver with metallic handle.

EX-4 To make a square or hexagonal head bolt.
EX-5 To make a ring with hook for wooden doors.
EX-6 Utility article-to prepare a ceiling fan hook.

6. Welding Shop :

EX-1 Welding practice-gas and electric.
EX-2 Welding for lap joint after preparing the edge.
EX-3 Welding of Butt joint after preparation of the edge.
EX-4 'T' joint welding after preparation of edge.
EX-5 Spot welding, by spot welding machine.
EX-6 Welding of plastic pieces by hot strip method.
EX-7 Welding practice by CO₂ gas welding

7. Machine Shop

EX-1 Study & sketch of lathe machine.
Ex-2 Plain and step turning & knurling practice.
Ex-3 Study and sketch of planning/Shaping machine and to plane a Rectangle of cast iron.

8. Fastening Shop

EX-1 Practice of bolted joints
EX-2 To prepare a rivetted joint
EX-3 To make a pipe joint
EX-4 To make a threaded joint
EX-5 Practice of sleeve joint

Course Outcome:

After successful completion of this course, students will able to

CO1: Acquire skills in basic engineering practice.

CO2: Identify the hand tools and instruments, gain measuring skills and Obtain practical skills in the trades.

CO3: Read and use a manufacturing drawing as a definition for the manufacturing of a part.

CO4: Select proper tools and cutting data for a given material and manufacturing process.

CO5: Identify safe welding practices and procedures conforming to Welding standards.

Suggested Reading:

1. A Textbook of Workshop Technology: Manufacturing Processes by R.S Khurmi and J.K Gupta (S Chand).
2. Introduction to Basic Manufacturing Processes and Workshop Technology by Rajender Singh

Website Sources:

- https://www.abebooks.com/servlet/BookDetailsPL?bi=30061491479&cm_sp=rec-_-pd_hw_i_1-_-bdp&reftag=pd_hw_i_1
- https://www.google.co.in/books/edition/Introduction_to_Basic_Manufacturing_Proc/ky7r-BclY8cC?hl=en&gbpv=1&pg=PP1&printsec=frontcover

IFTM UNIVERSITY, MORADABAD
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Diploma (EE) - I Year (I/II Semester)
(w.e.f. session 2022-2023)

DPEE-151/ DPEE-251: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB

Objective: The objective of this lab is to provide an understanding of basic electrical and electronic components used in various types of circuits, to know how the basic principles of electrical and electronic engineering like Ohm's Law, KCL, KVL work. To know about how the electricity consumed in a circuit is measured by the energy meter. To know how the resistance of a filament varies according to temperature, to know the working of electronic devices like a PN junction diode and NPN/PNP transistors and logic gates.

List of Experiments:

1. To study and identify the various components.
2. To verify Ohm's Law.
3. To verify Kirchhoff's Current Law (KCL).
4. To verify Kirchhoff's Voltage Law (KVL).
5. To observe the variation of resistance of a lamp with temperature by plotting V-I curve for 60 W and 100 W filaments lamp.
6. To study Star to Delta and Delta to Star conversion.
7. To verify the truth table of OR, AND, NOT, NAND, NOR and EXOR logic gates.
8. To study and plot V-I characteristics of a PN junction diode.
9. To study the biasing and working of NPN/PNP transistor.
10. To study a single phase Induction type energy meter.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the identification and application of the various types of components used in electrical and electronics circuits.

CO2: Understand how Ohm's Law work and its limitations.

CO3: Understand the concept of KCL, KVL and their applications.

CO4: Understand about the variation of resistance with temperature and working principle of an energy meter & its use.

CO5: Understanding, working & application of semiconductor devices.

Suggested Readings:

1. Handbook of laboratory experiments in electronics engineering by A.M. Zungeru
2. Basic electrical and electronics lab by Bharat Bhushan Jain
3. Laboratory Manual for Introductory Electronics Experiments by L.K. Maheshwari.

Website Sources:

- www.concept-of-physics.com/electromagnetism/verification-of-ohmas-law-using-voltmeter-and-ammeter.php
- www.jetir.org
- www.digitalelectronicsforstudents.files.wordpress.com
- www.mist.ac.in
- www.educompjre.files.wordpress.com

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DPPH-201: ELEMENTARY PHYSICS-II

Objective: The objective of this course is to provide an understanding of optics, electro statistics and semiconductors etc.

UNIT-I **(8 Sessions)**

Waves and Vibrations: Introduction, Types of wave motion with examples, Relation between velocity of wave, frequency and wave length of a wave ($v = \eta\lambda$), Simple harmonic motion: definition, expression for displacement, Velocity, acceleration, time period, frequency in S.H.M., Vibration of spring mass system, Free, forced and resonant vibrations with examples.

UNIT-II **(8 Sessions)**

Optics :Concept of mirrors, lenses, reflection & refraction of light, refractive index, lens formula (no derivation), real and virtual image, magnification, Power of lens, Simple and compound microscope, magnifying power and its calculation (in each case), Total internal reflection

UNIT-III **(10 Sessions)**

Electrostatics: Coulomb's law, Gauss's Law, Electric field intensity and electric potential, Electric field of point charge, charged sphere, Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and dielectric constant.

UNIT-IV **(10 Sessions)**

Current Electricity :Ohm's law, Resistance of a conductor, specific resistance, Series and Parallel, Combination of resistors, effect of temperature on resistance, Kirchhoff's laws, Wheatstone bridge principle and its applications, Heating effect of current and concept of electric power.

UNIT-V **(8 Sessions)**

Semi-Conductor Physics: Energy bands, Intrinsic and Extrinsic semiconductor, p-n junction diode and its characteristics, Diode as rectifier-half wave and full wave rectifier.

Course Outcomes:

Students completing this course will be able to:

CO1: Differentiate between wave and vibrations.

CO2: Understand mirror, lens, phenomenon of reflection and refraction, working and principle of Simple Microscope and compound microscope.

CO3: Explain Coulomb's law, Gauss Law and their applications.

CO4: Apply Ohms law to solve problems.

CO5: Understand semiconductors and characteristics of diodes.

PO-CO Mapping (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8
CO 1	3	2	3	1	2	2	2	3
CO 2	3	2	1	2	1	2	3	3
CO 3	3	2	1	2	3	1	1	3
CO 4	3	2	3	1	2	2	2	3
CO 5	3	2	1	2	3	3	2	1

Suggested Readings:

1. Concept of Physics Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Prakashan, Jullandhar

Website sources:

- <https://courses.lumenlearning.com>
- <https://en.wikipedia.org>
- <https://cnx.org>
- <http://www.sakshieducation.com>
- <https://www.toppr.com>
- <https://opentextbc.ca>
- <https://www.askiitians.com/>
- <https://www.askiitians.com>

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Diploma (EE) - I Year (II Semester)
(w.e.f. session 2022-2023)
DPMA 201: ELEMENTARY MATHEMATICS-II

Objective: - The main aims of this course are to understand and develop the basic Mathematical skills of diploma engineering students that are imperative for effective understanding of engineering subjects. To understand basics and applications of differential & integral Calculus and coordinate geometry.

UNIT – 1 **(10 Sessions)**

DIFFERENTIAL CALCULUS-I: Functions, Limits, Continuity, Functions and their graphs, Range and domain, Elementary methods of finding limits (right and left), Elementary test for continuity and differentiability. Methods of finding derivative, Function of a function, Logarithmic differentiation, Differentiation of implicit functions.

UNIT – 2 **(10 Sessions)**

Higher order derivatives, Leibnitz's theorem. Special functions (Exponential, Logarithmic, Hyperbolic, Inverse and circular function), Definition, Graphs, Range and Domain and Derivations of each of these functions.

UNIT – 3 **(10 Sessions)**

Application - Finding Tangents, Normal, Points of maxima and minima, Increasing and Decreasing functions, Sketching of some simple curves (without assumptions, question, not to be asked in the examination), Rate, Measure, Velocity, Acceleration, Errors and approximations.

UNIT – 4 **(10 Sessions)**

INTEGRAL CALCULUS-I: Methods of indefinite integration:- Integration by substitution, by partial fraction and by parts, Integration of special functions Meaning and properties of definite integrals, Evaluation of definite integrals.

UNIT – 5 **(12 Sessions)**

CO-ORDINATE GEOMETRY: Standard form of curves and their simple properties-Parabola Ellipse, Hyperbola, Tangent and normals, Straight lines, Planes and Spheres in space-distance between two points in space, Direction cosines and direction ratios, Finding equation of a straight line and Shortest distance between two lines under different conditions equation of a plane, Relation between lines and Planes, Sphere.

Course Outcomes:

Students completing this course will be able to:

CO1: Basic Knowledge of function, limit and derivatives.

CO2: Apply differential calculus and higher order to solve engineering problems.

CO3: Find velocity, acceleration, errors and approximation in engineering problems with application of derivatives.

CO4: Calculate simple integration by methods of integration and evaluate the area under curves, surface by using definite integrals.

CO5: Understand the geometric shapes used in engineering problems by co-ordinate geometry.

PO-CO Mapping (Please write 3,2,1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	1	2	3	1	1	3
CO2	3	2	3	1	2	2	2	3
CO3	3	2	1	2	3	3	2	1
CO4	3	2	3	1	2	2	2	3
CO5	3	2	1	2	1	2	3	3

Suggested Readings:

1. R.D. Sharma: Mathematics (I& II-XI), Dhanpat Rai Publication, Delhi.
2. B.S. Grewal : Engg. Mathematics, khanna Publishers, New Delhi.
3. H.R. Luthra : Applied Mathematics, Bharat Bharti Prakashan & Co. Meerut.
4. Kailash Sinha : Applied Mathematics, Nav Bharat Publication, Meerut.
5. A Text Book of Mathematics (XI & XII) NCERT.

Website Sources:

- www.pdfdrive.com
- www.dmi.gov.in
- www.yourarticlelibrary.com
- onlinecourses.nptel.ac.in
- en.wikipedia.org

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (II Semester)
(w.e.f. session 2022-2023)
DPCH 201: ELEMENTARY CHEMISTRY-II

Objectives: The main objective is to provide a basic scientific and technical understanding of fuel, handling of hydrocarbon fuels and lubricants. Students will learn the emerging alternative & renewable fuels. The course also provides basic knowledge of organic chemistry and polymers. This will enable students to be industry ready to contribute effectively in the field of petroleum chemistry and technology.

Unit – I: LUBRICANTS: (08 Sessions)

Definition, classification, necessity and various kinds of lubricants. function and mechanism of action of lubricants with examples. Properties of lubricants, importance of additive compounds in lubricants, synthetic lubricants and cutting fluids.

Unit – II: FUELS AND ENVIRONMENTAL POLLUTION: (08 Sessions)

Definition of fuel, its classification and their composition, knocking, anti-knocking agents, Octane number and Cetane number. Cracking and its type, gaseous fuel - water gas, bio gas, LPG, CNG and solar energy. Concept and various types of environmental pollution, air pollution and water pollution. General measures to control environmental pollution. Depletion of ozone layer, green house effect, acid rain, smog formation.

Unit – III: WATER TREATMENT AND CORROSION: (08 Sessions)

Concept of hard and soft water, Hardness of water, Softening method (only Ion exchange resin process). Disadvantages of hard water in different industries, boiler feed water. Corrosion - concept of metallic corrosion, factors affecting the corrosion rate, prevention of corrosion by various methods.

Unit – IV: GLASS AND CERAMICS: (08 Sessions)

Concept of glass and its constituents, Classification and uses of different glass, elementary idea of manufacturing process of glass.

Unit – V: ORGANIC CHEMISTRY: (08 Sessions)

Isomerism- Types of isomerism

1. Structural isomerism
2. Stereoisomerism (a) Geometrical (b) Optical
 - A. Electrophiles and nucleophiles
 - B. Reaction Intermediates
 - i. Free radical ii. Carbocation iii. Carbanion

POLYMERS:

1. Basic terms used in polymer chemistry and polymerization, monomers.
2. Characteristics of polymers and their classification

Course Outcomes:

Students completing this course will able to:

- CO1: Understand the classification, properties and importance of lubricants.
CO2: Learn about the various fuels, their classification and pollution to the environment
CO3: Learn about the treatment of water and basic concept of metallic corrosion.
CO4: Understand the concept, classification and uses of glass and ceramics.
CO5: Describe basic concepts of organic chemistry and polymerization.

PO-CO Mapping (Please write 3,2,1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	3	1	2	2	2	2
CO2	3	2	3	2	1	2	3	2
CO3	2	2	1	2	3	1	3	3
CO4	3	2	3	3	3	3	2	1
CO5	3	2	3	1	2	2	2	2

Suggested Readings:

1. E. Stocchi: Industrial Chemistry, vol. - I, Ellis Horwood Ltd. UK.
2. P.C. Jain, M. Jain: Engineering Chemistry, Dhanpat Rai & Sons, Delhi.
3. B.K. Sharma: Industrial Chemistry, Goel Publishing House, Meerut.

Website Sources:

- <https://onlinelibrary.wiley.com/doi/book/10.1002/9781118796214>
- <http://www.freebookcentre.net/Chemistry/Chemistry-Books-Online.html>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (II Semester)
(w.e.f. session 2022-2023)

DPME 203: ELEMENTARY MECHANICAL ENGINEERING

Objective:

To provide a comprehensive knowledge of basic mechanical systems, basic concepts from mechanical engineering sciences. Modern engineering tools (machine-tools) and related subjects to design mechanical engineering components.

UNIT I

(08 Sessions)

Thermal Engineering: A. SOURCES OF ENERGY; Basic ideas, conventional and nonconventional forms- Thermal, Hydel, Tidal, wind, Solar, Biomass and Nuclear and their uses. B. FUELS & COMBUSTION; Introduction to common fuels - solid, liquid and gases and their composition. Combustion of fuels- their higher and lower calorific values. Combustion equations for carbon, sulphur, hydrogen and their simple compounds. Calculation of minimum amount of air required for complete combustion. Combustion analysis on mass basis and on volume basis. Concept of excess air in a boiler furnace combustion. Heat carried away by flue gases. Analysis of flue gases by Orsat apparatus. Simple numerical problems Idea of specific properties of liquid fuels such as detonation, knock resistance (cetane and octane numbers), viscosity, solidification point, flash point and flame point.

UNIT II

(08 Sessions)

MACHINE COMPONENTS: Brief Idea of loading on machine components. (i) Pins, Cotter and Knuckle Joints. (ii) Keys, Key ways and spline on the shaft. (iii) Shafts, Collars, Cranks, Eccentrics. (vi) Couplings and Clutches. (v) Bearings-Plane, Bushed, Split-step, ball, Roller bearing, Journal bearing, Foot step bearing, thrust bearing, collar bearing and Special type bearings and their applications. Selection of ball bearing and roller bearing for given application using design data book.

UNIT III

(08 Sessions)

(i) Gears : Different types of gears, gear trains and their use for transmission of motion. Determination of velocity ratio for spur gear trains; spur gear, single and double helical gears, Bevel gears, Mitre wheel, worms, Rack and Pinion. Simple and compound and epicyclic gear trains and their use. Definition of pitch and pitch circle & module. (ii) Springs: Compression, Tension, Helical springs, Torsion springs, Leaf and Laminated springs. Their use and material. Selection of spring by design data book, simple numerical problem.

UNIT IV

(08 Sessions)

MECHANISMS: Definition of link, Frame and mechanism. Difference between machine and mechanism, kinematic pairs, lower and higher pairs. Velocity diagram for four bar mechanism, slider crank mechanism, quick return mechanism. Introduction to Cam and its use.

UNIT V

(08 sessions)

LUBRICATION: Different lubrication system for lubricating the components of machines. Principle of working of wet sump and dry sump system of lubrication. (Explained with simple line diagram). Selection of lubricant based on different application (Requirement with the help of manufacturer catalogue).

