



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

Course Structure
&
Syllabus
of
Diploma
Electronics and Communication Engineering

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

UNIVERSITY POLYTECHNIC
DEPARTMENT OF
ELECTRONICS AND COMMUNICATION
ENGINEERING
IFTM UNIVERSITY, MORADABAD



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IFTM UNIVERSITY
N.H.-24, Lodhipur Rajput, Delhi Road, Moradabad, Uttar Pradesh-244001
www.iftmuniversity.ac.in

Study & Evaluation Scheme of
Diploma (Electronics and Communication Engineering)
[Session 2022-23]
(As per CBCS guidelines)

Programme	Diploma (Electronics and Communication 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 numbers 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: Electronic Devices and Circuits, Basic Network System, Fundamentals of Communication Engineering, Principles of Digital Electronics, Introduction to Microprocessor, Introduction to Power Electronics, Fundamentals of Signals and Systems, Biomedical Electronics, Introduction to Data Communication Network, Electronics Equipment Testing & 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 Telemetry & Data Acquisition Systems, Process Control & Instrumentation, Modern Consumer Electronics Appliances, Electronics Equipment Testing 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 Telemetry & Data Acquisition Systems, Process Control & Instrumentation, Modern Consumer Electronics Appliances, Electronics Equipment Testing. Each student will have to choose two discipline specific elective courses (DSE) in all chosen; 1 in Semester V and 1 in Semester VI respectively. Each DSE 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 Electronics and Communication Engineering Program:

Students completing this programme will be able to:

PSO1: Apply the basic knowledge of the basic sciences and fundamentals of Electronics and Telecommunication Engineering.

PSO2: Use basic concepts in various domains of Electronics and Telecommunication Program such as Applied Electronics, Analog and Digital communication, Digital and Embedded Systems, Industrial Instrumentation and Automation.

PSO3: Identify, analyze and solve Electronics and Telecommunication Engineering problems to the substantiate conclusions.

PSO4: Design and implement electronic circuits and to analyze, interpret and experimentally validate the results.

PSO5: Work effectively on various technical projects to satisfy the industrial needs.

PSO6: Use modern engineering tools, software's and equipments to analyze the impact of engineering solutions in societal and environmental contexts.

PSO7: Apply ethical principles and knowledge for the benefits of society and industries.

PSO8: Individual and Teamwork: Work effectively as an individual and member or a leader in multidisciplinary teams.

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.

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

Cluster of Courses for Diploma (Electronics and Communication 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	DPEC-301	Fundamentals of Electronic Instrumentation & Measurement	04
2	DPEC-302	Electronic Devices and Circuits-I	04
3	DPEC-303	Basic Network System	04
4	DPEC-304	Fundamentals of Communication Engineering	04
5	DPEC-305	Principles of Digital Electronics	04
6	DPEC-351	Electronics Instrumentation & Measurement Lab	01
7	DPEC-352	Network System Lab	01
8	DPEC-353	Communication Lab-I	01
9	DPEC-354	Digital Lab	01
10	DPEC-401	Introduction to Microprocessor	04
11	DPEC-402	Introduction to Power Electronics	04
12	DPEC-403	Fundamentals of Transducers and Sensors	04
13	DPEC-404	Fundamentals of Signals and Systems	04

14	DPEC-405	Electronic Devices and Circuits-II	04
15	DPEC-451	Microprocessor Lab	01
16	DPEC-452	Power Electronics Lab	01
17	DPEC-453	Electronic Devices Lab	01
18	DPEC-454	Electronics Workshop & PCB Lab	01
19	DPEC-501	Modern Communication System	04
20	DPEC-502	Microwave & Radar Engineering	04
21	DPEC-503	Biomedical Electronics	04
22	DPEC-551	Communication Lab-II	01
23	DPEC-552	Microwave Lab	01
24	DPEC-601	Introduction to Data Communication Network	04
25	DPEC-602	Fundamentals of Control System	04
26	DPEC-603	Introduction to Optical Fiber Communication	04
27	DPEC-651	Control System Lab	01
28	DPEC-652	Optical Fiber Communication Lab	01

4. Discipline Elective Core Courses (DSC)

S. No	Subject Code	Subject Name	Credit
1	DPEC-504	Telemetry & Data Acquisition Systems	04
2	DPEC-505	Process Control & Instrumentation	04
3	DPEC-604	Modern Consumer Electronics Appliances	04
4	DPEC-605	Electronics Equipment Testing	04

5. Open Elective Course (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	DPEC-553	Industrial Training	01
2	DPEC-554	Seminar	01
3	DPEC-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	
							Mid Term Exam					External Exam
				L	T	P	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 Engg.	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
				L	T	P	Mid Term Exam			External Exam		
							CT	AS +AT	Total			
THEORY												
1.	DSC-01	DPEC -301	Fundamentals of Electronic Instrumentation & Measurement	3	1	0	20	10	30	70	100	4
2.	DSC-02	DPEC -302	Electronic Devices and Circuits-I	3	1	0	20	10	30	70	100	4
3.	DSC-03	DPEC -303	Basic Network System	3	1	0	20	10	30	70	100	4
4.	DSC-04	DPEC -304	Fundamentals of Communication Engineering	3	1	0	20	10	30	70	100	4
5.	DSC-05	DPEC -305	Principles of Digital Electronics	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
6.	DSC-06	DPEC -351	Electronics Instrumentation & Measurement Lab	0	0	2	-	-	30	70	100	1
7.	DSC-07	DPEC -352	Network System Lab	0	0	2	-	-	30	70	100	1
8.	DSC-08	DPEC -353	Communication Lab-I	0	0	2	-	-	30	70	100	1
9.	DSC-09	DPEC -354	Digital 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
				L	T	P	Mid Term Exam			External Exam		
							CT	AS +AT	Total			
THEORY												
1.	DSC-10	DPEC -401	Introduction to Microprocessor	3	1	0	20	10	30	70	100	4
2.	DSC-11	DPEC -402	Introduction to Power Electronics	3	1	0	20	10	30	70	100	4
3.	DSC-12	DPEC -403	Fundamentals of Transducers and Sensors	3	1	0	20	10	30	70	100	4
4.	DSC-13	DPEC -404	Fundamentals of Signals and Systems	3	1	0	20	10	30	70	100	4
5.	DSC-14	DPEC -405	Electronic Devices and Circuits-II	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
6.	DSC-15	DPEC -451	Microprocessor Lab	0	0	2	-	-	30	70	100	1
7.	DSC-16	DPEC -452	Power Electronics Lab	0	0	2	-	-	30	70	100	1
8.	DSC-17	DPEC -453	Electronic Devices Lab	0	0	2	-	-	30	70	100	1
9.	DSC-18	DPEC -454	Electronics Workshop & PCB Lab	0	0	2	-	-	30	70	100	1
10.	SEC-04	DPGP -401	General Proficiency	-	-	-	-	-	100	-	100	1
TOTAL				18	06	08	-	-	-	-	1100	25

Ability Enhancement Compulsory Course

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			
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

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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
							Mid Term Exam			External Exam		
				L	T	P	CT	AS +AT	Total			
THEORY												
1.	DSC-19	DPEC -501	Modern Communication System	3	1	0	20	10	30	70	100	4
2.	DSC-20	DPEC -502	Microwave & Radar Engineering	3	1	0	20	10	30	70	100	4
3.	DSC-21	DPEC -503	Biomedical Electronics	3	1	0	20	10	30	70	100	4
Departmental Elective (Select any one)												
4.	DSE-01	DPEC-504	Telemetry & Data Acquisition Systems	3	1	0	20	10	30	70	100	4
	DSE-02	DPEC-505	Process Control & Instrumentation									
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	DPEC -551	Communication Lab-II	0	0	2	-	-	30	70	100	1
7.	DSC-23	DPEC -552	Microwave Lab	0	0	2	-	-	30	70	100	1
8.	SEC-05	DPEC-553	Industrial Training	0	0	2	-	-	100	-	100	1
9.	SEC-06	DPEC-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
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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	DPEC -601	Introduction to Data Communication Network	3	1	0	20	10	30	70	100	4
2.	DSC-25	DPEC -602	Fundamentals of Control System	3	1	0	20	10	30	70	100	4
3.	DSC-26	DPEC -603	Introduction to Optical Fiber Communication	3	1	0	20	10	30	70	100	4
Departmental Elective (Select any one)												
4.	DSE-03	DPEC-604	Modern Consumer Electronics Appliances	3	1	0	20	10	30	70	100	4
	DSE-04	DPEC-605	Electronics Equipment Testing									
Open Elective (Select any one)												
5.	DOE-04	DOEE-061	Total Quality Management	3	1	0	20	10	30	70	100	4
	DOE-05	DOEE-061	Non-Conventional Energy Resources									
PRACTICALS/ PROJECT												
6.	DSC-27	DPEC -651	Control System Lab	0	0	2	-	-	30	70	100	1
7.	DSC-28	DPEC -652	Optical Fiber Communication Lab	0	0	2	-	-	30	70	100	1
8.	SEC-08	DPEC -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
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Diploma (EC) - 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, Kirchhoff'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>

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(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:

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

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DPCH 101: ELEMENTARY CHEMISTRY-I

Objectives: To emphasize the relevance of fundamentals and applications of chemistry for diploma holders and student will learn appropriate combinations of old and new emerging concepts. Also to bring potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

Unit-I **(8 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 **(8 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 **(8 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 storage cell (Edison accumulator), Solar cell (Photovoltaic cell), Numerical problems based on topics.

Unit-IV **(8 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 reactants are same) reactions.

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

Unit-V **(8 Sessions)**

COLLOIDS: Colloids and its types, Different system of colloids, Dispersed phase and dispersion medium. Methods of preparation of colloidal solutions, Dialysis and electrodialysis.

Properties of colloidal solution with special reference to adsorption, Brownian Movement, tyndal effect, Electrophoresis and coagulation. Gold number, Application of colloids.

Course Outcome:

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. Liquid Crystals and Plastic Crystals, vol.-I, edited by G.W. Gray and P.A. Winsor, Ellis Harwood Series in Physical Chemistry, New York.
2. Corrosion Engineering by M.G. Fontana McGraw Hill Publications.
3. Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004).
4. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.

Website Sources:

- <http://www.commonchemistry.org/>
- <https://uri.idm.oclc.org/login?url=https://www.engineeringvillage.com/search/quick.url?CID=quickSearch&database=1>
- <https://www.technicalsymposium.com/>

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(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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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, hump, 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 HazraChaudhary (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 (Electronics and Communication Engineering) Programme
Diploma (EC) - 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/>

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(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.succscds.net
- www.grammarly.com

IFTM UNIVERSITY, MORADABAD
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Diploma (EC) - I Year (I/II Semester)
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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

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(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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(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>

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(w.e.f. session 2022-2023)
DPCH 151: CHEMISTRY-I LAB

Objectives: Practical implementation of fundamental concepts of qualitative and quantitative analysis. Student will gain the knowledge on existing future upcoming devices, materials and methodology used in chemistry practical. They will rely on elementary treatment and qualitative analysis. These practical will provide an overview of quantitative analysis.

List of Experiments:

1. To analyse inorganic mixture for two acid and basic radicals from following radicals
A. Basic Radicals: NH_4^+ , Pb^{++} , Cu^{++} , Bi^{+++} , Cd^{++} , As^{+++} , Sb^{+++} , Sn^{++} , Al^{+++} , Fe^{+++} , Cr^{+++} , Mn^{++} , Zn^{++} , Co^{++} , Ni^{++} , Ba^{++} , Sr^{++} , Ca^{++} , Mg^{++}
B. Acid Radicals: CO_3^- , S^- , SO_3^- , CH_3COO^- , NO_2^- , NO_3^- , Cl^- , Br^- , I^- , SO_4^-
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 CaCO_3 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'Haver's method.

Course Outcome:

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. Applied Chemistry by R. S. Katiyar & J.P. Chaudhary Publication B.B.P. & Co. Meerut
2. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Wiley & sons, 6th Edition, 2007.
3. Elements of Physical Chemistry, Glasstone, Samuel B. ELBS, 2005.
4. Organic Chemistry, Finar, I.L.: Addison – Wesley Longman, Limited, 2004.
5. Principles of Physical Chemistry, by Puri B.R., Sharma L.R., S. Nagin & Company, Delhi

Website Sources:

- <https://www.gopracticals.com/basic-engineering/>
- <https://edu.rsc.org/resources/practical>
- <https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US>

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(w.e.f. session 2022-2023)
DPME 152/DPME 252: WORKSHOP LAB

Objective:

- To understand how different objects can be made from the given raw material by using different mechanical tools.
- To introduce students to the basic concepts of manufacturing via shaping, forming, machining
- To develop a knowledge of appropriate parameters to be operations used for various machining.
- 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

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(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.educompijre.files.wordpress.com

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(w.e.f. session 2022-2023)
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, Kirchoff'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, Jalandhar

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>

IFTM UNIVERSITY, MORADABAD
Diploma (Electronics and Communication Engineering) Programme
Diploma (EC) - 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:

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 (Electronics and Communication Engineering) Programme
Diploma (EC) - I Year (II Semester)
(w.e.f. session 2022-2023)
DPCH 201: ELEMENTARY CHEMISTRY-II

Objectives: To emphasize the relevance of fundamentals and applications of chemistry for diploma holders and student will learn appropriate combinations of old and new emerging concepts. Also to bring potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.

UNIT I **(08 Sessions)**

Lubricants: 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 **(08 Sessions)**

Fuels and Environmental Pollution: 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 **(08 Sessions)**

Water Treatment and Corrosion: 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 **(08 Sessions)**

Glass and Ceramics: Concept of glass and its constituents, Classification and uses of different glass, Elementary idea of manufacturing process of glass.

UNIT V **(08 Sessions)**

Organic Chemistry:

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 Polymerisation.
2. Characteristics of Polymers and their classification

Course Outcomes:

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. Liquid Crystals and Plastic Crystals, vol.-I, edited by G.W. Gray and P.A. Winsor, Ellis Harwood Engineering Chemistry by J C Kuriacose and J. Rajaram, Tata McGraw-Hill Co, New Delhi (2004)
2. Chemistry of Engineering Materials by C.P. Murthy, C.V. Agarwal and A. Naidu BS Publication Hyd.

Website Sources:

- <http://www.commonchemistry.org/>
- <https://uri.idm.oclc.org/login?url=https://www.engineeringvillage.com/search/quick.url?CID=quickSearch&database=1>
- <https://www.technicalsymposium.com/>

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

Objectives: Practical implementation of fundamental concepts of qualitative and quantitative analysis. Student will gain the knowledge on existing future upcoming devices, materials and methodology used in chemistry practical. They will rely on elementary treatment and qualitative analysis. These practicals will provide an overview of quantitative analysis.