Course Outcomes:

Students completing this course will be able to:

CO1: To understand various energy resources and energy systems available to produce power.

CO2: To understand about different mechanical components with their applications.

CO3: To make the student conversant with commonly used mechanism for industrial application.

CO4: To understand basic principle, related terms and apply principles of gear design.

CO5: To understand about lubrication systems and its importance.

PO-CO Mapping (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	3	1	2	2	1	3
CO2	3	2	2	2	3	3	2	2
CO3	2	3	3	2	2	1	1	3
CO4	3	2	3	1	2	2	2	3
CO5	2	3	2	2	2	2	2	1

Suggested Reading:

1. Elements of Mechanical Engineering by J.K.Kapoor (Bharat BhartiPrakashan).
2. Elements of Mechanical Engineering by R.P.Garg, BBP Pub. Pvt. Ltd, Meerut.

Website Sources:

- www.onlinecourses.nptel.ac.in
- <https://khannapublishers.in/index.php?route=product/category&path>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (II Semester)
(w.e.f. session 2022-2023)
DPCH 251: CHEMISTRY-II LAB

Objectives: Students will understand the scientific reasoning, quantitative analysis laboratory practice and safety. They will know the basic analytical and technical skills to work effectively in the various fields of chemistry. The ability to perform accurate quantitative measurements with an understanding of the theory and use of contemporary chemical instrumentation, interpret experimental results, perform calculations on these results and draw reasonable, accurate conclusions.

LIST OF EXPERIMENTS

(20 Sessions)

1. Determination of pH of common substances.
2. Measurement of soil pH (1:5 or 1:2).
3. Preparation of soap.
4. Determination of the strength of ferrous sulphate using standard ferrous ammonium sulphate and potassium dichromate as Intermediate Solution.
5. Determination of acids effect on Metals.
6. Determination of relative viscosity of a given liquid using Ostwald viscometer.
7. Determination of the strength of copper sulphate solution using a standard solution of sodium thio sulphate solution.
8. Extract synthetic coloring agents in food products and identify them by paper chromatography.
9. To identify functional groups in a given organic compound.
10. Determination of temporary and permanent hardness of water sample.

Course Outcomes:

Students completing this course will able to:

CO1: Understand about the standard solution, carrying out simple qualitative tests and of defining the optimal conditions for a reaction to proceed.

CO2: Volumetric quantitative determinations, preparations and standard analysis procedures.

Suggested Readings:

1. D.A. Skoog, Principles of Instrumental Analysis: Sundars College Publicing.
2. Modern Methods of Chemical Analysis: R.L. Pecsok: John Willey New York.
3. Experiments in Physical Chemistry - J.C. Ghose, Bharti Bhawan.

Website Sources:

- <https://www.labster.com/chemistry-virtual-labs/>
- <https://digitalllearning.ucf.edu/ilab/remote-labs/college-of-sciences-remote-labresources/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - I Year (II Semester)
(w.e.f. session 2022-2023)
DPPH-251: PHYSICS LAB-II

Objective: This course aim is to give exposure to the students about the experiments so that students will get a better understanding of the concepts studied by them in the theory course and can correlate with experimental observations.

LIST OF EXPERIMENTS

(20 Sessions)

1. To determine and verify the time period of cantilever by drawing graph between load and depression
2. To determine the magnifying power of a compound microscope
3. To determine the magnifying power of an astronomical telescope
4. To verify Ohm's law
5. To verify law of resistances in series
6. To verify law of resistances in parallel
7. To convert a galvanometer into an ammeter of given range
8. To convert a galvanometer into a voltmeter of a given range

Course Outcomes:

Students completing this course will be able to:

CO1: Evaluate time period of cantilever

CO2: Determine magnifying power

CO3: Verify law of resistances

CO4: Apply the mathematical concepts/equations to obtain quantitative results.

CO5: Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

Suggested Readings:

1. Concept of Physics Prof. H.C. Verma, Part-1 (Bharti Bhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (Bharti Bhawan)
3. A Text Book of Applied Physics: Eagle Prakashan, Jullandhar

Website sources:

- <https://www.learnbse.in>
- <http://notesforfree.com>
- <https://www.cmi.ac.in>
- <http://amrita.olabs.edu.in>
- <http://sisphysics.weebly.com>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEE 301: ELEMENTARY DIGITAL ELECTRONICS

Objective: Learn and understand the basics of digital electronics, Boolean algebra, and able to design the simple logic circuits and test/verify the functionality of the logic circuits.

UNIT I **(10 Sessions)**

Digital system and binary numbers: Introduction to analog and digital systems and signals, number system (binary, decimal, octal, hexadecimal), conversions from one number system to another, complements (1's complement, 2's complement 9's complement and 10's complement), binary addition and subtraction (subtraction using 1's complement method and 2's complement method), signed binary numbers, representation of negative numbers using 1's complement and 2's complement method, BCD code, Excess-3 code, Gray code, ASCII code.

UNIT II **(08 Sessions)**

Logic Gates: Introduction to logic gates, AND gate, OR gate, NOT gate, universal gates (NAND and NOR), EX-OR, and EX-NOR gate, Boolean Relations and their applications, DeMorgan's Theorems, Canonical form representations, karnaugh map (k-map) upto 4 variables.

UNIT III **(08 Sessions)**

Combinational Logic: Basic of Combinational circuits, design of combinational circuits, half adder, full adder, half subtractor, full subtractor, decimal adder, binary magnitude comparator (upto 2 bit), multiplexer (2-to-1 multiplexer, 4-to1 multiplexer), demultiplexer (1-to-2 demultiplexer, 1-to-4 demultiplexer), encoder and decoder, Display Devices (LED, LCD and 7-segment display).

UNIT IV **(08 Sessions)**

Sequential Circuits: Flip-flops (RS flip flop, JK flip flop, D flip flop and T flip flop), various types of registers and counters and design.

UNIT V **(06 Sessions)**

Memory: Introduction of memory, basic memory operation, classification of memory, RAM, ROM, Masked ROM, PROM, EPROM, EEPROM.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand number representation and conversion between different representations in digital electronic circuits.

CO2: Distinguish between analog and digital systems. Learn to simplify the digital circuits by applying Boolean laws and K-map.

CO3: Analyze, design and implement combinational logic circuits.

CO4: Analyze, design and implement sequential logic circuits.

CO5: Understand the characteristics of memory and their classification.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	1	1	3	2	1
CO2	3	2	2	1	1	3	2	1

C03	3	2	2	1	1	3	2	1
C04	3	1	1	1	2	2	3	2
C05	3	1	1	1	2	2	3	2

Suggested Readings:

1. Mano, M.M.: Switching Circuit & Logic Design, Wiley.
2. Jain, R.P.: Modern Digital Electronics, Tata McGraw Hill.
3. Donald, P.L., Malvino, A.P., and Saha, G.: Digital Principles and Applications, Tata McGraw Hill.
4. Ronald J.T., Neal S. W., and Gregory L.M.: Digital Systems Principles and Applications, Pearson Publication.

Website Sources:

- <https://nptel.ac.in/courses/108/105/108105132/>
- https://en.wikipedia.org/wiki/Digital_electronics
- <http://www.asic-world.com/digital/index.html>
- <https://www.electrical4u.com/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEE 302: BASIC NETWORK SYSTEMS

Objective: The objective of this course is to make the students capable of analyzing any given electrical network. To make the students learn how to synthesize an electrical network from a given impedance/admittance function.

UNIT I **(08 Sessions)**
 Signals and its types, Linear & Nonlinear Networks, Basic Circuit Elements (e.g. Resistors, Capacitors, Inductors.), Series combination of resistances, inductances and capacitances, Parallel combination of resistances, inductances and capacitances, Simple numerical problems.

UNIT II **(08 Sessions)**
Basic Network Circuit and Theorems: Classification of Networks, Kirchhoff Voltage Law, Kirchhoff Current Law, Source Conversion (V–I, I–V), Superposition Theorem, Thevenin’s Theorem, Norton’s Theorem, Maximum Power Transfer Theorem, Delta & Star Networks, Delta to Star & Star to Delta Transformation, Nodal Analysis, Mesh Analysis, Simple Numerical Problems.

UNIT III **(10 Sessions)**
Introduction to AC Network Concepts: A.C. Fundamentals- Alternating voltage and current, variables relating to alternating quantities, AC through pure resistance, inductance and capacitance, Energy stored in a inductance, and Energy stored in a capacitance, Simple numerical problems.

UNIT IV **(07 Sessions)**
Introduction to RL, RC and RLC Circuits: Series circuit, Parallel circuit, Series-parallel circuit, Conditions of Resonance, Simple numerical problems.

UNIT V **(07 Sessions)**
Introduction to Laplace Transforms: Laplace transformations to some basic functions, Partial fraction expansion method, Application of Laplace transformation in Electric circuits, Concepts of Poles and Zeros, Simple numerical problems.

Course Outcomes:

Students completing this course will be able to-

CO1: Recognize various types of electrical signals, basic knowledge of Capacitor, Resistor and Inductor.

CO2: Analyze the circuit using Kirchhoff’s law and Network simplification theorems. Obtain the maximum power transfer to the load and simplify the network using reduction techniques

CO3: Read and Draw electrical phasor diagrams, study behavior of Capacitance and Inductance in AC circuits.

CO4: Analyze the series resonant and parallel resonant circuit.

CO5: Evaluate transient response, Steady state response, network functions.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	2	1	1	1
CO2	3	3	2	3	2	1	1	1
CO3	2	2	2	3	2	1	1	1
CO4	2	2	1	2	3	1	2	2
CO5	2	2	1	2	3	1	2	2

Suggested Readings:

1. Hayt W. H., Kemmerly J. E. and Durbin S. M., “Engineering Circuit Analysis”, 6th Ed., Tata McGraw-Hill Publishing Company Ltd.,2008.
2. Network Systems - D. Roy Chaudhary.
3. An introduction to Network Systems - A.K.Chakraborty

Website Sources:

- <https://nptel.ac.in/courses/108/105/108105159/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)

DPEE 303: INTRODUCTION TO POWER ELECTRONICS

Objective: The objective is to understand and acquire knowledge about various power semiconductor devices. To prepare the students to analyze and design different power converter circuits.

UNIT I **(08 Sessions)**

Introduction to SCR: Construction and working principle of an SCR, Characteristics of SCR, Construction and working principle of DIAC, TRIAC, UJT and MOSFET, Triggering circuits of Thyristor, Commutation of Thyristor, Series and Parallel operation of Thyristors.

UNIT II **(09 Sessions)**

Controlled Rectifiers: Introduction to Rectifiers and its applications, Single phase half wave-controlled rectifier with R-L load, Single phase full wave-controlled rectifier with R-L load, fully controlled full wave rectifier, 3-phase full wave half-controlled bridge rectifier, 3-phase full wave fully controlled bridge rectifier, Dual converters.

UNIT III **(07 Sessions)**

Choppers: Introduction to Choppers and their working principles & applications, Time Ratio Control, Types of Choppers: Type-A, Type-B, Type-C and Type-D, Thyristor chopper circuit: Voltage-commutated chopper, Current-commutated chopper, Load-commutated chopper.

UNIT IV **(07 Sessions)**

Inverters: Introduction, applications, Single-phase voltage source inverter, Three-phase bridge inverter, Pulse-width modulated inverter, Voltage source inverter, Current source inverter, Series inverters, Parallel inverters.

UNIT V **(09 Sessions)**

Cycloconverters: Introduction to cycloconverters, working principle and applications, 1- phase step up & step down cycloconverters, 3-phase to 1-phase cycloconverters, 3- phase to 3-phase cycloconverters.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the fundamental concepts & working of SCR, DIAC & TRIAC.

CO2: Understand the concepts & working of Controlled Rectifiers and their applications.

CO3: Understand the concepts & working of types of Choppers.

CO4: Understand the concepts of Inverters & its types

CO5: Understand the concepts of Cycloconverters, their working and applications.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	1	3	2	1	1	1
CO2	2	2	1	1	2	1	1	1
CO3	3	3	2	2	2	1	1	1
CO4	2	3	1	2	3	1	2	2
CO5	3	2	2	2	3	1	2	2

Suggested Readings:

1. Introduction to Power Electronics- Dr. P. S. Bhimbra, Khanna Publishers.
2. Power Electronics- M. S. Jamil Asghar, PHI Pvt. Ltd.
3. Power Electronics- P. C. Sen, McGraw Hill Education.

Website Sources:

- <https://nptel.ac.in/courses/108/102/108102145/>
- <https://nptel.ac.in/courses/108/105/108105066/>
- https://onlinecourses.nptel.ac.in/noc20_ee97/preview

IFTM UNIVERSITY, MORADABAD
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Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)

DPEE 304: ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS-I

Objective: To introduce students to monitor, analyze and control any physical system. To understand students how different types of meters work and their construction. To enhance the knowledge of students by designing and create novel products and solutions for real life problems. To introduce students a knowledge to use modern tools necessary for electrical projects.

UNIT I

(08 Sessions)

Philosophy of Measurement: Dimensions & Standards:-Scientific Notations, Elect. Units-C.G.S & MKS systems, The practical units, MKS system , S.I system, Dimensions & standards of measurement- International standards ,Primary standards, Secondary standards and Working standards, Measurement of Errors.

UNIT II

(08 Sessions)

Basic Concept of Measuring Instruments: Analog Measuring Instruments- Classifications, Types of Torques- deflecting torque, controlling torque and damping torque, Galvanometers, Ammeters and Voltmeters- Moving iron, Moving coil (PMMC & dynamometer), Electrostatic & induction type, Range extension of Indicating instruments using shunts and Multipliers, Instruments Transformers.

UNIT III

(08 Sessions)

Measurement of Resistance: Classifications– low, medium and high resistances, Measurement of low resistance- Kelvin’s Double bridge, Measurement of medium resistance- Wheat-stone’s bridge, Measurement of high resistance- Guard wire method and Megger.

UNIT IV

(08 Sessions)

Measurement of Resistance: Classifications –low, medium and high resistances, Measurement of low resistance-Kelvin’s Double bridge, Measurement of medium resistance –Wheat-stone’s bridge, Measurement of high resistance –Guard wire method and Megger

UNIT V

(08 Sessions)

Potentiometric Measurements and Testing of Cables: Simple D.C. Potentiometers, Crompton Potentiometer, Applications of potentiometer for the measurement of current voltage and resistance, Testing of Cables: Methods of locating the faults in cables– Murray loop test and Varley loop test.

Course Outcomes:

Students completing this course will be able to:

CO1: Comprehend the basics of electrical measurements.

CO2: Understand basic principle, working, characteristics and applications of the various measuring Instruments.

CO3: Understand the measurement of power in a single phase and three phase A.C. circuit

CO4: Understand & measure resistance for AC bridges for measurement of electrical parameters like resistance.

CO5: Ability to use various Potentiometers and to test the cables.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	2	1	1	1
CO2	3	1	2	1	2	1	1	1
CO3	2	2	1	2	2	1	1	1
CO4	2	1	2	2	3	1	2	2
CO5	1	2	1	2	3	1	2	2

Suggested Readings:

1. G.K. Banerjee, "Electrical & Electronic Measurement", PHI Learning. India
2. A.K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India.
3. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler & Co. Pvt. Ltd.
4. M.B. Stout, "Basic Electrical Measurement" Prentice hall of India, India.
5. Electrical Measurements by Buckingham and Price, Prentice Hall
6. D.V.S Murthy, "Transducers and Instrumentation", Prentice Hall of India, 2nd edition, 2009.
7. A.S Morris, "Principles of Measurement and Instrumentation", Pearson/Prentice Hall of India, 2nd edition, 1994.
8. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw-Hill Edition, 1995, 1st Edition, 1995.