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 thiosulphate 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 Outcome:

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. Applied Chemistry by R. S. Katiyar & J.P. Chaudhary Publication B.B.P. & Co. Meerut
2. March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure Smith, Michael B./March, Jerry, John Willey & sons, 6th Edition, 2007.
3. Elements of Physical Chemistry, Glasstone, Samuel B. ELBS, 2005.
4. Organic Chemistry, Finar, I.L.: Addison – Wesley Longman, Limited, 2004.
5. Principles of Physical Chemistry, by Puri B.R., Sharma L.R., S. Nagin & Company, Delhi

Website Sources:

- <https://www.gopracticals.com/basic-engineering/>
- <https://edu.rsc.org/resources/practical>
- <https://play.google.com/store/apps/details?id=com.softwareindiavinod.chemistrypracticals&hl=en&gl=US>

IFTM UNIVERSITY, MORADABAD
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(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 (Electronics and Communication Engineering) Programme
Diploma (EC) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEC 301: FUNDAMENTALS OF ELECTRONIC INSTRUMENTATION AND MEASUREMENT

Objective: The objective of the course is to introduce the fundamentals of Electronics Instruments and Measurement providing an in-depth understanding of Measurement errors, Bridge measurements, Digital Storage Oscilloscope, Function Generator and Analyzer, Display devices, Data acquisition systems and transducers.

UNIT I **(08 Sessions)**

Introduction to the Process of Measurements: Definition of measurement, Methods of measurements, Types of Instruments, Deflection and Null type instrument, Static and Dynamic characteristics, Review of the term error, Accuracy, Precision, Resolution, Sensitivity and Range.

UNIT II **(08 Sessions)**

Measuring Instruments: Analog Instruments, Classification of Analog Instruments, Principles of operation, D'Arsonval Galvanometer, Construction, Torque Equation, Permanent Magnet Moving Coil Instrument (PMMC), Construction of PMMC, Torque Equation, Ohmmeters (Series and Shunt type).

UNIT III **(10 Sessions)**

D.C and A.C Bridges: D.C bridges: wheat stone bridge, Kelvin Bridge, A.C Bridges: General equation for bridge balance, General form of an AC bridge, Measurement of self inductance: Maxwell's inductance bridge, Hay's bridge, Anderson bridge, Measurement of capacitance: Schering bridge, Measurement of frequency: Wein's bridge.

UNIT IV **(08 Sessions)**

CRO: Introduction, CRT, Electron gun, Electrostatic focusing, Electrostatic deflection, Post deflection acceleration of electron beam, Deflection plates, Block diagram and explanation of a basic CRO, Measurement of voltage, frequency, time period & phase using CRO (Lissajous pattern), CRO probes.

UNIT V **(06 Sessions)**

Digital Instruments: Introduction of Digital Instruments, Characteristics of Digital Instruments, Comparison of Analog and Digital Instruments, Working of Ramp, Dual Slope and Integrating type Digital Voltmeter, Block Diagram and Working of Digital Multimeter, Advantage of Electronic Multimeter over Conventional Multimeter.

Course Outcomes:

Students completing this course will be able to:

CO1: Recognize the evolution and history of units and standards in Measurements.

CO2: Choose right type of instruments for measurement of current, voltage, power and energy.

CO3: Employ appropriate instruments and bridge circuits to measure given set of parameters.

CO4: Explain the basic features of oscilloscope and different types of oscilloscopes.

CO5: Illustrate basic digital meters such as voltmeters, ammeters and multimeters

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
CO3	3	2	2	1	1	3	2	1
CO4	3	1	1	1	2	2	3	2
CO5	3	1	1	1	2	2	3	2

Suggested Readings:

1. A.K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation – Dhanpat Rai & Sons.
2. Helfric & Cooper - Modern Electronic Instrumentation and Measurement Techniques- PHI.
3. H. S Kalsi, “Electronic Measurement”, TMH India.

Website Sources:

- http://web.mst.edu/~cottrell/me240/resources/basic_inst/Basic_Instrumentation.pdf
- <https://sctevtservices.nic.in/docs/website/pdf/140297.pdf>
- https://www.tutorialspoint.com/electronic_measuring_instruments/measuring_instruments.htm
- <https://en.wikipedia.org/wiki/Instrumentation>
- <https://nptel.ac.in/courses/108/105/108105153/>

IFTM UNIVERSITY, MORADABAD
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Diploma (EC) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEC 302: ELECTRONIC DEVICES AND CIRCUITS-I

Objective: To introduce basic semiconductor devices, their characteristics and application. To understand analysis and design of simple diode circuit. To learn and analyze the PN junction behavior at the circuit level and its role in the operation of diodes and active device.

UNIT I

(08 Sessions)

Semiconductors: Introduction to solids: conductor, insulator and semiconductors, Direct and Indirect semiconductor, Types of semiconductor, Band theory of solids, fermi level and carrier concentrations of n and p- type semiconductors, Drift and Diffusion current, Introduction to carrier mobility & conductivity, Continuity equation, Hall Effect.

UNIT II

(10 Sessions)

Semiconductors Diodes: Band structure of P-n junction, depletion layer, p-n junction diode characteristics, Transition & diffusion capacitance of p-n junction diode, Zener & avalanche breakdowns, calculation of ripple factor, form factor and peak factor, Average and r.m.s value of voltage and current for half wave and full wave rectifier, Filter circuits: shunt capacitor, series inductor.

UNIT III

(08 Sessions)

Bipolar Junction Transistor: Introduction to Transistor, construction and working of BJT (NPN and PNP) and their symbols, concept of leakage current, Input and Output characteristics of CB, CE and CC configurations, Current amplification factors: alpha, beta and gamma, relationship b/w alpha, beta and gamma.

UNIT IV

(08 Sessions)

Field Effect Transistors: Construction and working of JFET and its characteristics, analysis of CG, CD, CS configuration and its characteristics, MOSFET: construction, working in enhancement and depletion modes.

UNIT V

(06 Sessions)

Some Special Devices: Introduction and applications of Photodiodes, Photo detectors, solar cell, Light emitting diodes etc, Introduction to SSI, MSI, LSI and VLSI.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the semiconductor, insulator, conductor and their energy level diagram.

CO2: Analyze PN junctions in semiconductor devices and able to analyze simple rectifiers and voltage regulators using diodes.

CO3: Design and analyze simple BJT circuits.

CO4: Design and analyze simple JFET and MOSFET circuits.

CO5: Analyze the behavior of special purpose diodes such as photodiodes, photo detectors.

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. V K Mehta, "Principle of Electronics" S Chand Publication.
2. Robert Boylestad & L. Nashelsky "Electronic Devices and Circuit Theory", Pearson.
3. Sanjay Sharma, "Electronic Engineering", Katson Publication.
4. Y.N. Bapat: "Electronics Devices & Ckts", Discrete & Integrated.

Website Sources:

- <https://nptel.ac.in/courses/117/103/117103063/>
- <https://www.electronics-tutorials.ws/>
- https://www.electronics-tutorials.ws/transistor/tran_1.html

IFTM UNIVERSITY, MORADABAD
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Diploma (EC) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEC 303: BASIC NETWORK SYSTEM

Objective: Introducing the topic and illustrating its importance for the electronics engineering field in network / circuits, Basic Network Theorems, Two port networks, signals Concept of linear network, elements of a network system, Resistance: Law of resistance, the concept of conductance and conductivity, series and parallel combination of resistances, voltage and current divider rules, concept of shorts and open circuit in a network, series and parallel combination of capacitors and series and parallel combination of inductance.

UNIT I **(10 Sessions)**

Fundamentals of a Network System: Concept of linear network, elements of a network system, Resistance: law of resistance, concept of conductance and conductivity, series and parallel combination of resistances, voltage and current divider rules, concept of shorts and open circuit in a network, series and parallel combination of capacitors and series and parallel combination of inductance.

UNIT II **(08 Sessions)**

Introduction to Basic network concepts: Classification of networks, Independent and dependent sources, Ideal voltage and current source, Conversion of sources, Kirchhoff Voltage law, Kirchhoff current law, Nodal analysis, Mesh analysis, and Concept of network duality.

UNIT III **(07 Sessions)**

Basic Network Theorems: Introduction of Super-position theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem in D.C circuits, Delta to star & star to delta conversion.

UNIT IV **(08 Sessions)**

Two port network: Concept of ports in network, introduction to T-network and π -network, symmetric and asymmetric network, balance and unbalance network, analysis of Z, Y and h-parameter of a two port network, introduction and characteristics of Low pass filter, high pass filter, band pass filter, Band reject filters.

UNIT V **(07 Sessions)**

Signals: Definition, Types of signals, Representation of test signals: step signal, impulse signal, ramp signal, gate signal and waveforms synthesis using step, ramp and gate function.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the behavior of different circuits and their response using various circuit analysis tools and fundamentals of network system.

CO2: Analyze the basics of network concept and classification of networks.

CO3: Understand the concept of basic network theorem.

CO4: Analyze the given network using different two port network parameters.

CO5: Identify the characteristics of signal and determine various signal and waveforms synthesis using step, ramp and gate function.

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. 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.

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)

DPEC 304: FUNDAMENTALS OF COMMUNICATION ENGINEERING

Objective: Introduce the students to various modulation and demodulation techniques of analog communication. Analyze different parameters of analog communication techniques and also focuses on pulse modulation and demodulation

UNIT I

(08 Sessions)

Communication: Introduction, Block Diagram of Communication System, Types of communication system, need of modulation and demodulation in Communication System, types of modulation: amplitude modulation, frequency modulation, phase modulation and pulse modulation.

UNIT II

(10 Sessions)

Amplitude Modulation: Amplitude modulation: Derivation of an expression for amplitude modulation, carrier and side band, modulation index and depth of modulation, relative power distribution in carrier and side bands, elementary idea of DSB, DSB-SC, SSB, SSB-SC modulation.

UNIT III

(10 Sessions)

Frequency modulation and Phase modulation: Frequency modulation: Derivation of an expression for frequency modulated wave spectrum, modulation index, maximum frequency deviation and deviation ratio, advantages and disadvantages of FM over AM, Phase modulation: expression of phase modulated wave.

UNIT IV

(08 Sessions)

Pulse Code Modulation: Elementary idea of sampling theory and pulse modulation; Shannon's theorem and coding technique, Quantization (Brief idea only). Time Division and frequency division multiplexing, CDMA, WDMA, FDMA and TDMA (Brief Idea Only). PCM system, Types of PCM and its application.

UNIT V

(08 Sessions)

Principle of AM & FM Modulators and Demodulators: Working principles and typical application of Collector Modulator, Base Modulator and Balanced Modulator, Working principles and application of varactor diode modulator, Principle of demodulation of AM wave using diode detector circuit, Basic principles of detection of FM waves.

Course Outcomes:

After successful completion of the course student will be able to

CO1: Understand the behavior of basic analog communication and classification of communication system.

CO2: Understand the concept of amplitude modulation and demodulation techniques used in analog communication.

CO3: Understand the concept of frequency modulation and phase modulation techniques

CO4: Understand the pulse code modulation, CDMA, WDMA, FDMA and TDMA techniques.

CO5: Analyze principle of AM & FM modulators and demodulators.

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

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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. Kennedy & Davis-, “Electronic Communication System” – Tata McGraw Hill.
2. R P Singh and S D Sapre, “Communication System:Analog and Digital”-Oxford press.

Website Sources:

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

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(w.e.f. session 2022-2023)
DPEC 305: PRINCIPLES OF DIGITAL ELECTRONICS

Objective: The objective of this course is to familiarize with the number system, logic Gates, combinational circuits, memory, memory and the basics of digital electronics.

UNIT I (08 Sessions)

Digital system and binary numbers: Introduction to analog and digital systems and signals, Signed binary numbers, conversions from one number system to another, complements, binary addition and subtraction (subtraction using 1's complement method and 2's complement method), BCD code, Excess-3 code, Gray 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 algebra, Canonical form representations, karnaugh map (k-map) upto 4 variables.

UNIT III (12 Sessions)

Combinational Logic Circuits: 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.

UNIT IV (06 Sessions)

Sequential Circuits: Flip-flops (RS flip flop, JK flip flop, D flip flop and T flip flop), Counters: classification of counter, binary and decade counter, Shift registers: Introduction and basic concepts including shift left and shift right.

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 the basic knowledge of digital logic levels, Binary number system, compliments and codes.

CO2: Analyze knowledge of digital logic gates in Boolean algebra and K-map.

CO3: Design different combinational circuit like adder, subtractor, Multiplexer, Encoder etc.

CO4: Analyze and design various digital electronic circuits like flip flop, Counter etc.

CO5: Understand basic knowledge of Memory and its different types.

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. M. Morris Mano, Hill & Peterson, “Switching Circuit & Logic Design”, Wiley
2. R.P Jain, “Modern Digital Electronics”, TMH.
3. Anand Kumar, “Fundamentals of Digital Circuits” , PHI
4. Anil K. Maini, “Digital Electronics: Principles And Integrated Circuit”, Wiley

Website Sources:

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

IFTM UNIVERSITY, MORADABAD
Diploma (Electronics & Communication Engineering) Programme
Diploma (EC) - II Year (III Semester)
(w.e.f. session 2022-2023)

DPEC 351: ELECTRONICS INSTRUMENTATION & MEASUREMENT LAB

Objective: The objective of this lab is to familiarize with the functions of multimeter and to acquire the basic knowledge about different bridges.

List of Experiments

1. Study of Electronic Multimeter.
2. Study of CRO.
3. Measurement of Low resistance with the help of Kelvin's bridge.
4. Measurement of Medium resistance with Wheatstone bridge.
5. Measurement of Capacitance with the help of Schering bridge.
6. Measurement of Inductance by using Hay's bridge.
7. Measurement of Frequency by using Wien's bridge.
8. Measurement of Inductance by using Maxwell's bridge.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the use of Multimeter for various applications.

CO2: Understand the use of cathode ray oscilloscope for different applications like voltage, frequency.

CO3: Balance DC & AC bridges with the help of CRO.

CO4: Develop practical knowledge about theories of different bridge.

CO5: Analyze the measurement of frequency, capacitance and inductance with the help of bridges.

Suggested Readings:

1. A.K. Sawhney, TMH, "Electronic Measurements and Instrumentation".

Website Sources:

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

IFTM UNIVERSITY, MORADABAD
Diploma (Electronics & Communication Engineering) Programme
Diploma (EC) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEC 352: NETWORK SYSTEM 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.

List of Experiments

1. Implementation and verification of KVL.
2. Implementation and verification of KCL.
3. To verify Y- Δ and Δ -Y (star to delta and delta to star) conversion.
4. To verify mesh and node network.
5. To verify Superposition Theorem.
6. To verify Norton's Theorem.
7. To verify Thevenin's Theorem.
8. To verify Maximum Power Transfer Theorem.

Course Outcomes:

Students completing this course will be able to:

CO1: Analyze the circuit using Kirchhoff's law and Network simplification theorems.

CO2: Apply the knowledge to verify Y- Δ and Δ -Y (star to delta and delta to star) conversion and simplify the network.

CO3: Analyze the circuit using verify mesh, node network,

CO4: Analyze the circuit using Superposition, Norton's and Thevenin's theorems.

CO5: Analyze the circuit using the maximum power transfer to the load & also analyze the series resonant and parallel resonant circuit

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.