Website Sources:

- <https://www.m-tutor.com/login.php>
- <https://nptel.ac.in/courses/108/108/108108076/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)

DPEE 305: TRANSMISSION & DISTRIBUTION OF ELECTRICAL POWER

Objective:

- To obtain the equivalent circuits of the transmission lines for determining voltage regulation and efficiency.
- To gain knowledge on the design of insulators & their performance.
- To discuss about different types of cables.
- To impart knowledge on various types of distributor and calculate the voltage drops in distributors.
- To understand and estimation of transmission line parameters.

UNIT I

(08 Sessions)

Introduction- Energy Consumption, Production of Electric Power, Delivery System (Different Types of Delivery System and Comparison), Single Line Diagram of Power System, Brief Description of Power System Elements (Synchronous Machine, Transformer, Transmission Line, Busbar, Circuit Breaker and Isolator) Units and Power in Alternating System (Pure Resistive Network, Pure Inductive Network, Pure Capacitive Network).

UNIT II

(08 Sessions)

Transmission of Electrical Power- Configuration of Transmission Line, Types of Conductors, Resistance of Line, Skin Effect, Kelvin's Law, Proximity Effect, Power Cables (Construction, Current Rating, Thermal Breakdown, Oil Filled Cables, Gas Filled Cables, Cross Linked Polyethylene Cables, Power Cables Installation).

UNIT III

(08 Sessions)

D.C. & A.C. Distribution Systems- Types of D.C. Distributions, Distributors Fed at One End & at Both Ends, 3-Wire D.C Systems, A.C. Distribution Calculations, Methods of Solving A.C. Distribution Problems (No Numerical Problems).

Power Factor- Concept of power factor, Reasons and disadvantages of low power factor, Methods for improvement of power factor using capacitor banks, Static VAR Compensator (SVC).

UNIT-IV

(08 Sessions)

Mechanical Design of Transmission Line- Sag & Tension, Calculation of Sag Using Centenary Method, Effects Of Wind & Ice Loading, Sag Template, Vibration Dampers, ACSR Conductors (No Numericals).

Electrical Design of Transmission Lines- Design Consideration of EHV Transmission Lines, Choice of Voltage, Number of Circuits, Conductor Configuration, Design of Insulation, Necessity of Neutral Grounding, Various Methods of Neutral Grounding (No Numericals).

UNIT-V

(08 Sessions)

Substations: Brief Idea of Substations; Out Door Grid Sub-Station 220/132 KV, 66/33 KV Outdoor Substations, Pole Mounted Substations and Indoor Substation, Layout of 33/11 KV & 220/33KV Distribution Substation.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the basics of electrical power system such as layout of power system, power system elements, transmission lines and circuit breakers.

CO2: Understand the concept of electric power transmission, types of transmission and cables used in transmission of electric power system.

CO3: Understand the distribution using DC & AC distribution system. Also understand the basics of power system and its improvement techniques.

CO4: Understand the mechanical and electrical design of transmission lines.

CO5: Understand the working and types of substations.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	3	2	1	1	1
CO2	3	1	2	1	2	1	1	1
CO3	2	2	1	2	2	1	1	1
CO4	2	1	2	2	3	1	2	2
CO5	1	2	1	2	3	1	2	2

Suggested Readings:

1. Wadhwa,C.L.,'Electrical power systems', New age International Pvt Ltd.publishers,1995.
 2. Gupta B.R.,' Power system Analysis & Design', Wheeler Publishing, 2006.
 3. Cotton,H.,'Transmission and distribution of electrical Energy', ELBS,1985.
 4. Chakrabarti ,P. V. Gupta , Soni M, Text Book on 'Power System Engineering', Wheeler Publishing .2009.
 5. V.K. Mehta, Rohit Mehta, 'Principles of power system' Chand publications, 4th Edition.
- ONLINE RESOURCES: 1.
6. Deepak. S .Bankar , 'Elements of Power System' , TECH-NEO PUBLICATIONS
 7. Ashfaq Hussain , 'Electrical Power Systems' Dhanpat Rai & co.

Website Sources:

- <http://www.worldcat.org/title/transmission-and-distribution-of-electrical-energy-revised-edition/oclc/477100844?referer=di&ht=edition>.
- <http://www.home.iitk.ac.in/Padiyar.pdf>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEE 351: DIGITAL ELECTRONICS LAB

Objective: The objective of this lab is to familiarize with the functions of basic logic gates and to acquire the basic knowledge about the conversion of one number system to verify the truth table of gates on experiment kit or breadboard.

LIST OF EXPERIMENTS:

1. To study digital ICs and their nomenclature.
2. To study and verify the truth table of basic logic gates (OR, AND, and NOT).
3. To study and verify the truth table of universal gates (NAND, NOR) and EX-OR gate.
4. To study and verify the SOP.
5. To study and verify POS.
6. To construct the half adder circuit using EX-OR and AND gate and verify its operation.
7. To construct the half subtractor circuit using EX-OR, NOT and AND gate and verify its operation.
8. Implementation of 4x1 multiplexer using logic gates.
9. To convert gray code to binary code.
10. To convert binary code to gray code.

Course Outcomes:

Students completing this course will be able to:

CO1: Develop practical knowledge about theories of digital IC's

CO2: Analyses and verifies the Truth Table of various IC's.

CO3: Analyze and implement different combinational circuit.

CO4: Simplify the digital circuits.

CO5: Understand practical knowledge about number system conversion.

Suggested Reading:

1. M. Morris Mano, Hill & Peterson, "Switching Circuit & Logic Design", Wiley
2. R.P Jain, "Modern Digital Electronics", TMH.

Website Sources:

- en.wikipedia.org
- onlinecourses.nptel.ac.in
- www.vlab.co.in

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEE 352: NETWORK SYSTEMS LAB

Objective:

- To make the students capable of analyzing implementation and verification KVL and KCL of any electrical network.
- To make the students learn how to verify mesh and node network.
- To make the students learn how to Norton's, Thevenin's and Maximum Power Transfer Theorem, superposition theorem.
- To make the students capable of frequency response of a parallel/series R-L-C Circuit and determine resonance frequency.

List of Experiments

1. Implementation and verification of KVL.
2. Implementation and verification of KCL.
3. To verify superposition theorem.
4. To verify Norton's Theorem.
5. To verify Thevenin's Theorem.
6. To verify Maximum power transfer theorem.
7. To determine power and power factor of RLC series circuit.
8. To study frequency response of series R-L-C circuit and determine resonance frequency.
9. To study frequency response of a parallel R-L-C Circuit and determine resonance frequency.
10. To study star-delta transformation.

Course Outcomes:

Students completing this course will be able to:

CO1: Apply the knowledge to verify KVL & KCL.

CO2: Analyze the circuit using Superposition and Network simplification theorems.

CO3: Obtain the maximum power transfer to the load, and analyze the series resonant and parallel resonant circuit.

CO4: Understand working of RLC circuits

CO5: Apply the knowledge to verify Y- Δ and Δ -Y (star to delta and delta to star) conversion and simplify the network.

Suggested Readings:

1. A Chakraborty "Network Analysis and Synthesis", Dhanpat Rai & Co.
2. D. Roy Chaudhary, "Networks and Systems"- New age publications.
3. K M Soni, "Network analysis and synthesis"- Katson publication.
4. Valkenberg V., "Network Analysis", 3rd Ed., Prentice Hall International Edition. 2007.
5. Valkenberg V., "Network Synthesis.
6. Kuo F. F., "Network Analysis and Synthesis", 2nd Ed., Wiley India. 2008.

Website Sources:

- en.wikipedia.org
- onlinecourses.nptel.ac.in
- ndl.iitkgp.ac.in
- www.tutorialspoint.com
- www.vlab.co.in

IFTM UNIVERSITY, MORADABAD
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(w.e.f. session 2022-2023)
DPEE 353: POWER ELECTRONICS LAB

Objective:

- To learn how to visualize and work on laboratory and multidisciplinary tasks.
- To introduce students to different aspects of power plant engineering.
- To familiarize the students to the working of power plants based on different fuels.

List of Experiments:

1. Study of V-I Characteristics of SCR.
2. Study of Power Transistor as a Switch.
3. Study of SCR as a Switch.
4. Testing of Half Wave rectifier circuit.
5. Testing of Full Wave Centre Tapped rectifier circuit
6. Testing of Full Wave Bridge rectifier circuit
7. Study of Power control by using DIAC.
8. Study of Power control by using TRIAC.
9. Study of R-C firing circuit of SCR.
10. Study of UJT firing Circuit of SCR.

Course Outcomes:

Students completing this course will be able to:

CO1: Understanding the theory & circuit representation of thyristor- SCR.

CO2: Understanding the theory & circuit representation of Rectifier Circuit.

CO3: Analyze the power control by using DIAC and TRIAC.

CO4: Create the circuit for TRIAC and observe the waves shapes and voltages at relevant points

CO5: Demonstrate firing circuits of UJT & SCR.

Suggested Readings:

1. Power Plant Engineering- Soni Gupta Bhatnagar
2. Power Plant Engineering- R. K. Rajpoot
3. Power Plant Engineering- B.R. Gupta

Website Sources:

- <https://nptel.ac.in/courses/108/108/108108078/>
- <https://nptel.ac.in/courses/108/105/108105058/>
- <https://nptel.ac.in/courses/108/102/108102047/>

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Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEE 354: ELECTRICAL MEASUREMENT-I LAB

Objective:

- To learn how to visualize and work on laboratory and multidisciplinary tasks.
- To demonstrate various bridges & sensors using simulation and hardware setups.
- To Measure Voltage, Current, Power factor, Power, Energy.

List of Experiments:

1. To study the construction of a permanent magnet moving instrument.
2. To calibrate an ammeter with the help of a standard ammeter.
3. To calibrate a voltmeter with the help of a standard voltmeter.
4. To study the construction of a dynamometer wattmeter
5. To calibrate a wattmeter with the help a standard wattmeter.
6. To measure an unknown resistance using ammeter-voltmeter method.
7. To measure power and power factor in a load using ammeter-voltmeter and wattmeter.
8. To measure resistance using Wheatstone bridge.
9. To study Megger and measure insulation resistance using it.
10. To measure low resistance using Kelvin's double bridge.

Course outcome:

Students completing this course will be able to:

CO1: Understand the use of Magnetic Circuits.

CO2: Measurement uses PMMC and Moving Iron type Instruments.

CO3: Measurement of R, L, C, Voltage, Current, Power factor, Power, Energy.

CO4: Ability to balance AC bridges to find unknown values.

CO5: Have knowledge to demonstrate the designing and conducting experiments, to analyze and interpret data.

Suggested Reading:

1. G.K. Banerjee, "Electrical & Electronic Measurement", PHI Learning . India
2. A.K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India.
3. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler & Co. Pvt. Ltd.
4. M.B. Stout, "Basic Electrical Measurement" Prentice hall of India, India.
5. Electrical Measurements by Buckingham and Price, PrenticeHall
6. D.V.S Murthy, "Transducers and Instrumentation", Prentice Hall of India, 2nd edition, 2009.
7. A.S Morris, "Principles of Measurement and Instrumentation", Pearson/Prentice Hall of India, 2nd edition, 1994.
8. H.S. Kalsi, "Electronic Instrumentation", Tata McGraw-Hill Edition, 1995, 1st Edition, 1995.

Website source:

- <https://www.m-tutor.com/login.php>
- <https://nptel.ac.in/courses/108/108/108108076/>

IFTM UNIVERSITY, MORADABAD
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Diploma (EE) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEE 401: ELECTRICAL MACHINE-I

Objective: Electrical machines course is one of the important courses of the Electrical discipline. In this course the different types of transformers, DC generators and motors which are widely used in industry are covered and their performance aspects will be studied.

UNIT I **(06 Sessions)**

D.C. Machines: Principle of Electromechanical Energy Conversion, Construction of D.C. Machines- Field Magnet, Armatures, Windings, Commutator & Brush Gear, Action of Commutator, E.M.F. Equation, Armature Reaction.

UNIT II **(10 Sessions)**

D.C. Generator: Constructional Details & Working Principle of D.C. Generators, Types of D.C. Generators- Separately Excited D.C. Generators, Self Excited D.C. Generator- Series, Shunt & Compound Generator, Cumulatively Compounded and Differentially Compounded D.C. Generator, Condition for Self Excitation, Characteristics of D.C. Generator, Operation of D.C Generator in Series and Parallel, Application of D.C. generator, Losses and efficiency of D.C. generator.

UNIT III **(08 Sessions)**

D.C. Motors: Back E. M. F., Speed of D.C. Motor, Torque Equation, Types of D.C. Motors- Series, Shunt & Compound D.C. Motors, Cumulatively Compounded and Differentially Compounded D.C. Motor, Characteristics of D.C. Motor, Speed Control of D.C. Motor- Armature Control & Field Control Method, Losses & Efficiency, Testing of D.C. Machines- Direct & Indirect Method (Brake Test & Swinburne's Test), Electric Braking of D.C. motors.

UNIT IV **(08 Sessions)**

Transformer: Constructional Details, Types of Transformers, Ratio of Transformation, Primary No Load Current, Mutual and leakage fluxes, leakage reactance, Phasor Diagram on No Load & Load, Equivalent Circuit, Equivalent Resistance & Reactance, Open circuit and short circuit test, Losses & Efficiency Condition for Maximum Efficiency, Commercial Efficiency & All Day Efficiency, Voltage Regulation.

UNIT V **(08 Sessions)**

Transformer (Continued): Division of Load Between Two Transformers In Parallel, Auto Transformer- construction, working and application, Three Phase Transformer, Construction of three phase transformers, Three Phase Transformer Connections, Maintenance of Transformer, Cooling of transformer.

Course Outcomes:

Students completing this course will be able to:

CO1: Acquire knowledge about the fundamental principles and classification of DC Machine.

CO2: Acquire knowledge about the constructional details and principle of operation of DC Generator.

CO3: Acquire knowledge about the working of DC machines and motors.

CO4: Acquire knowledge about constructional details, working, testing, voltage regulation and calculation of losses and efficiency of transformer.

CO5: Acquire knowledge about the constructional details of three-phase transformers, parallel operation of two transformers.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	2	3	1	1	1	1
CO2	2	2	2	1	2	1	1	1
CO3	3	2	1	2	2	1	1	1
CO4	1	2	2	2	2	1	2	2
CO5	2	3	1	2	1	1	2	2

Suggested Readings:

1. Bhimbra, P.S.: Electrical Machines, Khanna publishers.
2. Clayton & Hancock: Performance and Design of DC Machines, BPB Publishers.
3. Kothari, D.P., and Nagarth, I.J.: Electrical Machines, Tata McGraw Hill.
4. Husain, A.: Electric Machines, Dhanpat Rai & Co.

Website Sources:

- <https://nptel.ac.in/courses/108/105/108105155/>
- https://en.wikipedia.org/wiki/Electric_machine

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DPEE 402: ELECTRICAL DESIGN DRAWING & ESTIMATING-I

Objective: The objective of this course is to read, understand and interpret electrical engineering drawings. Communicate and correlate through sketches and drawings. Prepare working drawings of electrical circuits, motor control, earthing and motor parts.

UNIT I **(08 Sessions)**

Electrical Symbols & Diagrams: List of Symbols for Electrical Equipments & Accessories Used in Electrical Lighting, Fan & Power Circuits, Alarm & Indicating Circuit, Contactor Control Circuits as per I.S.S., Type of Diagrams- Wiring Diagrams (Multiple & Single Line Representation) & Schematic Diagrams as per I.S.S.