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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Diploma (EC) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEC 353: COMMUNICATION LAB-I

Objective:

- To practice the basic theories of analog communication system.
- To study of DSB SC/ SSB SC Modulation and Demodulation simulation software or hardware implementation.
- To study of Amplitude/ Frequency Modulation and Demodulation.
- To study of the Square, Triangular, Sawtooth waveform synthesis to the students, which after completion they will verify using the simulation software or hardware implementation.

List of Experiments

1. To study the element of communication system.
2. To study Amplitude Modulation and Demodulation.
3. To study DSB SC Modulation and Demodulation.
4. To study SSB SC Modulation and Demodulation.
5. To study Frequency Modulation and Demodulation.
6. To study of Square waveform synthesis.
7. To study of Triangular waveform synthesis.
8. To study of Saw tooth waveform synthesis.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand practical knowledge about theories of analog communication, identify and solve basic communication problems.

CO2: Apply hands-on experience for the students, so that they are able to apply theoretical concepts in practice.

CO3: Demonstrate various pulse modulation techniques.

CO4: Evaluate analog modulated waveform in time /frequency domain and also find modulation index.

CO5: Understand about the performance of analog communication systems.

Suggested Readings:

1. Kennedy & Davis, "Electronic Communication System" – Tata McGraw Hill.
2. R P Singh and S D Sapre, "Communication System: Analog and Digital"- Oxford press.

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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Diploma (EC) - II Year (III Semester)
(w.e.f. session 2022-2023)
DPEC 354: DIGITAL LAB

Objective: The objective of this lab is to familiarize with the functions of basic logic gates. To acquire the basic knowledge about the verification of the truth table of gates on experiment kit or breadboard.

List of Experiments

1. Introduction to digital electronics lab, nomenclature of digital ICs, specifications.
2. Verification of truth table of AND, OR, NOT logic gates.
3. Verification of truth table of universal gates.
4. Implementation of the given Boolean function using logic gates in both SOP and POS forms.
5. Verification and implementation Half Adder and Half Subtractor.
6. To convert a Binary code to Gray code.
7. Verification and implementation of Full Adder.
8. Verification and implementation of Full Subtractor.

Course Outcomes:

Students completing this course will be able to:

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

CO2: Analyze and verification of Truth Table of various IC's.

CO3: Analyze and implementation of the different combinational circuit.

CO4: Evaluate and verify the binary code to gray code.

CO5: Evaluate circuits of adders, subtractor etc.

Suggested Readings:

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

Website Sources:

- en.wikipedia.org
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IFTM UNIVERSITY, MORADABAD
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Diploma (EC) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEC 401: INTRODUCTION TO MICROPROCESSOR

Objective: To understand the basic architecture of 8 bit microprocessors. To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design. To understand techniques for faster execution of instructions and improve speed of operation and performance of microprocessors. To understand RISC and CISC based microprocessors. To understand the concept of multi core processors.

UNIT I **(08 Sessions)**

Overview of Microcomputers System: Organization of micro computers: CPU, memory, input & output devices, memory, Buses – Bus architecture of microcomputer, Address bus, Data bus & Control bus, Definition of program, Applications of microprocessors

UNIT II **(08 Sessions)**

Microprocessor Architecture: General microprocessor architecture, instruction Pointer and Instruction register, Instruction format: Machine and mnemonics code, Machine and Assembly language, High level language, Use of ALU: Accumulator, Temporary register, flag flip-flop to indicate overflow, Underflow, Zero result occurrence, Introduction to timing and control circuit

UNIT III **(08 Sessions)**

Introduction of 8085 Microprocessor: Evolution of microprocessor , Pin diagram of Intel 8085, Architecture-ALU, Timing & Control unit, Registers, Data & Address bus, Timing & control signals, Fetch operation, Execute Operation.

UNIT IV **(08 Sessions)**

Instruction set for Intel 8085: Word size- one byte, Two byte & Three byte instructions, Addressing modes of 8085, 8085 interrupts, and introduction to 8085 instructions set, Timing diagram of 8085, program for Addition & Subtraction of two 8-bit numbers.

UNIT V **(08 Sessions)**

Programming: Interpreter, Assembler & Compiler, program for Addition & Subtraction of two 8-bit numbers, Memory – Semiconductor memories – RAM, ROM, EPROM, and EEPROM.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the general architecture of a microcomputer system and architecture & organization of 8085 Microprocessor.

CO2: Understand and classify the instruction set of 8085 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.

CO3: Design system using memory chips and peripheral chips for 16 bit 8086 microprocessor.

CO4: Understand device techniques for faster execution of instructions improve speed of operations and enhance performance of microprocessors.

CO5: Understand semiconductor memories like RAM & ROM & basic programming techniques in microprocessor.

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. A. P. Mathur, "Introduction to Microprocessor" –Tata McGraw Hill, Delhi.
2. B. Ram, "Fundamentals of Microprocessors & Microcomputers"- Dhanpat Rai & Sons, Delhi.
3. Rafiquzzaman, "Microprocessor" –Prentice Hall of India, Delhi.

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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Diploma (EC) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEC 402: INTRODUCTION TO POWER ELECTRONICS

Objective: The objective of this course is to familiarize with the transistor, Thyristors, inverters and the basic concepts of power electronics.

Unit I **(08 Sessions)**

Introduction to Power Electronic Systems: Introduction, Applications of power electronics, Advantages and Disadvantages of power electronics, Power electronics system, Types of power electronics convertors.

Unit II **(10 Sessions)**

Diode circuits: Introduction to diode circuits with DC sources, Diode circuits with resistive load R, Resistive and Capacitive load R-C, resistive and inductive load R-L, Inductive and Capacitive load L-C and resistive, capacitive and inductive R-L-C load, freewheeling diode.

Unit III **(08 Sessions)**

Power Semiconductor Diodes and Transistors- Introduction, construction of power diodes, Types of power diodes Characteristics of power diodes.
 Power Transistors: Introduction, Types of power transistors, working and characteristics of BJT, power MOSFETs, and IGBTs.

Unit IV **(06 Sessions)**

Thyristors- Constructional details and working, switching characteristics of a Thyristor, Thyristors gate characteristics, two transistor model, series & parallel operation of Thyristors, GTO, Thyristor protection-Design of snubber circuit, firing circuit for Thyristors-Main features of firing circuits, R & R-C firing circuits, introduction to Thyristor commutation techniques, Introduction to DIAC, Triac.

Unit V **(08 Sessions)**

Inverters: Introduction, Operating principle of single phase voltage source inverters-single phase bridge inverters steady state analysis of single phase inverters. Three phase bridge inverters- Three phase 180° mode VSI.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the concepts of Power Electronics Systems.

CO2: Understand the concepts & applications of solid state electronics.

CO3: Acquire the basic knowledge of electronic devices- power diodes, transistors, Thyristors, TRIAC, GTOs, MOSFETs and IGBTs.

CO4: Analyze the characteristics and performance operation of Thyristors.

CO5: Understand the concepts of Inverters.

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. Dr. P.S. Bhimbra “Power Electronics”, Khanna Publishers
2. Dr. A. K. Gupta, L.P. Singh, Akhilesh R. Upadhyay “Power Electronics IC Circuits, Devices and Industrial Applications”, Dhanpat Rai Publishing Company

Website Sources:

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

IFTM UNIVERSITY, MORADABAD
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Diploma (EC) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEC 403: FUNDAMENTALS OF TRANSDUCERS AND SENSORS

Objective: To make students familiar with the constructions and working principle of different types of sensors and transducers. To aware students about the measuring instruments and the methods of measurement.

UNIT I **(09 Sessions)**

Sensors, Primary Sensing Elements: Mechanical Devices as Primary Detectors, Mechanical Spring Devices, Pressure Sensing Primary Devices (Bourdon Tubes, Bellows, Diaphragms), Flow Rate Sensing Primary Devices, Temperature Sensor, Optical Fiber Sensors.

UNIT II **(08 Sessions)**

Transducer Basics: Basic Idea and Principle of Operation of the Transducers, Electric Transducers, Classification of Transducers, Resistive Transducers, Potentiometers, Materials used for Potentiometers, Advantages and Disadvantages of Resistance Potentiometers, Strain Gauges, Types of Strain Gauges.

UNIT III **(09 Sessions)**

Transducers Types: Resistance Thermometers its construction and advantages, Thermistors its construction and applications, Thermocouples its construction, working, advantages and disadvantages, its construction and applications, Variable Inductance Transducers, LVDT its advantages, disadvantages and uses, RVDT, Capacitive Transducers, Hall Effect Transducers and its applications.

UNIT IV **(07 Sessions)**

Optoelectronics Transducers: Photo Voltalic Cell and its applications, Photoconductive Cell, Semiconductor Photodiode, Applications of Photo diodes, Photo transistors, Applications of Photo transistors, Photo Optic Transducers, Photo Electric Transducers its advantages and disadvantages, Piezo Electric Transducers its advantages and disadvantages.

UNIT V **(07 Sessions)**

Display Devices: LCD Display, LEDs and photo couplers, LED- Material, Construction, Working, Power & Efficiency, Characteristics, Photo Detectors - Optical detection Principles, P-N photo diode, Avalanche Photodiode, Numeric Display (only brief description)

Course Outcomes:

Students completing this course will be able to:

CO1: Understand various types of Sensors and their working principle

CO2: Understand various types of Transducers and their working principle applications.

CO3: Develop the knowledge of some of transducer, its types.

CO4: Understand the characteristics of various optoelectronics transducers

CO5: Understand the concepts of Display devices and their working.

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. H S Kalsi, "Electronic instrumentation", Tata McGraw Hill.
2. C. S. Ranjan- "Instrumentation Devices & Systems"- Tata McGraw Hill.
3. Singh Jasprit -"Optoelectronics an Introduction to Materials and Devices" - McGraw-Hill
4. A.K. Sawhney - A course in Electrical & Electronic Measurement & Instrumentation – Dhanpat Rai & Sons.

Website Sources:

- <https://nptel.ac.in/courses/108/108/108108147/>
- <https://nptel.ac.in/courses/108/105/108105064/>
- <https://nptel.ac.in/content/storage2/courses/112103174/pdf/mod2.pdf>
- <https://en.wikipedia.org/wiki/Transducer>
- https://www.electronics-tutorials.ws/io/io_1.html

IFTM UNIVERSITY, MORADABAD
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Diploma (EC) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEC 404: FUNDAMENTALS OF SIGNALS AND SYSTEMS

Objective: Coverage of continuous and discrete-time signals and systems, their properties and representations and methods that is necessary for the analysis of continuous and discrete-time signals and systems. Knowledge of time domain representation and analysis concepts as they relate to difference equations, impulse response and convolution, etc. Knowledge of frequency-domain representation and analysis concepts using Fourier Analysis tools, Z-transform.

UNIT I **(10 Sessions)**

Introduction to Signal: Definition, types of signals and their representations continuous and discrete time signals, Classification of Signals: Periodic and nonperiodic, even and odd, energy and power signals, exponential and sinusoidal signals, periodicity, unit impulse, unit step, unit ramp and gate functions, time scaling and time shifting of step function, ramp function.

UNIT II **(10 Sessions)**

Introduction to Systems: Continuous time and discrete time systems, Properties of systems: Linearity, Causality, time invariance and stability.

UNIT III **(10 Sessions)**

Fourier series Representation of Signals: Fourier series representation of continuous periodic signal & its properties, Fourier series representation of discrete periodic signal & its properties.

UNIT IV **(08 Sessions)**

Fourier Transform: The continuous time Fourier transform for periodic and non-periodic signals, Properties of CTFT. Discrete time Fourier transform for periodic and non-periodic signals, Properties of DTFT, the convolution.

UNIT V **(08 Sessions)**

Laplace transform: Definition, Properties of Laplace Transform, and application of Laplace transform, concept of Poles and Zeros, Z-Transform: Definition, basic principles of z-transform, the inverse Z-transform (brief idea only), Properties of z-transform.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand about various types of signals and systems, classify them, analyze them, and perform various operations

CO2: Characterize and analyze the properties of CT and DT signals and systems

CO3: Analyze CT and DT systems in Time domain using convolution

CO4: Represent CT and DT systems in the Frequency domain using Fourier analysis tools like CTFS, CTFT, DTFS and DTFT.

CO5: Analyze CT and DT systems using Laplace transform and Z transform.

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. K M Soni, "Signal and System",- katson publication.
2. S K Panday, "Signal and System"-S Chand.
3. P. Ramesh Babu, R.Ananda Natarajan, "Signals and Systems", SCITECH Publications.
4. V. Oppenheim, A.S. Willsky and S. Hamid Nawab, 'signals & System', PEARSON Education, Second Edition, 2003

Website Sources:

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- www.tutorialspoint.com
- www.vlab.co.in

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Diploma (EC) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEC 405: ELCTRONIC DEVICE AND CIRCUITS –II

Objective: The objective of this course is to familiarize with the Op-Amp, Oscillators, Filters and linear IC's.

UNIT I **(10 Sessions)**

Operational amplifiers: Ideal OP-AMP, Specifications of operational amplifier and its block diagram, open & closed loop circuits, inverting and non inverting configuration, and CMMR and slew rate.

Applications of operational amplifier: adder, sub tractor, differential amplifier, integrator, comparator, log & anti-log amplifiers.

UNIT II **(08 Sessions)**

Feedback amplifiers: feedback concept, transfer gain with and without feedback, general characteristics of negative and positive feedback amplifiers.

Classifications: voltage-series, voltage-shunt, current-series and current-shunt feedback amplifier, Stability criterion.

UNIT III **(08 Sessions)**

Active Filters using Op –Amp: Introduction and characteristics of Low pass filter, high pass filter, band pass filter, band reject filters, all pass filter, Butterworth filter, Introduction of Power amplifier circuits.

UNIT IV **(07 Sessions)**

Oscillators: Oscillators Principles, Types of Oscillators, Frequency Stability, Phase Shift Oscillator, Wien Bridge Oscillator, Crystal Oscillator. Hartley Oscillator, Colpitts Oscillator.

UNIT V **(07 Sessions)**

Linear IC's: Introduction to voltage regulator IC, three terminal voltage regulators IC. Introduction to 555 IC timer, timer as a bistable, mono stable & astable multivibrators.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the current, voltage characteristics of semiconductor devices and introduction about Operational Amplifier.

CO2: Analyze and understand about Feedback Amplifier with their characteristics and operation.

CO3: Design and analyze of Active filters and power amplifier circuit.

CO4: Analyze and understand about Oscillators.

CO5: Understand operational circuit diagrams of IC's & multivibrators circuits.

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. J. Millman & C.C. Halkias- Integrated Electronics; Tata Mc-Graw Hill.
2. Robert Boylestad & L. Nasheisky - Electronics Devices and Circuit Theory; Pearson Education.
3. Sedra Smith- Microelectronics circuits, Oxford Press, India.
4. Op-Amps and Linear Integrated Circuits, Fourth Edition, Ramakant A. Gayakwad, Pearson Education.

Website Sources:

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

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Diploma (EC) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEC451: MICROPROCESSOR LAB

Objective:

- To expose students to the operation of a typical microprocessor (8085) trainer kit.
- To provide practical hands on experience with Assembly Language Programming.
- To develop the quality of assessing and analyzing the obtained data.