UNIT II **(08 Sessions)**

Wiring Materials & Accessories: Brief Description, General Specifications as per I.S.S. & Approximate Cost of Different Types of Wires, Switches, Distribution Boards, Switchboards, Junction Boxes, Batten & its Accessories, Conduit & its Accessories, Lamp Holders, Socket Outlets, Plugs, Ceiling Roses & Fuses. Energy Meters used in Domestic & Power Wiring Installations, Brief Description & Specifications. Approximate Cost of Switches Push Buttons, Bells, Indicating Lights, Indicating Panels, Relays etc used in Alarm Circuits, Study of Materials & Accessories in Workshop.

UNIT III **(08 Sessions)**

Light & Fan Circuits: Schematic Wiring Diagrams (Multiple & Single Line Both) using Junction Boxes & Looping Systems for Following Types of Circuits: Lights & Fans Controlled by Necessary Switches & Regulators, Stair Case Wiring, Corridor Lighting. One Lamp Controlled by Three or More Switches.

UNIT IV **(08 Sessions)**

Alarm Circuits: Reading, Designing & Drawing Schematic & Wiring Diagrams of following Alarm Circuits: Circuits Meant to Convey Information by Means of Light Only – By Means of Bell Signals Only, Bell Respond Circuit Using One Bell & Relay. Bell Respond Circuit of an Office or Three Rooms. Circuits Meant to Convey Information by Means of Bell & Light Both for Call Signals. Circuits Meant to Convey Information by Means of Bell & Light to Give ‘Stop’ & ‘Go’ Signals. Traffic Control Light System for two Road Crossing. Light Circuit that gets Connected Automatically to DC Supply in case of Power Failure.

UNIT V **(08 Sessions)**

Design and Drawing of Panel Boards: Introduction, Design consideration, Standard Sizes of boards. Some Examples: Design and Drawing a panel board to contain two switches and one fan regulator for concealed conduit wiring, Design and Drawing a panel board that contains four switches, One 5A socket outlet and one fan regulator.

Course Outcomes:

Students completing this course will be able to:

CO1: Recognize various electrical devices and their symbols, read schematic and wiring diagrams of electrical devices.

CO2: Recognize various types of wiring material and accessories & various types of wiring systems and their use.

CO3: Read and interpret electrical installation plan. Communicate about circuits and devices through sketches and drawings

CO4: Estimate and determine the cost of wiring installation

CO5: Recognize various electrical devices placed on the panels/distribution boards and to design the panels.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	3	2	1	1	1	1
CO2	2	2	1	2	2	1	1	1
CO3	2	3	2	1	2	1	1	2
CO4	2	1	2	2	2	2	2	2
CO5	3	1	2	1	1	2	2	1

Suggested Readings:

1. Electrical Design Drawing & Estimating - T. D. Bisht, Bharat Prakashan, Allahabad.
2. Electrical Estimating & Costing - Surjit Singh (Dhanpat Rai & sons)
3. Electrical Engineering Design and Drawings by Surjeet Singh, Dhanpat Rai and Co, New Delhi
4. Electrical Engineering Design and Drawings by SK Bhattacharya, SK Kataria and Sons, New Delhi.
5. Electrical Engineering Design and Drawings by Ubhi & Marwaha, IPH, New Delhi.
6. Electrical Design and Drawing by SK Sahdev, Uneek Publications, Jalandhar .
7. Electrical Engineering Drawing by Surjit Singh, SK Kataria and Sons, New Delhi

Website Sources:

- <http://swayam.gov.in>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
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(w.e.f. session 2022-2023)
DPEE 403: INTRODUCTION TO MICROPROCESSORS

Objective: To illustrate the architecture of 8085 and 8086 microprocessors. To introduce the programming techniques of 8085 microprocessor. To provide a strong foundation for designing real world applications using microprocessors and microcontrollers. To acquire the basic knowledge of the number system.

UNIT I

(08 Sessions)

Introduction to microprocessor, Evaluation of Microprocessors, Computer Generations, Single-Chip Microcomputers, CPU, Memory, Input & Output Device, Memory: RAM (Static & Dynamic), SDRAM, SGRAM, ROM, PROM, EPROM, EEPROM, Flash Memory, Magnetic Memory.

UNIT II

(08 Sessions)

Introduction to Intel 8085: Architecture of 8085, ALU, Timing and Control Unit, Registers, Data and Address Bus, Pin Configuration, Intel 8085 Instructions, Opcode and Operands, Instruction Word Size. Instruction Cycle: Fetch operation, Execute Operation, Machine Cycle and State, Instruction and Data Flow.

UNIT III

08 Sessions)

Instruction Set of Intel 8085: Instruction and Data Formats, Addressing Modes: Direct Addressing, Register Addressing, Register Indirect Addressing, Immediate Addressing and Implicit Addressing. Intel 8085 Instructions: Data Transfer Group, Arithmetic Group, Logical Group, Branch Group, Stack, I/O and Machine Control Group.

UNIT IV

(08 Sessions)

Programming of Microprocessor: Assembly Language, Low-Level Language, High-Level Language, Area of Application of Languages, Interpreter, Assembler & Compiler, Addition of two 8-bit numbers using Intel 8058, Subtraction of two 8-bit numbers using Intel 8058.

UNIT V

(08 Sessions)

Introduction to Intel 8086, Architecture of 8086, Memory Segmentation, Applications of Microprocessors in Electrical Engineering

Course Outcomes:

Students completing this course will be able to:

CO1: Understand basic concept of digital fundamentals to Microprocessor based personal computer system & understands the characteristics and classification of memory.

CO2: Assess and solve basic binary math operations using the microprocessor and explain the 8085 microprocessor's internal architecture and its operation within the area of manufacturing and performance.

CO3: Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the 8085 microprocessor.

CO4: Analyze assembly language programs.

CO5: Understand the 8086 microprocessor's internal architecture and applications of microprocessor in electrical engineering.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	3	2	1	2	1	1	1
CO2	2	1	2	2	2	2	1	1
CO3	2	2	3	2	1	2	1	2
CO4	2	2	1	2	2	1	2	2
CO5	3	2	1	1	1	1	2	1

Suggested Readings:

1. Introduction to Microprocessor – A. P. Mathur (Tata Mcgraw Hill, Delhi)
2. Fundamentals of Microprocessors & Microcomputers – S. Gaonkar
3. Microprocessor – Rafiqzaman (Prentice Hall of India, Delhi)

Website Sources:

- <https://nptel.ac.in/courses/108/103/108103157/>
- <https://nptel.ac.in/courses/108/105/108105102/>
- <https://nptel.ac.in/courses/108/107/108107029/>
- <https://nptel.ac.in/courses/106/108/106108100/>

IFTM UNIVERSITY, MORADABAD
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(w.e.f. session 2022-2023)

DPEE 404: ELECTRICAL MEASUREMENTS & MEASURING INSTRUMENTS-II

Objective: To introduce students to monitor, analyze and control any physical system. To understand students how different types of meters work and their construction. To provide a student a knowledge to design and create novel products and solutions for real life problems. To introduce students a knowledge to use modern tools necessary for electrical projects.

UNIT- I

(08 Sessions)

Measurement of Energy: Measurement of energy in D.C. circuits using Electrolytic meters, Measurement of energy in A.C. circuits using Motor meters – Errors in motor meters, Single phase induction type energy meters-principle of operation, Errors in Energy meters and their compensation Testing of energy meters, Principle of operation of Clock meters.

UNIT- II

(08 Sessions)

Instrument Transformers: Current Transformers (C.T.) and Potential Transformers (P.T.), Errors in current transformers and Potential Transformers-Ratio error and phase angle error (No Derivations) Connections of C.T. and P.T. in circuits Measurement of power using C.T. and P.T. (No numerical problems).

UNIT- III

(08 Sessions)

A.C. Bridges: Measurement of self -inductance-Maxwell's Inductance Bridge, Maxwell's capacitance Bridge, Hay's Bridge, Anderson's Bridge, Measurement of capacitance – De Sauty's Bridge, Wein's Bridge, Schering Bridge, Apparatus used in conjunction with A.C. Bridge, (No numerical problems).

UNIT- IV

(08 Sessions)

Cathode Ray Oscilloscope: Basic block diagram of a Cathode Ray Oscilloscope, Signal display on Oscilloscope, Display subsystems, Electrostatic focusing, and Electrostatic deflection, Oscilloscope controls, Measurement of voltage current and frequency using Oscilloscope. (No numerical problems).

UNIT- V

(08 Sessions)

Measurement of Non-Electrical Quantities: Transducers-Measurement of strain using Strain gauge, Gauge factor, Displacement transducers-Capacitive transducer, Inductive transducer, L.V.D.T., Potentiometric transducer, Piezoelectric transducer, Measurement of temperature using RTD, Thermocouples, Thermistors (No numerical problems).

Course Outcomes:

Students completing this course will be able to:

CO1: Measurement of energy in D.C. and A.C. circuits using meters, principle of operation of energy meters, errors and testing of Energy meters.

CO2: To understand instrument transformers, measurement of power using current and potential transformers.

CO3: Measurement of inductance and capacitance using A.C. bridges.

CO4: Analyze frequency, phase with an oscilloscope.

CO5: Analyze & measure strain, displacement, temperature, Pressure etc.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	2	1	1	1	2	1
CO2	1	2	2	2	1	2	2	1
CO3	2	2	3	2	1	2	1	2
CO4	2	2	1	1	2	2	2	2
CO5	1	1	2	1	2	3	1	1

Suggested Readings:

1. G.K. Banerjee, "Electrical & Electronic Measurement", PHI Learning. India
2. A.K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India.
3. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler & Co. Pvt. Ltd.
4. M.B. Stout, "Basic Electrical Measurement" Prentice hall of India, India.
5. Electrical Measurements by Buckingham and Price, PrenticeHall
6. D.V.S Murthy, "Transducers and Instrumentation", Prentice Hall of India, 2nd edition, 2009.
7. A.S Morris, "Principles of Measurement and Instrumentation", Pearson/Prentice Hall of India, 2nd edition, 1994.
8. H.S.Kalsi, "Electronic Instrumentation", Tata McGraw-Hill Edition, 1995, 1st Edition, 1995.

Website Sources:

- <https://www.m-tutor.com/login.php>
- <https://nptel.ac.in/courses/108/108/108108076/>

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(w.e.f. session 2022-2023)
DPEE 405: INDUSTRIAL ELECTRONICS & CONTROL

Objective: To make the students understand all the processes involved in the industries, the various unit operations and be able to apply control schemes to these processes to get the output with desired specifications.

UNIT I **(10 Sessions)**

Introduction to Control System: Types of control system, Open loop and closed loop system, Advantages and disadvantages of open loop and closed loop control system, Components of closed loop system, Effects of feedback, Transfer function.

UNIT II **(08 Sessions)**

Thyristor Control of Electric Motors: Speed control of DC shunt motor, Speed control of DC series motor, Speed control of Induction motor by stator voltage control method, Closed-loop speed control system for 3-phase Induction motors.

UNIT III **(06 Sessions)**

Heating Control: Introduction and advantages of electrical heating, Principle of induction heating, Effect of supply frequency and source voltage on induction heating, Applications of induction heating, Principle of dielectric heating, Effect of supply frequency and source voltage on dielectric heating, Applications of dielectric heating, Difference between induction heating and dielectric heating.

UNIT IV **(08 Sessions)**

Welding Control: Theory of resistance welding, Classification of resistance welding, Control in resistance welding.

AC Power Conditioner: Introduction, Power supply noise, Servo System: Servo motor, Servo controlled voltage stabilizer, AC generator voltage regulator, Uninterruptible Power Supply (UPS).

UNIT V **(08 Sessions)**

Programmable Logic Controller: Introduction, Functions of PLC, Application of PLC, Advantages and disadvantages of PLC over conventional relay type of control, Functional block diagram of PLC, Sequence of operations in PLC.

Course Outcomes:

Students completing this course will be able to:

CO1: Get a complete overview of strategies for process control. Know all the industrial processes and demonstrate their knowledge in designing the control loops for these processes.

CO2: Know the applications of DC motors.

CO3: Understand heating schemes for a given applications.

CO4: Understand resistance welding schemes for a given applications and also understands the concept of AC power conditioner.

CO5: Develop knowledge about PLC and their applications in industries.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	2	3	1	2	1	1	1
CO2	2	2	1	2	2	2	1	1
CO3	2	3	2	2	1	2	1	2
CO4	2	1	2	2	2	1	2	2
CO5	1	2	1	3	1	1	2	1

Suggested Readings:

1. Bhattacharya, S. and Chatterjee, S.: Industrial Electronics and Control, Tata McGraw Hill.
2. Paul, B.: Industrial Electronics and Control, PHI Learning Pvt. Ltd.
3. Bimbhra, P.S.: Power Electronics, Khanna Publishers.
4. Nagrath, I.J. and Gopal, M.: Control Systems Engineering, New Age International Publishers.

Website Sources:

- <https://nptel.ac.in/courses/108/107/108107128/>
- <https://nptel.ac.in/courses/108/105/108105088/>
- https://en.wikipedia.org/wiki/Power_electronics
- https://www.designingbuildings.co.uk/wiki/Electrical_control_systems

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEE 451: ELECTRICAL MACHINE-I LAB

Objective: To enable, train and evaluate the ability of the students to perform the analysis of any electromechanical system. To empower students to determine the parameters of DC machines and transformers by performing experiments on these machines. To enable students to identify and solve DC machine and transformer related problems.

List of Experiments:

1. To study and run a D.C. shunt motor.
2. To run a D.C. machine & change its direction of rotation.
3. To control the speed of a D.C. shunt motor using Armature control method.
4. To control the speed of a D.C. shunt motor using field control method.
5. To determine the magnetization characteristics of a D.C. generator.
6. To determine the load characteristics of a D.C. shunt motor.
7. To study and run the DC series motor with starter.
8. To perform brake test on a D.C. machine & determine its efficiency.
9. To study a transformer & determine its transformation ratio.
10. To perform open circuit and short circuit test on a transformer and determine the efficiency.

Course Outcomes:

Students completing this course will be able to:

CO1: Formulate and then analyze the working of any electrical machine using mathematical models under loaded and unloaded conditions.

CO2: Troubleshoot the operation of an electrical machine.

CO3: Conduct testing and experimental procedures on different types of electrical machines.

CO4: Select a suitable measuring instrument for measuring electrical and non electrical quantities for a given application.

CO5: Understand the concepts of performing transformer tests and calculating efficiency.

Suggested Readings:

1. Kothari, D.P. and Umre, B.S.: Laboratory Manual for Electrical Machines, I K International Publishing House Pvt. Ltd.
2. Chaturvedi, D.K.: Electrical Machines Lab Manual with MATLAB Programs, Laxmi Publications.
3. Bhimbra, P.S.: Electrical Machines, Khanna publishers

Website Sources:

- <https://nptel.ac.in/courses/108/105/108105155/>
- https://en.wikipedia.org/wiki/Electric_machine

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEE 452: ELECTRICAL DESIGN DRAWING & ESTIMATING-I LAB

Objective: To acquaint with the fundamental concepts of electrical wiring, their estimation, costing.

List of Experiments:

1. To study types of switches, holders and tools used in common wiring.
2. To study various types of wiring systems such as batten wiring, cleat wiring and conduit wiring.
3. To study joint box system and looping-in system of wiring.
4. To control one light lamp using one single-way switch.
5. To control one light lamp and one fan using two single-way switches.
6. To control one light lamp, one tube light and one fan using three single-way switches.
7. To design staircase wiring system with the help of two 2-way switches.
8. To design connection circuit of a tube light with a choke and a starter.
9. To study the working and connection diagram of a relay.
10. To design a switch board which is having four switches, one 5A socket out let and one fan regulator.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the fundamentals of different electrical wiring.

CO2: Understand the estimating and costing of electrical equipment, contracting procedure in electrical engineering etc.

CO3: Gain practical knowledge of various types of switches working.

CO4: Understand working of relay

CO5: At the closing stage of the course, the students will be able to know the basics of electrical wiring.