List of Experiments

1. To study 8085 microprocessor.
2. To add two 8-bit binary number using 8085 microprocessor.
3. To subtract two 8-bit binary number using 8085 microprocessor.
4. To develop a program to find out the smallest of three decimal numbers.
5. To develop a program to find out the biggest of three decimal numbers.
6. Write a program to arrange an array of data in descending order by using 8085 instruction set.
7. Write a program to arrange an array of data in ascending order by using 8085 instruction set.
8. To prepare an assembly language program to multiply of two 8- bit numbers for 8085 microprocessor.

Course Outcomes:

Students completing this course will be able to:

CO1: Identify relevant information to supplement to the Microprocessor course.

CO2: Set up programming strategies and select proper mnemonics and run their program on the training boards.

CO3: Practice different types of programming keeping in mind technical issues and evaluate possible causes of discrepancy in practical experimental observations in comparison.

CO4: Develop testing and experimental procedures on Microprocessor analyze their operations under different cases.

CO5: Prepare professional quality text and computational results, incorporating accepted data analysis and synthesis.

Suggested Readings:

1. A. P. Mathur, "Introduction to Microprocessor" –Tata McGraw Hill, Delhi.
2. B. Ram, "Fundamentals of Microprocessors & Microcomputers"- Dhanpat Rai & Sons, Delhi.
3. Rafiquzzaman, "Microprocessor" –Prentice Hall of India, Delhi.

Website Sources:

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

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(w.e.f. session 2022-2023)
DPEC 452: POWER ELECTRONICS LAB

Objective: The objective of this course is to make the students to design triggering circuits of SCR. To introduce power electronics components from which the characteristics of SCR, TRIAC, IGBT and MOSFET are obtained. To perform the experiments on various converters.

List of Experiments

1. 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 & Full Wave (Centre Tapped & Bridge) rectifier circuit.
5. Study of Power control by using DIAC.
6. Study of Power control by using TRIAC.
7. Study of R-C firing circuit of SCR.
8. 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 various firing circuits of UJT & SCR.

Suggested Readings:

1. Dr. P.S. Bhimbra (Khanna Publisher)

Website Sources:

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

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(w.e.f. session 2022-2023)
DPEC 453: ELECTRONIC DEVICES LAB

Objective: The objective of this course is to study various electronic components and design of various electronic circuits like power supply, audio and power amplifiers. This course is considered as a foundation course for electronics engineers. The subjects to be studied in higher semesters require thorough knowledge on electronic devices and circuits.

List of Experiments

1. To Study of lab equipments and components: CRO, Multimeter, Function Generator, Power supply- Active and Passive components & Bread Board.
2. To Study the V-I characteristics of diode.
3. To Study of Zener diode as a voltage regulator.
4. To Study and measure the V_{rms} , V_{dc} , and ripple factor of Half wave rectifier.
5. To Study and measure the V_{rms} , V_{dc} , and ripple factor of Full wave rectifier.
6. To Study a characteristics of BJT in common base (CB) configuration.
7. To Study a characteristics of BJT in common emitter (CE) configuration
8. To Study Op-Amp as an adder.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the characteristics of basic electronic devices & V-I characteristics of the diode.

CO2: Understand Zener diode as a voltage regulator

CO3: Evaluate values of V_{rms} , V_{dc} , and ripple factor of Half/full wave rectifier

CO4: Understand the characteristics of BJT in common base (CB)/ common emitter (CE) configuration.

CO5: Understand the concepts of Op-Amp as an adder.

Suggested Readings:

1. Adel S Sedra, Kenneth C Smith and Arun N Chandorkar, "Microelectronic Circuits – Theory and Applications", Seventh Edition, Oxford University Press, 2017.
2. Robert L Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Eleventh Edition, Pearson India Education Services Pvt. Ltd., 2015.
3. Donald A Neamen, "Electronic Circuits – Analysis and Design", Third Edition, McGraw Hill Education, 2006.
4. Albert Malvino and David Bates, Electronic Principles, Eighth Edition, McGraw Hill Education, 2016.

Website Sources:

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

IFTM UNIVERSITY, MORADABAD
Diploma (Electronics & Communication Engineering) Programme
Diploma (EC) - II Year (IV Semester)
(w.e.f. session 2022-2023)
DPEC 454: ELECTRONICS WORKSHOP & PCB LAB

Objective: The objective of this lab is to familiarize with the PCB fabrication and to acquire the basic knowledge about step wise PCB fabrication.

List of Experiments

1. Study of Chemicals used in PCB Lab.
2. Study of PCB curing machine and photo contact printer used for developer of negative.
3. Study of PCB shearing machine.
4. Study of photo resist dip coating and photo U.V (Double Side) machine used for developing PCB.
5. Study of etching machine (Proto Etch) used for developing PCB.
6. Study of roller tinning machine and precision drilling machine.
7. Testing of regulated power supply fabricated.

Course Outcomes:

Students completing this course will be able to:

CO1: Develop practical knowledge about the theories related to PCB fabrication.

CO2: Apply necessary tools to print the negative.

CO3: Analyze the different techniques related to fabrication of the PCB.

CO4: Understand about shearing machine, roller tinning machine & driller machine.

CO5: Understand photo resist dip coating and obtained the various steps and process of fabrication.

Suggested Readings:

1. R.S. Khandpur, "Printed Circuit Boards".

Website Sources:

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

IFTM UNIVERSITY, MORADABAD
Diploma (Electronics & Communication Engineering) Programme
Diploma (EC) - 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:

At the end of the course, the students 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.skillneed.com
- www.campus2-corporate.in
- www.thebalancecareers.com
- www.indeed.com

IFTM UNIVERSITY, MORADABAD
Diploma (Electronics & Communication Engineering) Programme
Diploma (EC) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEC 501: MODERN COMMUNICATION SYSTEM

Objective:

- Aim is to identify the functions of different components.
- Learn about theoretical bounds on the rates of digital communication system and represent a digital signal using several modulation methods
- Draw signal space diagrams compute spectra of modulated signals and apply redundancy for reliable communication.

UNIT I

(10 Sessions)

Elements of Digital Communication and Information Theory: Model of a digital communication system, Logarithmic measure of information. Source coding fixed in and variable length code words, Hartely-Shannon law for channel.

UNIT II

(10 Sessions)

Sampling Theory and Pulse Modulation: Sampling theorem, Signal reconstruction in time domain, Waveform Coding Technique: Quantization, Quantization noise, Encoding and Pulse code modulation, Differential pulse code modulation, Delta modulation, Comparison of PCM and DM.

UNIT III

(08 Sessions)

Digital Modulation Techniques: Types of digital modulation, Wave forms for amplitude, Frequency and phase shift keying, Method of generation and detection of coherent and non-coherent binary ASK, FSK, PSK and DPSK.

UNIT IV

(08 Sessions)

Mobile Communication: Evaluation of mobile communication, A simplified reference model for mobile communication, A brief introduction for radio transmission, signals, propagation, multiplexing, modulation, spread spectrum and cellular system.

UNIT V

(08 Sessions)

Medium Access Control: Introduction to MAC, Introduction to GSM, GPRS, GPS and enable positioning system.

Course Outcomes:

Students completing this course will be able to:

CO1: Remember the basics of information theory and digital communication system, source coding techniques.

CO2: Understand the performance of sampling theorem and pulse modulation.

CO3: Understand the generation and detection of the digital modulation techniques.

CO4: Understand the mobile communication technique for transmission of signals.

CO5: Analyze the performance of different medium access control and brief idea of GSM, GPRS, GPS.