Suggested Readings:

1. Electrical Design Drawing & Estimating - T. D. Bisht. , Bharat Prakashan, Allahabad.
2. Electrical Estimating & Costing - Surjit Singh (Dhanpat Rai & sons)
3. Electrical Engineering Design and Drawings by Surjeet Singh, Dhanpat Rai and Co, New Delhi
4. Electrical Engineering Design and Drawings by SK Bhattacharya, SK Kataria and Sons, New Delhi.
5. Electrical Engineering Design and Drawings by Ubhi & Marwaha, IPH, New Delhi.
6. Electrical Design and Drawing by SK Sahdev, Uneek Publications, Jalandhar .
7. Electrical Engineering Drawing by Surjit Singh, SK Kataria and Sons, New Delhi

Website Source:

- <http://swayam.gov.in>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEE 453: MICROPROCESSOR LAB

Objective: To learn how to visualize and work on laboratory and multidisciplinary tasks. To illustrate the architecture of 8085 and 8086 microprocessors. To introduce the programming techniques of 8085 microprocessor. To provide a strong foundation for designing real world applications using microprocessors and microcontrollers.

List of Experiments:

1. To study 8085 microprocessor.
2. To study 8086 microprocessor.
3. To add two 8-bit binary number using 8085 microprocessor.
4. To add two Hexadecimal numbers using 8085 microprocessor.
5. To subtract two 8-bit Hexadecimal number using 8085 microprocessor.
6. To subtract two 8-bit binary number using 8085 microprocessor.
7. To multiply two 8-bit binary number using 8085 microprocessor.
8. To divide two 8-bit binary number using 8085 microprocessor.
9. Write a program to find out the smallest number in an array of data.
10. Write a program to find out the largest number in an array of data.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the concepts of assembly language programming in 8085 and 8086 microprocessors

CO2: Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's internal architecture and its operation within the area of manufacturing and performance.

CO3: Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller.

CO4: Analyze assembly language programs.

CO5: Train their practical knowledge through laboratory experiments.

Suggested Readings:

1. Introduction to Microprocessor – A. P. Mathur (Tata Mcgraw Hill, Delhi)
2. Fundamentals of Microprocessors & Microcomputers – S. Gaonkar
3. Microprocessor – Rafiquzzaman (Prentice Hall of India, Delhi)

Website Sources:

- <https://nptel.ac.in/courses/108/103/108103157/>
- <https://nptel.ac.in/courses/108/105/108105102/>
- <https://nptel.ac.in/courses/108/107/108107029/>
- <https://nptel.ac.in/courses/106/108/106108100/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEE 454: ELECTRICAL MEASUREMENT-II LAB

Objective:

- To learn how to visualize and work on laboratory and multidisciplinary tasks.
- To introduce the basic principles of all measuring instruments.
- To deal with the measurement of voltage, current, power factor, power, energy and magnetic measurements.

List of Experiments:

1. To study the construction of an Induction type energy meter.
2. To calibrate an Induction type energy meter with the help of a standard wattmeter and a stop watch.
3. To measure an unknown inductance using Maxwell's bridge.
4. To measure an unknown inductance using Hay's bridge.
5. To measure an unknown capacitance using Schering bridge.
6. To measure an unknown capacitance using Wien's bridge.
7. To study a Cathode Ray Oscilloscope.
8. To measure phase difference and frequency using a CRO.
9. To study a strain gauge transducer and measuring pressure using it.
10. To study LVDT and measure displacement using it.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand different types of measuring instruments, their construction and operation.

CO2: Identify the instruments suitable for typical measurements.

CO3: Understand detailed study about CRO.

CO4: Understand the different types of transducers and LVDT

CO5: To balance, AC bridges to find unknown values.

Suggested Readings:

1. G.K. Banerjee, "Electrical & Electronic Measurement", PHI Learning. India
2. A.K. Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India.
3. E.W. Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", A.W. Wheeler & Co. Pvt. Ltd.
4. M.B. Stout, "Basic Electrical Measurement" Prentice hall of India, India

Website Sources:

- <https://nptel.ac.in/courses/108/105/108105153/>
- <https://nptel.ac.in/courses/108/106/108106172/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - II Year (IV Semester)
(w.e.f. session 2022-2023)
PSC 401: PROFESSIONAL COMMUNICATION

Course Objectives: The course aims to:

- Enhance the Employability and Career Skills of students.
- Enable the students to communicate confidently and effectively in everyday life.
- Orient the students towards grooming as a professional.
- Make the students Employability Graduates.
- Develop students' confidence and to help them attend interviews successfully.

UNIT I **(08 Sessions)**

Introduction to Soft Skills- Hard Skills v/s Soft Skills, Conversation Skills, Employability and Career Skills, Strategies to improve skills and knowledge at work.

UNIT II **(08 Sessions)**

Self-Introduction- Gathering information, Introducing oneself to the audience, Introducing the topic, Asking and answering questions, Presentation- Practice with audio-visual aids (5 minute).

UNIT III **(08 Sessions)**

Introduction to Group Discussion- Participating in group discussions, Understanding group dynamics, brainstorming the topic, Question-answer session, Group Discussion- Do's and Don'ts and Strategies to participate in GD effectively.

UNIT IV **(08 Sessions)**

Interview Etiquettes- Dressing and Grooming, Body language, Attending job interviews– telephone/Skype interview - one to one interview & panel interview, Frequently asked Questions related to job interviews.

UNIT V **(08 Sessions)**

Groups v/s Teams, Time Management, Stress management, Respecting Social Protocols, Understanding Career Management, Developing a long- term Career Plan.

Course Outcomes:

Students completing this course will be able to:

CO1: Develop adequate Soft Skills required for the workplace and to differentiate between soft and hard skills.

CO2: Create first impression and give presentation effectively.

CO3: Understand group dynamics and to participate confidently in Group Discussions.

CO4: Appear in job interviews and to get success in these.

CO5: Work well with other people in teams or group formally and informally and to communicate confidently and effectively in everyday life.

PO-CO Mapping (Please write 3,2,1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	3	3	3	1	2	2	3
CO2	3	2	3	2	2	3	2	3
CO3	2	3	2	3	2	3	2	1
CO4	2	2	3	3	1	2	2	3
CO5	3	3	2	3	3	2	3	3

Suggested Readings:

- 1- Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015.
- 2- E. Suresh Kumar et al. Communication for Professional Success. Orient Black Swan: Hyderabad, 2015
- 3- Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014.
- 4- S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

Website Sources:

- www.fluenu.com
- www.skilluneeed.com
- www.campus2-corporate.in
- www.thebalancecareers.com
- www.indeed.com

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEE 501: ELECTRICAL MACHINE-II

Objective: To acquire knowledge about the constructional details and principle of operation of three phase and single phase induction motors. To acquire knowledge about the starting and speed control of induction motors. To acquire knowledge about testing and applications of induction motors, working of synchronous machines as generators and motors, testing and applications of synchronous machines.

UNIT I **(06 Sessions)**

Induction Motor: Production of Rotating Magnetic Field in a Three Phase winding, Construction and Working of 3-Phase Induction Motor (Squirrel Cage and Wound Rotor Motor), Rotor Frequency, Rotor E.M.F., Rotor Current and Rotor Power Factor, Torque Equation, Torque-slip Characteristics, Effect of rotor resistance upon the torque slip curve.

UNIT II **(10 Sessions)**

Induction Motor (Cont.): Principle and Methods of Speed Control of 3-Phase Induction Motor, Methods of Starting of 3-Phase Induction Motor (Direct-on-Line, Auto Transformer, Star Delta Starters), Starter for Slip Ring Induction Motor, Double Squirrel Cage Induction Motor, Application of 3-phase Induction Motor, Testing of 3-phase Induction Motor (No-load and Blocked Rotor Test), Losses and Efficiency of 3-phase Induction Motor, Harmonics and its effects, cogging and crawling in Induction Motors, (Simple Problems Only)

UNIT III **(09 Sessions)**

The Alternator: Construction, Working Principle- Stator Windings, Concept of distribution factor and coil span factor, emf equation, Armature reaction at unity, lag and lead power factor, Equivalent circuit diagram of synchronous machine, Determination of Voltage Regulation, Parallel Operation, Necessary Conditions for Successful Parallel Operation, Simple Numerical Problems.

UNIT IV **(09 Sessions)**

Synchronous Motor: Construction, Working Principle, Starting Methods, Effect of Load on Synchronous Motor, Effect of Change in Excitation on the Performance of Synchronous Motor, V-Curves, Torque & Mechanical Power Developed, Condition for Maximum Mechanical Power, Synchronous Condenser, Hunting and its Elimination, Comparison between Induction Motor and Synchronous Motor, Uses of Synchronous Motor, Simple Numerical Problems.

UNIT V **(06 Sessions)**

F.H.P. Motors: Classification of F.H.P. Motors, Construction Working and application of Capacitor Motor (All Types) Shaded Pole Motor -Single Phase Synchronous Motor, Single Phase Series and Universal Motor, Servo Motor.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the production of rotating magnetic field, types of rotor, rotor frequency, E.M.F., torque of three phase induction motor.

CO2: Understand the starting methods, testing, application, losses, efficiency, harmonics, cogging & crawling of three phase induction motor.

CO3: Understand about construction, working principle, armature reaction, voltage regulation, parallel operation of the alternator or synchronous generator.

CO4: Understand about construction, working principle, starting methods, V-curves, synchronous condenser, hunting and application of synchronous motor.

CO5: Understand about the F.H.P. motors, construction working and application of capacitor motor, shaded pole motor, single phase synchronous motor, universal motor and servo motor.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	2	2	1	1	1
CO2	1	2	2	2	2	2	1	1
CO3	2	2	2	3	1	2	1	2
CO4	2	2	2	1	2	1	2	2
CO5	1	1	3	2	1	1	2	1

Suggested Readings:

1. Electrical Machinery - Dr. P.S. Bhimbra
2. Electrical Drives - J.S. Katre
3. Electrical Machines –Ashfaq Hussain

Website Sources:

- <https://nptel.ac.in/courses/108/102/108102146/>
- <https://nptel.ac.in/courses/108/105/108105155/>
- <https://nptel.ac.in/courses/108/105/108105131/>
- <https://nptel.ac.in/courses/108/106/108106023/>
- <https://nptel.ac.in/courses/108/105/108105017/>
- <https://nptel.ac.in/courses/108/106/108106071/>
- <https://nptel.ac.in/courses/108/106/108106072/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)

DPEE 502: ELECTRICAL DESIGN DRAWING & ESTIMATING-II

Objective: The objective of this course is to understand and interpret electrical engineering drawings. Able to understand the sketches and prepare electrical circuits for small residential flats. Able to estimate the cost of service connection and design of small transformer.

UNIT I **(08 Sessions)**

Design Consideration of Electrical Installation: Electrical supply system, three phase four wire system, protection of electrical installation against overload, short circuit and earth fault, Earthing, General requirements of electrical installations, Neutral and earth wire, Types of loads.

UNIT II **(09 Sessions)**

Design Consideration of Electrical Installation (Cont.): System of wiring, Service mains, sub-circuits. Location of outlets, Location of control switches, Location of main board and distribution board. Guidelines for installation of fittings, Load assessments, Permissible voltage drops and sizes of wires, Estimating and costing of electrical installations, Drawings of at least two sheets.

UNIT III **(08 Sessions)**

Electrical Installation for Different Types of Small Residential Flats: Introduction, Installation plan, schematic and wiring diagram, Selecting the number of Sub-circuits and size of wires, Calculation of length of wire required, Estimating the cost of electrical wiring installation for residential buildings. Some solved examples.

Preparation of Tender Documents: Tender- constituents, finalization, specimen tender, Procedure to take financial loans from banks for taking contracts.

UNIT IV **(07 Sessions)**

Estimation of Service Connections: Service connection, types of service connections-overhead and underground for single story and double story buildings, estimate of materials required for giving service connection to domestic consumers, commercial consumers and industrial consumers at L.T. and H.T. costing of material and work in above cases.

UNIT V **(08 Sessions)**

Design of Small Transformer and Chokes: Theory of transformer design, Design of small transformer, Making of small transformer, Design of chokes, Schematic and wiring diagrams of three phase Induction Motor control circuits.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand various type of electrical supply system and different methods of wiring protection

CO2: Understand general guidelines, methods and procedure of electrical wiring

CO3: Estimate the total cost of wiring in small residential flats and buildings.

CO4: Estimate the total cost of service connection to domestic, commercial and industrial consumers.

CO5: Design of Small Transformer (1 KVA and less) and Chokes.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	1	2	2	1	1
CO2	2	2	2	2	2	2	1	1
CO3	3	2	2	2	3	1	1	2
CO4	3	1	2	2	1	2	2	2
CO5	1	1	3	1	2	1	2	1

Suggested Redings:

1. Electrical Design and Drawings by Raina & Bhattacharya
2. Electrical Design & Drawings by Sarabjeet Singh
3. IEEE Guide 80 for Earthing, IEEE Publication, New York
4. Electrical Design and Drawing by Surjit Singh, North Publication, Jalandhar
5. Electrical Engineering Design, Drawing & Estimation by Ankit Agarwal, Madhavi Gupta

Website Sources:

- <http://swayam.gov.in>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEE 503: UTILIZATION OF ELECTRICAL ENERGY

Objective: To focus on the recent illumination practices adopted. To provide the understanding of the concepts of Electrolysis processes and illumination engineering. To provide the understanding of the heating and welding methods for industrial applications. To provide the understanding of electric traction systems and drives.

UNIT I **(09 Sessions)**

Illumination: Nature of light, curve of relative sensitivity of human eye and wave length, **Definitions:** Flux, Solid Angle, Luminous Intensity, Illumination, Luminous Efficiency, Depreciation Factor Coefficient of Utilization, Space to Height Ratio, Reflection Factor, Laws of Illumination. Calculation of Number of Light Points for Interior Illumination; Calculation of Illumination at Different Points; Considerations Involved in Simple Design Problems and Illumination Schemes; Levels of Illumination. Methods To Increase Illumination Efficiency Different Sources of Light: Difference in Incandescent and Discharge Lamps- Their Construction & Characteristics, Fittings Required for Filament Lamp, Mercury Lamp, Fluorescent Lamp Sodium Lamp, Neon Lamp. Main Requirements of Proper Lighting; Illumination Level, Absence of Flare, Contrast and Shadow.

UNIT II **(08 Sessions)**

Electric Heating: Introduction, Advantages of Electrical Heating, Heating Methods: Resistance Heating (Direct Resistance Heating, Indirect Resistance Heating, Electric Ovens, Their Temperature Range) Salt Bath Heaters Properties of Heating Elements, Domestic Water Heaters and other Heating Appliances, Induction Heating, Principle, Core Type and Coreless Induction Furnace, Electric Arc Heating, Direct and Indirect Arc Heating, Arc Furnace. Di-electric Heating, Applications in Various Industrial Fields, Microwave Ovens, Simple Design Problems of Resistance Heating Element.

UNIT III **(09 Sessions)**

Electric Cooling: Concept of Refrigeration and Air-Conditioning, Brief Description of Vapour Compression Refrigeration Cycle, Description of Electrical Circuit Used in Refrigerator, Air-Conditioner and Water Cooler.

Electric Welding: Welding Methods, Principles of Resistance Welding, Welding Equipments, Electric Arc Welding Principle, Characteristics of Arc, Carbon and Metallic Arc Welding, Power Supply, Advantage of Coated Electrode, Comparison of AC And DC Arc Welding, Welding Equipment.

UNIT IV **(09 Sessions)**

Electrochemical Processes: Need of Electro-Deposition, Faraday's Laws in Electro Deposition, Objectives of Electroplating, Description of Process for Electroplating, Factors Governing Electro Deposition, Equipments and Accessories for Electroplating Plant, Principle of Anodizing and its Applications Electroplating on Non-conducting Materials.

UNIT V **(05 Sessions)**

Energy Conservation: Need for Energy Conservation, Over View of Energy Management, Basic Idea about Energy Audit.

Tariffs: Meaning of Different Tariffs and their application, Block Rate, Flat Rate, Maximum Demand and Two Part Tariffs, Bill Preparation.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand Solid Angle, Luminous Intensity, Illumination, Luminous Efficiency & Incandescent and Discharge Lamps.

CO2: Able to identify a heating/ welding scheme for a given application.

CO3: Understand various electric cooling and Electric Welding Processes.

CO4: Understand Electrochemical Processes, Faraday's Law, and Anodizing Process.

CO5: Understand the need of Energy Conservation, Demand and Bill Preparations.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	1	1	1	2	1	1
CO2	2	2	2	2	2	2	1	1
CO3	3	3	2	2	2	1	1	2
CO4	3	1	2	2	1	2	2	2
CO5	3	2	3	1	1	1	2	1

Suggested Readings:

1. Utilisation of Electrical Energy- R. K. Rajput
2. Utilisation of Electrical Energy – H. Partab (Dhanpat Rai & Sons)

Website Sources:

- <https://nptel.ac.in/courses/108/106/108106022/>
- <https://nptel.ac.in/courses/108/108/108108078/>
- <https://nptel.ac.in/courses/108/105/108105060/>
- <https://nptel.ac.in/courses/108/105/108105061/>
- <https://nptel.ac.in/courses/108/104/108104140/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)

DPEE 504: FUNDAMENTALS OF HIGH VOLTAGE ENGINEERING

Objective: To know about generation voltages and currents to test the electrical equipment. To acquire the knowledge of high voltage techniques and overvoltage phenomena in electrical power transmission systems.

UNIT I **(10 Sessions)**

Basic Process of Conduction and Break Down in Solid Dielectrics: Classification of insulating materials, Dielectric constant, Properties of dielectrics, Dielectric Break-down: Intrinsic break-down and test apparatus to measure strength of solids, Frohlic theory of break-down for crystalline dielectric, Band theory of break-down for amorphous dielectric, Thermal break-down and time to thermal break-down, Discharge Break-down, Electro Chemical Break-down, Measurement of dielectric loss or loss angle, Commonly used solid dielectrics.

UNIT II **(08 Sessions)**

Basic Process of Conduction and Break Down in Liquid and Gaseous Dielectrics: Properties of transformer oil, Conductivity of fluids, Repeated discharges through liquids, Behavior of fluids under non-uniform fields, Corona voltage, visual corona and corona at sub-critical voltage, Effects of corona, Discharge through gases, Gases under varying pressure and temperatures, Gases under high vacuum, Some common gaseous dielectric.

UNIT III **(06 Sessions)**

High Voltage Generation: Power Frequency High Voltage Generation, High Voltage Transformers, Cascaded Transformers, Series Resonance Method, Resonance Transformers.

UNIT-IV **(08 Sessions)**

Measurement of High Voltages: Power Frequency Measurement, Transformer Ratio, Potential transformers, Potential dividers - Resistance Potential Dividers, Capacitance Potential Dividers, Ryall crest voltmeter Sphere-gap method, Uniform field gap method, Rod gap, Needle gap, Electrostatic Voltmeters Quadrant Electrometer, Ellipsoidal Voltmeters Measurement of DC High Voltage - Generating Voltmeter, Measurement of impulse voltages.

UNIT-V **(08 Sessions)**

High Voltage Testing: Transformer Testing, Line Insulators Testing Mechanical Strength- Porosity- Power Frequency Dry Flashover Voltage- Power Frequency Wet Flashover Voltage- Impulse Voltages Flashover Test- Puncture Voltage Testing of Power Cables- Type approval Tests.- Development Tests. Testing of Power transformers - Connection for transformers, Impulse Voltage Test- Power Frequency Voltage Test-Dry Test Power Frequency Voltage -Wet Test Current Transformer Testing- Power Frequency High Voltage Test- Impulse Voltage Test. Testing of voltage transformer-induced voltage test.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand breakdown of HV insulation and Dielectrics (solid).

CO2: Understand breakdown of HV insulation and Dielectrics (Liquid and Gas).

CO3: Understand the principles of theory of high voltage generation

CO4: Understand the principles of theory of high voltage Measurement techniques.

CO5: Understand the need of testing and procedures of the electrical devices.

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	1	1	1	2	2	1	2
CO2	3	2	2	2	2	2	2	2
CO3	2	2	2	2	3	1	2	1
CO4	2	1	2	2	1	2	2	1
CO5	1	1	1	3	2	1	2	1

Suggested Readings:

1. Ray, S.: An Introduction to High Voltage Engineering, Prentice Hall India Learning Private Limited.
2. Wadhwa, C.L.: High Voltage Engineering, New Age International Publishers.
3. Naidu, M.S. and Kamaraju, V.: High-Voltage Engineering, Tata McGraw Hill.

Website Sources:

- <https://nptel.ac.in/courses/108/104/108104048/>
- <https://encyclopedia2.thefreedictionary.com/High-Voltage+Engineering>
- <https://www.sciencedirect.com/book/9780750636346/high-voltage-engineering-fundamentals>
- <https://www.electrical4u.com/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEE 505: CONTROL OF ELECTRICAL MACHINES

Objective: Learn and understand the control components, control diagrams, A.C. control circuit, industrial control circuit and basic concept of PLC.

UNIT-I **(10 Sessions)**

Control Components: Fuses and combination fuse switch units, Miniature circuit breaker, Contactors: Solenoid type, Clapper type, **Over-load relays:** Thermal over-load relay, Ratchet type over load relay, Magnetic over-load relay, Dash pot type oil filled relay, **Timing relays:** Thermal time delay relay, Pneumatic time delay relay, Synchronous motor-driven timer, Solid state timer, Phase failure relay, Push-buttons selector switches (two position) (three position) limit switch, Single side actuation type, Double side actuation type, Rotary cam type, Heavy duty limit switch, Proximity switches, Solenoid valve, Master controllers & Drum switches, Pressure switches, Temperature controller (thermostat), Float switches, Mechanical brakes for motors control, Transformer, Rectifiers, Reactors, Capacitors symbols for various components, **Control diagram:** Two wire control circuit, Three wire control circuit.

UNIT-II **(08 Sessions)**

A.C. Control Circuit: forward/reversing of 3 phase motors with push-button, inter-locking with auxiliary contact, inter-locking sequence, starting of motors, starting of multispeed squirrel cage motor, dynamic braking of squirrel cage induction motor, plugging of squirrel cage induction motor, over-load protection of motors, single phase protection, over-temperature protection, voltage stabilizer for 3 phase and single phase motors, control of synchronous motors, principle of acceleration, motor starter with field application by definite time relay, motor starter with field control by polarized field frequency control. Motor starter with field application by slip frequency relay over-load protection scheme.

UNIT-III **(08 Sessions)**

Control of single phase motors across the line starter, reversal of universal motor, speed control of universal motor, starter for capacitor type split phase motor, dynamic braking.

UNIT-IV **(08 Sessions)**

Industrial control circuit, heater control, compressor motor control, skip hoist control, walking beam battery operated truck conveyor system, control lift circuit, trouble shooting in control circuits, analyzing the problems, major trouble spots fuse base loose connections faulty contacts incorrect wire markers combination problems, low-voltage grounds procedures used in trouble-shooting, trouble shooting practice should be done in the lab.

UNIT-V **(06 Sessions)**

Basic concept and application of PLC, Basic operation and principles of PLC, Advantages of PLC.

Course Outcomes:

Students completing this course will be able to:

- CO1: Understand the concept of protective schemes
- CO2: Understand the concepts of different AC control components.
- CO3: Understand the concepts of various types of motors.
- CO4: Understand the different industrial control circuit.
- CO5: Understand the concept of PLC.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	1	2	1	2	2
CO2	2	1	2	2	2	2	2	2
CO3	2	1	2	2	1	2	3	1
CO4	3	2	2	2	2	2	1	1
CO5	3	2	3	1	1	2	2	1

Suggested Readings:

1. Bimbhra P.S.: Electrical Machinery, Khanna Publishers.
2. Katre J.S.: Electrical Drives, Tech-Max Publications.
3. Paul B.: Industrial Electronics and Control, PHI Learning.
4. Singh A. & Chhabra A. K.: Fundamental of Digital Electronics and Microprocessors, S. Chand & Company Pvt. Ltd.

Website Sources:

- <https://www.electrical4u.com/control-of-electrical-drives/>
- <https://www.slideshare.net/venkatdon/control-of-electrical-machines>
- <https://www.electrical4u.com/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)

DOEC 051: INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP DEVELOPMENT

Objective: The objective of this course to familiar with the organizational structure, Industrial Management, importance of human resources and develop their analytical skills.

UNIT I **(08 Sessions)**

Introduction: Management Function: Principles of Management. Concept, Development, application and scope of Industrial Management, Production and productivity, Present day concept of Industrial Engineering.

UNIT II **(08 Sessions)**

Management Tools: Time and Motion study, work simplification: process charts and flow diagrams, Production Planning and control.

Communication: Importance, Types and Barriers in Communication, Theories of Leadership. Motivation Theory: Maslow's Need Hierarchy theory, Herzberg two factor theory.

UNIT III **(08 Sessions)**

Inventory control: Inventory, Inventory management techniques, cost, Deterministic models, Introduction to supply chain management.

Quality control: Basic concepts, Statistical quality control (SQC), control charts, sampling Plan, Introduction to total quality control (TQC).

UNIT IV **(08 Sessions)**

Project Planning & control: Project planning and project control. **Business planning:** Project identification & Selection, Project Report Preparation. **Intellectual Property Rights:** Introduction to IPR (Patents, Copy Right, Trade Mark), Concept and History of Patents.

UNIT V

Entrepreneurship Development: **(08 Sessions)**

Definition, Requirements to be an entrepreneur, Entrepreneur and Manager Entrepreneurial Motivation: Motivating Factors, Entrepreneurship Development. Human resource management: Recruitment, Selection, Training.

Course Outcomes:

Students completing this course will be able to:

CO1: Exhibit the attitude and skill required for the application of Industrial Management.

CO2: Understand the various management tools and various Motivation theories affecting motivation.

CO3: Select, analysis and inventory control models based upon given data.

CO4: Understand how the production planning and control is carried out in the industries.

CO5: Understand faster values positive attitude and interpersonal relations.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	2	1	2	3
CO2	2	2	1	2	1	1	2	2
CO3	3	2	2	1	2	2	3	3
CO4	2	3	2	2	1	1	2	2
CO5	3	2	1	3	1	2	2	3

Reference Books:

1. L.M. Prasad, "Principles and Practice of Management, Sultan Chand & Sons.
2. N.G.Nair, "Production and Operations Management".
3. Hisrich Peters, "Entrepreneurship Development"-TMH.
4. R K Singhal and Sruti Singhal, "Entrepreneurship Development"-Katson Publication.

Website Sources:

- <https://nptel.ac.in/courses>
- <https://en.wikipedia.org>
- <https://www.unleashedsoftware.com>
- <https://www.bigcommerce.com/>
- <https://entreneurhandbook.co.uk/entrepreneurship/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)
DOCE 051: DISASTER MANAGEMENT

Course Objectives:

- To provide students an exposure to disasters, their significance, and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.

UNIT I (10 Sessions)

Introduction to Disasters: Concepts, and definitions (Disaster, Hazard, Vulnerability, Resilience, Risks), Disasters: Classification, Causes, Impacts (including social, economic, political, environmental, health, psychosocial, etc.). Differential impacts- in terms of caste, class, gender, age, location, disability Global trends in disasters urban disasters, pandemics, complex emergencies, Climate change

UNIT II (08 Sessions)

Approaches to Disaster Risk reduction: Disaster cycle - its analysis, Phases, Culture of safety, prevention, mitigation, and preparedness community based DRR, Structural- non-structural ensures, roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), states, Centre, and other stake-holders.

UNIT III (08 Sessions)

Disasters: hazard, global and Indian scenario, general perspective, importance of study in human life, Direct and indirect effects of disasters, long term effects of disasters. Introduction to global warming and climate change.

UNIT IV (06 Sessions)

Natural Disasters - Natures and extent of disasters, natural calamities such as earthquake, floods, drought, coasts hazards, cloud burst, Avalanches, Cyclone, landslides etc.

UNIT V (08 Sessions)

Manmade Disasters Chemical and industrial hazards, nuclear hazards, fire hazards, etc., Role of growing population and subsequent industrialization, urbanization and changing lifestyle of human beings in frequent occurrences of manmade disasters.

Course Outcomes:

After completion of this course, the student shall able to

CO1: To understand basic concepts in disaster management, definitions and terminologies used in disaster management

CO2: Explain the core elements and phases of disaster risk management and develop possible measures to reduce disaster risks across sector and community

CO3: To understand direct and indirect effects of disasters like global warming and climate change

CO4: Obtain knowledge on different types of natural disaster

CO5: Obtain knowledge on different types of man- made disaster

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	2	1	2	1	2	3	1
CO2	3	2	1	2	1	1	1	1
CO3	3	2	2	1	2	2	3	3
CO4	2	3	2	2	1	1	2	2
CO5	2	2	1	2	1	2	3	1

Suggested Reading:

1. Sharma, V. K. (1999), "Disaster Management", National Centre for Disaster Management, IPE, Delhi
2. Anil, K. Gupta and Sreeja, S. Nair (2011), "Environmental Knowledge for Disaster Risk Management", NIDM, New Delhi
3. Nick (1991), "Disaster Management: A Disaster Manager's Handbook", Asian Development Bank, Manila Philippines
4. Kapur, et al. (2005), "Disasters in India: Studies of Grim Reality", Rawat Publishers, Jaipur

Website Sources:

- <https://nptel.ac.in/courses/105/104/105104183/>
- <https://nptel.ac.in/courses/124/107/124107010/>
- https://onlinecourses.nptel.ac.in/noc20_ce07/preview
- https://onlinecourses.swayam2.ac.in/cec19_hs20/preview

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEE 551: ELECTRICAL MACHINE-II LAB

Objective: To learn how to visualize and work on laboratory and multidisciplinary tasks. To acquire knowledge about the principle of operation of three phase motor. To acquire knowledge about the starting and speed control of induction motors. To acquire knowledge about testing of induction motors.

List of Experiments:

1. To run a three phase induction motor and change its direction of rotation.
2. To run a three phase induction motor and determine its slip at various loads.
3. To connect and start a three phase induction motor using DOL starter and auto-transformer starter.
4. To determine load characteristics of a poly phase induction motor.
5. To perform no-load test and blocked rotor test on a three phase induction motor and to determine its efficiency.
6. To draw torque Vs slip characteristics of a three phase slip ring induction motor.
7. To study and run three-phase synchronous generator.
8. To determine the load characteristics of three-phase synchronous generator.
9. To study and run three phase synchronous motor.
10. To study a single phase induction motor and its various starting methods.

Course Outcomes:

Students completing this course will be able to:

CO1: To understand the construction and operation of different types of motors.

CO2: To obtain the performance characteristics of different motors.

CO3: To identify the effects of loading of motors.

CO4: To formulate and then analyze the working of any electrical machine using mathematical models under loaded and unloaded conditions.

CO5: To analyze the response of any electrical machine.

Suggested Readings:

1. Electrical Machinery - Dr. P.S. Bhimbra
2. Electrical Machines –Ashfaq Hussain

Website Sources:

- <https://nptel.ac.in/courses/108/102/108102146/>
- <https://nptel.ac.in/courses/108/105/108105155/>
- <https://nptel.ac.in/courses/108/105/108105131/>
- <https://nptel.ac.in/courses/108/106/108106023/>
- <https://nptel.ac.in/courses/108/105/108105017/>
- <https://nptel.ac.in/courses/108/106/108106071/>
- <https://nptel.ac.in/courses/108/106/108106072/>

IFTM UNIVERSITY, MORADABAD
Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (V Semester)
(w.e.f. session 2022-2023)

DPEE 552: ELECTRICAL DESIGN DRAWING & ESTIMATING-II LAB

Objective: The objective of this course is to read, understand and interpret connection diagrams of various motors. Communicate and correlate through sketches and drawings. Design small transformers.

List of Experiments:

1. To study connection diagram of 3-phase induction motor and starter.
2. To study connection diagram of 1-phase induction motor (Fan Motor).
3. To study connections diagrams of a 3-phase transformer.
4. Estimating and costing of electrical wiring of a small residential flat.
5. Estimating and costing of electrical wiring of a three storied building.
6. To study earthing of electrical equipments.
7. To study the constructional details and wiring diagram of sodium lamp.
8. To study connection diagram of D.C. motor using 3 point starter.
9. To study connection diagram of 3-phase synchronous motor.
10. To study design of a small Transformer.

Course Outcomes:

Students completing this course will be able to:

CO1: Recognize contactor and its use in various applications of 3 phase induction motor

CO2: Recognize different types of earthing.

CO3: Read and interpret key diagrams

CO4: Read and interpret schematic and wiring diagrams

CO5: Prepare estimate of wiring installation of various types of Buildings.

Suggested Readings:

1. Electrical Design and Drawings by Raina & Bhattacharya
2. Electrical Design & Drawings by Sarabjeet Singh
3. IEEE Guide 80 for Earthing, IEEE Publication, New York
4. Electrical Design and Drawing by Surjit Singh, North Publication, Jalandhar
5. Electrical Engineering Design, Drawing & Estimation by Ankit Agarwal, Madhavi Gupta

Website Sources:

- <http://swayam.gov.in>

Diploma (Electrical Engineering) Programme

Diploma (EE) - III Year (VI Semester)

(w.e.f. session 2022-2023)

DPEE 601: INSTALLATION, MAINTENANCE AND REPAIR OF ELECTRICAL MACHINES

Objective: The aim of this course is to enable the students to acquire and apply the knowledge and skills related to low current, circuits of lighting and heavy current installation. This course includes conductors and insulators, cable laying equipment, low-current materials, and types of electrical circuits, application circuits of low current installation, lighting and power socket circuit elements, making high current installations, assembling header cable and making underground line cables. The aim of this course is to teach the students about the equipment used in electricity transmission and distribution and to enable the students to acquire and apply their knowledge on installation of the structure, operation and maintenance procedures. This course includes installations to make compensation, lightning installations, grounding installations, safety systems installation.

UNIT I

(08 Sessions)

Scope and Organization of Electrical Maintenance Department: Requirement of Electrical Maintenance Department, Organization of Work of Electrical Machine Department, Office Work and Record Keeping of Electrical Maintenance Department, History & Plant Maintenance Log Book & Job Cards.

UNIT II

(08 Sessions)

Installation and Commissioning: General Guidelines for Loading and Unloading of Heavy Electrical Machines, Brief Description of the Accessories Used for Loading and Unloading of Heavy Electrical Equipment, Precautions to be Taken While Executing Such Jobs, Handling & Transport of Electrical Machine, Equipment & Line Accessories to Site, Installation (Testing and Commissioning) of Electrical Equipment Like Motors/Generator, Transformers, Switch Gears, Transmission and Distribution Lines etc.

UNIT III

(08 Sessions)

Preventive Maintenance of Electrical Equipment and other Installations: Meaning of Preventive Maintenance, Advantages of Programmed Preventive Maintenance, Preparation of Preventive Maintenance Schedule for Transformers, Transmission Lines, Induction Motors, Circuit Breakers, Underground Cables, Storage Batteries etc.

Troubleshooting: Causes for Failure of Electrical Equipments, Classification of Faults Under (i) Electrical, (ii) Magnetic (iii) Mechanical, Tool and Instruments used for Trouble Shooting and Repair, Use of Trouble Shooting Charts, Diagnosis of Faults in (i) D.C. Machines (ii) Synchronous Machines (iii) Transformers, (iv) Induction Motors, (v) Circuit Breakers, (vi) Overhead & Underground Distribution Lines, (vii) Storage Batteries (Viii) Other Appliances.

UNIT IV

(08 Sessions)

Earthing Arrangements: Reasons for Earthing of Electrical Equipment, Earthing Systems, Permissible Earth Resistance for Different Types of Installations, Methods of Improving the Earth Resistance, Measurement of Earth Resistance, System Earthing and Equipment Earthing.

Insulation Testing: Classification of Insulation as per ISS 1271/1958, Insulation Resistance Measurement, Reasons for Determination of Insulation Resistance, Methods of Improving Insulation Resistance, Vacuum Impregnation, Transformer Oil Testing and Interpretation of the Test Results.

UNIT V

(08 Sessions)

Electrical Accidents and Safety: Classification of Electrical Accidents, Statutory Regulations (IS 5216-1969), Treatment for Electric Shock, Artificial Respiration, Types and Use of Different Types of Fire Extinguishers, Effect of Current on Human Body, Important Indian Electricity Rules.

Course outcome:

Students completing this course will be able to:

CO1: Understand electrical installation and maintenance work skills that are needed for job creation and self reliance.

CO2: Understand installation skills like planning the layout and installation of wiring, testing of electrical work safety, competence with tools, effective use of materials, inspection of electrical installation, interpretation of wiring drawing and the likes are highly needed for the job creation.

CO3: Better understand how to install, maintain and repair different electrical equipment and machines.

CO4: Understand the electrical maintenance skills like diagnosing basic faults and recognize the associated signs, use electrical test equipment effectively, understand the basic regulatory requirements in maintenance.

CO5: Understand about the learning of different types of electrical accidents, statutory rules and regulations, different treatment for electric shock and various types of fire extinguishers

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	1	1	1	2	1	2	1
CO2	3	2	2	2	2	2	2	1
CO3	3	2	2	2	1	2	1	1
CO4	2	1	2	2	2	2	1	2
CO5	2	1	1	3	1	2	1	2

Suggested Readings:

1. R.P. Gupta, “Installation, Maintenance & Repair of Electrical Machines”
2. Tarlok Singh, “Installation Commissioning & Maintenance of Electrical Equipments” S.K. Kataria & Sons
3. S.Rao, “Testing Commissioning Operations & Maintenance Electrical Equipments”, Khanna Publishers.

Website Sources:

- [https://www.usbr.gov/power/data/fist/fist4_1B/41B%20Maintenance%20Scheduling%20for%20Electrical%20Equipment%20\(November%202005\).pdf](https://www.usbr.gov/power/data/fist/fist4_1B/41B%20Maintenance%20Scheduling%20for%20Electrical%20Equipment%20(November%202005).pdf)
- <https://www.archsd.gov.hk/media/11269/e102.pdf>
- <https://library.e.abb.com/public/ae2141fea4bfa9d748257a700024a579/1SDC010002D0206.pdf>
- <https://www.worldskillsindia.co.in/worldskill/file/Electrical-Installations.pdf>

Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (VI Semester)
(w.e.f. session 2022-2023)
DPEE 602: SWITCH GEAR AND PROTECTION

Objective: To introduce students to power system protection and switchgear. To teach students the theory and applications of the main components used in power system protection for electric machines, transformers, bus bars, overhead and underground feeders. To teach students the theory, construction, applications of main types circuit breakers, relays for the protection of generators, transformers and protection of feeders from over- voltages and other hazards. To develop an ability and skill to design the feasible protection systems needed for each main part of a power system in students.

UNIT I **(07 Sessions)**

Faults: Types of faults, Three-phase symmetrical faults, effects of faults on system reliability and stability abnormalities, short circuits and their effects, representation of fault conditions through single line diagrams.

UNIT II **(09 Sessions)**

Switch Gear: Purpose of protective gear, characteristics of a protection system. **Classification of fuses:** H.V. Fuses, application and working, grading and coordination L.V. fuses, election of fuses, characteristics. **Isolators and switches:** Outdoor isolators, functions, air break switches braking capacity of switches. **Circuit Breakers:** Requirements of circuit breakers, definition of terms associated with circuit-breakers, reasons for arc formation, principles of arc extinction, types of circuit-breakers, comparison with oil circuit breaker classification, rating of circuit breakers, working of different types of air and oil circuit breaker, specification of circuit breakers, maintenance schedule, SF-6 and Vacuum circuit breakers. **Relays:** Requirement of relays, operation principles induction type over current, directional over current, differential, percentage differential relays, working, applications and characteristics, basic principles of static relays. Introduction of distance relay.

UNIT III **(08 Sessions)**

Protective Schemes: Protection of alternators, stator faults, rotor faults, mechanical conditions, external faults their reasons, effect and protections used

Protection of power transformer: Types of faults, its effects, types of protective schemes over current earth fault, differential protection, Buckholtz devices, winding temperature protection. Motor protection: types of faults and protection in motors, thermal relays, protection of small motors, under voltage protection.

Protection of feeders : radial, parallel and ring feeders protection, directional time and current graded schemes differential protection.

UNIT IV **(08 Sessions)**

Protection against Over Voltages: Causes of over voltages, travelling waves earth wire, protective zone, lightning arrestors, space-gap and electrolytic arrestors, surge absorber, location and rating of lightning arrestors. Thyrite lightning arrestor.

UNIT V **(08 Sessions)**

Different Type of Sub-Stations: Layout, single line diagram bus bar arrangement, equipments their functions, accessories, study of protective schemes, etc. batteries and their maintenance, operation of small sub-station.

Reactors: Types of reactors, Busbar reactor, Tuning reactor, arc-suppression reactor, connection of reactors in power stations, Uses of reactors.

Neutral grounding: Types of grounding solid grounding, reactance grounding, arc suppression coil grounding, choice of method of neutral earthing, grounding of sub-station, grounding of line structure and substation equipment. Concept of G.I.S. (Gas Insulated Substation).

Course Outcomes:

Students completing this course will be able to:

CO1: Gain knowledge on different Protective Equipments or Power Systems.

CO2: Know about various protective systems- how it works and where it works?

CO3: Understand different applications of the relays, circuit breakers for different elements of power system

CO4: Express Oil Circuit Breaker, Air Blast Circuit Breaker, SF6 Circuit Breaker.

CO5: Identify DMT, IDMT type relays.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	1	1	1	1	2	2	1
CO2	2	3	2	2	2	3	2	1
CO3	2	3	2	2	2	3	1	1
CO4	2	2	1	2	2	2	1	2
CO5	1	3	1	3	2	1	1	2

Suggested Readings:

1. Sunil S Rao “Switchgear Protection & Power Systems”, Khanna Publishers.
2. Badari Ram & D.N Viswakarma “Power System Protection and Switchgear”, TMH publications.
3. Paithankar and S.R.Bhide, “Fundamentals of Power System Protection”, PHI, 2003.
4. T S Madhav Rao, “Power System Protection: Static Relays”, Tata McGraw-Hill, 2nd edition R3: C R Mason, “Art & Science of Protective Relaying”, Wiley Eastern Ltd.
5. Cl Wadhwa, “Electrical Power Systems”, New Age international (P) Limited, Publishers, 3rd editon.
6. “Hand Book of Switchgears by BHEL”, TMH Publications.

Website Sources:

- <https://www.m-tutor.com/login.php>
- <https://nptel.ac.in/courses/108/108/108108076/>

Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (VI Semester)
(w.e.f. session 2022-2023)
DPEE 603: POWER PLANT ENGINEERING

Objective: Power Plant Engineering basically focuses on power generation principles for real world applications. The main purpose of implementing this course in the curriculum is to learn about how the power is generated in a power plant and its applications. The course objective to introduce students to different aspects of power plant engineering, to familiarize the students to the working of power plants based on different fuels and to expose the students to the principles of safety and environmental issues.

UNIT I

(08 Sessions)

Introduction of Power and Energy: Sources of Energy: Conventional and Non – Conventional sources of Energy, Types of fuels: Solid, Liquid, and Gaseous Fuels, Types of power station.

Introduction of Thermal Power Plants: General Layout of Steam Power Plant, Power Plant Equipment and Their Working: Boiler, Turbine Ash Handling Plant, Economizer, Air Pre-Heater, Condenser, Cooling Tower, Advantages and Disadvantages, Efficiency: Thermal and Electrical.

UNIT II

(08 Sessions)

Introduction of Hydropower Plants: Advantages and Disadvantages, Classification of Hydropower Plant, General layout of Hydro power plant, Working of Different Components Used in Hydropower Plant.

UNIT III

(08 Sessions)

Nuclear Power: Principles of Nuclear Energy, Lay Out of Nuclear Power Plant, Nuclear Power Station, Nuclear Reactor, Nuclear Waste Disposal, Site Selection of Nuclear Power Plants.

UNIT IV

(07 Sessions)

Non Conventional Sources of Energy: Non-Conventional Power Plants: Introduction to Non-Conventional Power Plants (Solar, Wind, Geothermal, Tidal) etc.

UNIT V

(09 Sessions)

Economics of Generation: Economic Consideration Load Estimation, Load Curves, Load Duration Curve, Demand Factor, Load Factor, Diversity Factor, Plant Capacity Factor and Utilization Factor, Simple Problems involving Interpretation and Application of Above Factors. Cost of Generation, Fixed Cost, Running Cost, Cost per Unit, Effect of Load and Diversity Factor on Over-all Cost of Generation. Economic Load Division between Power Stations for a given Load Duration Curve.

Course Outcomes:

At the end of the course, a student will be able to:

CO1: Able to get the basics of Power Plants. Analyze the working and layout of thermal power plants and discuss about its economic and safety impacts.

CO2: Discuss the working principle and basic components of the hydropower plants and the economic principles and safety precautions involved with it.

CO3: Describe the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it.

CO4: Able to get the idea about the power generation by renewable and non-renewable energy resources.

CO5: Understand economics of power generation and learn important related terminology.

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	1	1	2	2	1
CO2	3	2	2	2	2	3	2	1
CO3	3	2	2	2	2	3	1	1
CO4	2	1	2	1	2	2	1	1
CO5	1	1	3	1	2	1	1	1

Suggested Readings:

1. Power Plant Engineering- Soni Gupta Bhatnagar
2. Power Plant Engineering- R. K. Rajpoot
3. Power Plant Engineering- B.R. Gupta

Website Sources:

1. <https://nptel.ac.in/courses/108/108/108108078/>
2. <https://nptel.ac.in/courses/108/105/108105058/>
3. <https://nptel.ac.in/courses/108/102/108102047/>
4. <https://nptel.ac.in/courses/108/105/108105104/>
5. <http://nptel.ac.in/courses/112105051/>

Diploma (Electrical Engineering) Programme
Diploma (EE) - III Year (VI Semester)
 (w.e.f. session 2022-2023)
DPEE 604: ELECTRIC TRACTION

Objective: The objective of this course is to provide the students the fundamental concepts of drives and types of drives used in traction. To train the students with a good engineering breadth so as to analyze the accessing techniques for braking system implementation.

UNIT I **(08 Sessions)**

Electric Traction Drives: Introduction, Types of electric traction systems & its advantages, Suitability of electric traction drives- D.C. Series motor, A.C. series motor, 3 phase induction motor, characteristics of electric traction drives, methods of starting and speed control, different methods of braking, plugging, rheostatic, regenerative.

UNIT II **(09 Sessions)**

Power supply of Electric Traction: Different systems of power supplies, power supply arrangement i.e. traction substation major equipment transformer, circuit breaker, interrupter, protection system.

UNIT III **(08 Sessions)**

Mechanics of Traction: System of units, speed time curves, their construction, simplification and interpretation for main line, suburban routes, tractive effort, specific energy consumption and factors effecting it, Weight transfer due to torque coefficient of adhesion.

UNIT IV **(08 Sessions)**

Overhead Equipments & Track Circuits: Over head equipments, catenary and its types, Working & maintenance of over head equipments, current collection system, D.C. and A.C. track circuits, signals for traffic control.

UNIT V **(07 Sessions)**

Supervisory Remote Control: System of remote control, its advantages, mimic diagram, remote control system and network remote control centre (R.C.C.). Rail and Return Path, Earth return protection of underground equipment, Negative booster, Voltage distribution on rails.

Course Outcomes:

Students completing this course will be able to:

CO1: Express working of various types of traction Drives

CO2: Understand system of power supply of electric traction and major equipment used.

CO3: Ability to discuss the mechanics of Train movement. Ability to plot trapezoidal and quadrilateral speed time curves. Ability to discuss & specify energy consumption

CO4: Learn Overhead Equipment used in electric traction and signal system used for the same

CO5: Read mimic diagrams used in control station and also learn uses of SCADA

CO-PO Mapping (Please write 3, 2, 1 wherever required)

(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	1	3	3	1	1	2	2	1
CO2	2	3	2	2	2	3	2	1
CO3	2	3	2	2	2	3	1	1
CO4	2	2	1	2	1	2	1	1
CO5	3	1	1	2	1	1	1	1

Suggested Readings:

1. Modern Electric Traction: H. Partab, Dhanpat Rai & Co.
2. Utilization of Electric Power & Electric Traction- J. B. Gupta, S.K. Kataria & Sons.
3. An Introduction to Electric Traction- Sachidananda Mallik & Rupali G. Nazar, S.K. Kataria & Sons.
4. Electric Traction- J. Upadhyay & S.N. Mahendra, Allied Publishers Pvt. Ltd.

Website Sources:

- <https://www.irfca.org/faq/faq-elec.html>
- https://en.wikipedia.org/wiki/Railway_electric_traction
- <http://www.railway-technical.com/infrastructure/electric-traction-power.html>

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Diploma (EE) - III Year (VI Semester)
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DPEE 605: PROCESS CONTROL & INSTRUMENTATION

Objectives: The objective of the course is to make the students familiar with different process dynamics in Process industries and different control schemes generally used to get best output. It also makes students aware of various analysis and design methods for multivariable systems.

UNIT I **(08 Sessions)**

Introduction: Block Diagram of a General Open and Closed Loop Process, Control System and Application.

Control System Components : Brief Description and Working of a Potentiometer, Differential Transformer Servo Motors, Tacho-Generator, Eddy Current Clutches Relay Contactors Timing Relay Temperature Switches Saturable Core Reactors & Its Use As Magnetic Amplifier.

Instrument Transformer: Theory of Current And Potential Transformers Ratio & Phase Angle Errors, Effect of Variation of Power Factor, Secondary Burden and Testing of C.T. & P.T.

UNIT II **(08 Sessions)**

Transducers: Definition of Transducers, Classification of Transducers & its Application. Active & Passive Type Their Use For Measurement of Mechanical And Electrical Quantities, Such As Speed Pressure Strain Displacement Volume Temperature Magnetic Flux And Humidity, Application of Transducers for Instrumentation & Control. Selection Criteria Based on Static and Dynamic Characteristics.

UNIT III **(08 Sessions)**

Process Instrumentation: Functional Block Diagram of Instrumentation System, Description of each Block. Description Of Practical Circuits For The Following: **Temperature Measurements:** General, Heat Transfer Modes, Temperature Measuring Devices Like Thermocouples, Pyrometer, Resistance Thermometer.

UNIT IV **(08 Sessions)**

Flow Measurement: General, Flow Meters: Venturi Meter, Orifice Plate, Pitot Tube, Rotameter, Turbine Meter, Electromagnetic Meter & Mass Flow Measurement. **Pressure Measurements:** General, Dynamic Performance, Pressure Receiver and Transmission Line, Input Impedance, Energy Level Of Pressure Pickups, Pressure Pickups. Manometer, Pressure Elements Differential Pressure.

UNIT V **(08 Sessions)**

Vibration Measurements: Vibration Measurement Systems, Analysis of Acceleration Data.

Strain Measurements: Requirements for Strain Measurement, Strain Gauges, Selection of Gauges, General Strain Measurements.

Course Outcomes:

Students completing this course will be able to:

CO1: To understand open and close loop control system, components of control system, instrument and potential transformer.

CO2: To understand classification and applications of transducers, use of transducers for measurement of electrical and mechanical quantities.

CO3: To understand instrumentation system using block diagram and temperature measuring devices viz. thermocouples, pyrometers.

CO4: To understand flow measurement using different flow meters and pressure measuring devices.

CO5: To understand vibration measurement systems and strain gauges for strain measurement.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	1	2	2	1	1	1
CO2	3	2	2	3	2	2	2	1
CO3	3	2	2	3	1	2	2	1
CO4	2	1	2	2	1	2	1	1
CO5	1	1	3	1	1	2	1	1

Suggested Readings:

1. Process Control Instrumentation Technology- Curtis D. Johnson, Pearson.
2. Transducers & Instrumentation- D. V. S. Murty, Prentice Hall India Learning Private Limited.
3. Instrumentation & Process Control- D. C. Sikdar, Khanna Publishing.
4. Electrical Instrumentation and Process Control- J. P. Navani, S. Chand and Company Pvt. Ltd.

Website Sources:

- <https://nptel.ac.in/courses/103/105/103105064/>
- <http://www.nptelvideos.in/2012/11/process-control-and-instrumentation.html>
- http://www.pc-education.mcmaster.ca/Lecture_Slides/Chap_01_Marlin_2002.pdf

Diploma (Electrical Engineering) Programme
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DOME 061: TOTAL QUALITY MANAGEMENT (TQM)

Objective: The main objective of this course is to improve the quality of an organization's outputs, including goods and services, through the continual improvement of internal practices. Total quality management aims to hold all parties involved in the production process accountable for the overall quality of the final product or service.

UNIT -I: (08 Sessions)

Quality Concepts:

Evolution of Quality control, concept change, TQM Modern concept, Quality concept in design.

Manufacturing Quality: Methods and Techniques for manufacture, Inspection and control of product, Quality in sales and services, Guarantee, analysis of claims.

UNIT -II: (08 Sessions)

Quality Management:

Organization structure and design, Quality function, decentralization, Designing and fitting organization for different types products and company,

TQM Principles: Leadership, strategic quality planning; Quality councils- employee involvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognition and reward, performance appraisal; Continuous process improvement.

UNIT -III: (08 Sessions)

Tools and Techniques: Seven QC tools (Histogram, Check sheet, Ishikawa diagram, Control chart, flow chart).

Control Charts: Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts, P-charts and C-charts.

UNIT -IV: (08 Sessions)

Defects Diagnosis and Prevention: Defect study, identification and analysis of defects, corrective measure, factors affecting reliability, Building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle.

UNIT -V: (08 Sessions)

ISO and its concept of Quality Management: Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements, documentation, requirements and benefits TQM implementation in manufacturing and service sectors, Auditing, Taguchi method, JIT in some details.

Course Outcomes:

On successful completion of the course students will be able to:

CO1: Understand the fundamental principles of Total Quality Management

CO2: Choose appropriate statistical techniques for improving processes.

CO3: Develop research skills that will allow them to keep abreast of changes in the field of Total Quality Management.

CO4: Explain the various types of Techniques are used to measure Quality.

CO5: Apply various Quality Systems and Auditing on implementation of TQM.

CO-PO Mapping (Please write 3, 2, 1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	2	2	3	3
CO2	3	2	1	2	1	1	1	1
CO3	3	2	2	1	2	2	3	3
CO4	3	2	2	1	2	2	3	3
CO5	3	2	1	2	1	1	1	1

Suggested Readings:

1. Total Quality Management, by Dale H. Besterfield, Pearson India.
2. Beyond Total Quality Management, Greg Bounds, McGraw Hill.
3. Besterfield D.H. et al., Total Quality Management, 3rd ed., Pearson Education Asia, 2006.
4. Evans J.R. and Lindsay W.M., The management and Control of Q.

Website Sources:

- <https://qcmr-1.itrcweb.org/2-quality-concepts/>
- <https://www.lucidchart.com/blog/8-total-quality-management-principles>
- <https://blog.kainexus.com/improvement-disciplines/lean/control-charts/an-introduction-to-process-control-charts>
- https://ndiastorage.blob.core.usgovcloudapi.net/ndia/2004/cmmt/CMMIT5Tue/Root_CauseAnalysis.pdf
- <https://www.iso.org/iso-9001-quality-management.html>

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DOEE 061: NON-CONVENTIONAL ENERGY RESOURCES

Objective: The electrical diploma holder must be made aware about saving and conserving Electrical Energy and tackle the problems of environmental pollution as they will have to face this challenge in future life.

UNIT I **(08 Sessions)**

Introduction: Different forms of energy, Energy chain, Classification of energy resources: Primary and secondary sources, Commercial and non-commercial sources, Conventional and non-conventional sources, Classification of non-conventional energy resources

UNIT II **(08 Sessions)**

Solar Energy: Basics of photovoltaic energy conversion, Types of solar photovoltaic cells, Solar photovoltaic module, V-I and P-V characteristics of PV module, Efficiency of PV module, Applications of Solar photovoltaic systems, Solar Thermal Power Plant, Efficiency of solar thermal power plant, Solar water heater

Wind Energy: Wind energy conversion, Types of wind power plants, merits and demerits of wind power generation

UNIT III **(08 Sessions)**

Geothermal Energy: Introduction to geothermal energy, Resources of geothermal energy, geothermal power plants, Merits and demerits of geothermal power generation, applications of geothermal energy

Magneto-Hydro-Dynamic (MHD) Power Generation: Introduction to MHD power generation, Open cycle MHD system, closed cycle MHD system, working principle of MHD power generation, Advantages of MHD power generation

UNIT IV **(08 Sessions)**

Fuel Cells: Working principle and operation of fuel cells, Types of fuel cells, Performance analysis of fuel cell, advantages of fuel cells, limitations of fuel cells, applications of fuel cells

Bio Energy-Biomass and Biogas: Biomass conversion process, biogas generation, factors affecting generation of biogas, types of biogas plants, selection of site for biogas plant

UNIT V **(08 Sessions)**

Ocean Thermal Energy Conversion (OTEC): Working principle of OTEC, availability, types of OTEC systems, advantages of OTEC, limitations of OTEC power plant, applications of OTEC power plant

Ocean Wave energy and Tidal Energy: Wave energy, Tidal energy, Tidal Power plants, Classification of tidal power plant, Advantages and Limitations of tidal power

Course Outcomes:

After undergoing the subject, the students will be able to:

CO1: Understand the importance of non-conventional energy sources for the present energy scenario.

CO2: Understand various alternate sources of energy like solar and wind energy.

CO3: Understand basic conversion technologies of geo-thermal & magneto hydrodynamics

CO4: Understand various fuel cells and its applications.

CO5: Understand Ocean Thermal Energy & Tidal energy for power plants and other applications.

PO-CO Mapping (Please write 3,2,1 wherever required)**(Note: 3 for highly mapped, 2 for medium mapped and 1 for low mapped)**

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	2	2	1	2	2	3	2
CO2	3	2	1	2	1	1	1	1
CO3	3	2	2	1	2	2	3	3
CO4	3	2	2	1	2	2	2	1
CO5	3	2	2	1	2	2	3	2

Suggested Readings:

1. S. Hasan Saeed, "Non-Conventional Energy Resources", S. K. Kataria & Sons, New Delhi
2. Non-Conventional Energy Resources by RK Singal; S. K. Kataria & Sons, New Delhi
3. Solar Energy Utilization; GD Rai; Khanna Publishers, New Delhi

Website Sources:

- Renewable energy - Wikipedia
- Non Conventional Energy Resources - Ashish Chandra - Google Books
- Non-Conventional Energy Resources - Bansal N.K. - Google Books

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**DPEE 651: INSTALLATION, MAINTENANCE AND REPAIR OF ELECTRICAL MACHINES
LAB**

Objective: To gain knowledge of testing, installation and maintenance of electrical appliances, their trouble shooting and electrical safety.

List of Experiments:

1. Commissioning of electrical equipments.
2. To study of troubleshooting of AC machines.
3. To determine polarity of single phase transformer.
4. To determine voltage ratio of single phase transformer.
5. Study of troubleshooting of Induction Machines.
6. To measure the Earth Resistance.
7. Study of troubleshooting of DC Machines.
8. To test Dielectric Strength of Transformer oil.
9. To study preventive maintenance schedule of circuit breaker.
10. To study preventive maintenance schedule of transformer.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the installation, commissioning and maintenance of different electrical components.

CO2: Understand concepts of commissioning, maintenance, electrical safety, installation and maintenance of domestic appliances.

CO3: Evaluate the voltage ratio of single phase transformer & polarity of single phase transformer.

CO4: Understand maintenance schedule of circuit breaker.

CO5: Analyze preventive maintenance schedule of transformer.

Suggested Reading:

1. R.P. Gupta, “Installation, Maintenance & Repair of Electrical Machines”
2. Madhvi Gupta, “Installation, Maintenance & Repair of Electrical Machines and equipment” S.K. Kataria & Sons
3. Tarlok Singh, “Installation Commissioning & Maintenance of Electrical Equipments” S.K. Kataria & Sons
4. S. Rao, “Testing Commissioning Operations & Maintenance Electrical Equipments”, Khanna Publishers.

Website source:

- [https://www.usbr.gov/power/data/fist/fist4_1B/4-1B%20Maintenance%20Scheduling%20for%20Electrical%20Equipment%20\(November%202005\).pdf](https://www.usbr.gov/power/data/fist/fist4_1B/4-1B%20Maintenance%20Scheduling%20for%20Electrical%20Equipment%20(November%202005).pdf)
- <https://www.archsd.gov.hk/media/11269/e102.pdf>
- <https://library.e.abb.com/public/ae2141fea4bfa9d748257a700024a579/1SDC010002D0206.pdf>
- <https://www.worldskillsindia.co.in/worldskill/file/Electrical-Installations.pdf>

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DPEE 652: POWER SYSTEM LAB

Objective: To analyze the performance of power system networks by conducting various experiments. To study different power system protective equipment by conducting suitable experiments. To develop computer programs for analysis of power systems.

List of Experiments:

1. To study various parameters of transmission line and their effect on transmission of electrical power.
2. To study working of various types of Relays.
3. To study working of various types of circuit breakers.
4. To study radial and ring distribution system.
5. To study operating characteristic of MCB fuse.
6. To study operating characteristic of HRC fuse.
7. To view an electrical installation and distribution system.
8. To determine location of fault in a cable using cable fault locator.
9. To determine the dielectric strength of transformer oil.
10. To study working model of a Buchholz Relay.

Course Outcomes:

Students completing this course will be able to:

CO1: Analyze the performance of transmission lines and relays.

CO2: Understand the steady-state power flow in a power system.

CO3: Analyze different types of short-circuit faults which occur in power systems.

CO4: Understand different types of fuse along with their working.

CO5: Understand dielectric strength of transformer oil and working of Buchholz relay (used in protection of transformer)

Suggested Readings:

1. Kothari, D.P. and Nagrath, I.J.: Power System Engineering, McGraw Hill Education.
2. Wadhwa, C.L.: Electrical Power Systems, Drawing & Estimation, New Age International Publishers.

Website Sources:

- https://en.wikipedia.org/wiki/Electric_power_system
- <https://www.electrical4u.com/power-system/>
- <https://nptel.ac.in/courses/108/105/108105067/>
- <https://nptel.ac.in/courses/108/105/108105104/>