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. Singh and Saprey, "Communication system: Analog and digital"-Oxford press.
2. D. Roddy, "Satellite Communication" - PHI 1998.
3. J. Schiller, "Mobile Communication"-Pearson Education IInd Ed.
4. S. Haykin, "Communication System" - John Willy & Sons IV Ed.

Website Sources:

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

IFTM UNIVERSITY, MORADABAD
Diploma (Electronics & Communication Engineering) Programme
Diploma (EC) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEC 502: MICROWAVE & RADAR ENGINEERING

Objective: The objective of this course is to familiarize with the electromagnetic wave theory, microwave tubes and radar system. Understand the basic concept of Radar and applications of various types.

UNIT I (10 Sessions)

E.M. Waves Theory: Introduction, Scalar and Vector quantity, Unit vector, Position and distance vector, Resolution of vector, Addition, Subtraction of vector, Scalar and Vector product, Line, Surface and Volume integral, Gradient of a scalar, Divergence of a vector, Curl of a vector, Gauss divergence theorem and Stoke theorem (no mathematical derivation), Maxwell Equation, Boundary Condition, Electromagnetic wave equation in free space.

UNIT II (08 Sessions)

Waveguides: Introduction to Microwave and its application, Introduction to waveguide, Types of waveguide, Introduction to electric and magnetic wave equations, Different field components of TE and TM modes in rectangular waveguide (no mathematical derivation), introduction to circular waveguide.

UNIT III (06 Sessions)

Microwave Component: Scattering matrix, passive microwave devices: waveguide tees, directional couplers, two hole directional coupler, isolators, circulators, s-parameter analysis of all components.

UNIT IV (06 Sessions)

Microwave Devices: Introduction to Microwave Tubes- Two cavity Klystron, Reflex Klystron, Travelling wave tube, Introduction to Microwave Semiconductor devices - Tunnel Diode, IMPATT, Gun diode and PIN diode.

UNIT V (10 Sessions)

Radar Systems: Introduction to Radar and its various applications, Radar range equation with derivation and its application. Block diagram and operating principle of basic pulse radar, Block diagram and operating principle of CW (Doppler), Block diagram and operating principle of MTI radar.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand about vectors its application and electromagnetic wave theory.

CO2: Understand about waveguides and its different types and magnetic wave equation.

CO3: Understand about Tee, coupler, Isolator, Circulator etc.

CO4: Understand klystron and semiconductor device like Tunnel Diode, IMPATT, Gun diode and PIN diode.

CO5: Understand basic fundamental of RADAR its operating principle and different types.

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 Readings:

1. S. Y. Liao - Microwave Devices and Circuits - PHI III ed.
2. M. L. Sisodia - Microwave - New Age Internationals.
3. I. M. Skolink - Introduction to Radar System- McGraw Hill.
4. Roddy & Coolen - Electronics Communication - PHI 4th ed.

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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Diploma (EC) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEC 503: BIOMEDICAL ELECTRONICS

Objective: The objective of this course is to familiarize with the physiological system of the human body and relation with the biomedical instruments for diagnosis and to aware diagnosis techniques with the help of measurement instruments.

UNIT I **(08 Sessions)**

Introduction: The age of Biomedical engineering, Development of biomedical instrumentation, Man- Instrumentation System, Components, Physiological system of the body, Problem encountered in measuring a living system.

UNIT II **(08 Sessions)**

Transducers and Electrodes: The transducers and transduction principles active transducers, Passive transducers, Transducer for Biomedical application. Electrodes: Electrode theory, Bio potential Electrodes - Microelectrodes, Body surface, Electrodes, Needle Electrodes, Biochemical transducers, Reference Electrodes, PH electrodes, Blood Gas Electrodes.

UNIT III **(08 Sessions)**

Source of Bioelectric Potentials: Resting and action potentials, Propagation of active potential, The bioelectric potential-ECG, EEG, EMG and Envoked response.

UNIT IV **(08 Sessions)**

Cardiovascular Measurement: Electrocardiography - ECG amplifiers, Electrodes and leads, ECG recorder - Three channel, Vector Cardiographs, EGC system for stress testing, Continuous ECG recording (Holter Recording), Blood pressure measurement, Blood flow measurement, Heart sound measurements.

UNIT V **(08 Sessions)**

Measurement of Respiratory System: Physiology of respiratory system, Measurement of breathing mechanics - Spirometer, Respiratory Therapy equipments: Inhalators ventilators and respirators, Humidifiers, Nebulizers and Aspirators.

Diagnostic Techniques: Ultrasonic Diagnosis ECo - Cardiography, ECO, Encephalography, Ophthalmic Scans, X-Ray and Radio-isotope instrumentation, CAT Scan, Emission Computerised Tomography, MRI.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand physiological system of the human body and problems measuring in a living systems.

CO2: Understand about transducers and electrodes.

CO3: Understand about bioelectric potential.

CO4: Understand about cardiovascular systems and its measurement techniques.

CO5: Understand respiratory systems and its measurement techniques.

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 Reading:

1. Cromwell- Biomedical Instrumentation and Measurements-Prentice Hall (India)
2. R. S. Khandpur - Biomedical Instrumentation - Tata Mcgraw Hill.

Website Sources:

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

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Diploma (EC) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEC 504: TELEMETRY & DATA ACQUISITION SYSTEMS

Objective: To introduce the basic concept of telemetry system and data acquisition. To aware students about the specification of data acquisition system. Students can also identify the types of the telemetry system.

UNIT I **(08 Sessions)**

Telemetry Systems: Introduction, Methods of data transmission, General telemetry system, Types of telemetry systems, Landline Telemetry system: DC voltage, DC current and position telemetry system land line telemetry.

UNIT II **(08 Sessions)**

Transmission channel and media: Introduction, Wire-line channels, Radio channels, Microwave channels, Power lines carrier channels, Introduction to radio link, Transmitting and receiving antenna.

UNIT III **(08 Sessions)**

Data Acquisition System: Introduction, objective of Data Acquisition System, generalized block diagram of Data Acquisition System, analog data acquisition system, digital data acquisition system.

UNIT IV **(08 Sessions)**

Multiplexed System: – Amplitude and frequency modulation techniques, Pulse amplitude modulated (PAM) system, Pulse width modulated system (PWM), Pulse code modulated system (PCM) system.

UNIT V **(08 Sessions)**

Recorders: Introduction, use of recorders, Digital recording systems, X-Y recorder: working principle, construction, operation and salient features of X-Y recorder and introduction of Magnetic tape recorder.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the basics of telemetry systems and its types.

CO2: Understand the transmission channels used in telemetry.

CO3: Understand the Data Acquisition system and its types.

CO4: Understand the various modulation techniques.

CO5: Analyze the working process of various types of recorders.

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	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. A. K. Sawhney – “A course in Electrical & Electronic Measurement & Instrumentation” – Dhanpat Rai & Sons.
2. D Patranabis, “Telemetry Principle”-TMH Ed 1 1999.
3. Mani and Rangan, “Instrumentation Devices and Systems”, Tata McGraw Hill, New Delhi (1997).
4. H. S Kalsi, “Electronic Measurement”, TMH India

Website Sources:

- <https://nptel.ac.in/content/storage2/courses/117101105/downloads/L2.pdf>
- <http://www.digimat.in/nptel/courses/video/108105088/L07.html>

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Diploma (EC) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEC 505: 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.

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: Understand any kind of process by framing it in block diagram, mathematical model and different process variables.

CO2: Understand the concepts of various transducers.

CO3: Implement different control schemes to various processes.

CO4: Design relay logic & pressure measurement for various processes.

CO5: Understand the various Vibration measurement systems and 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	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. 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

IFTM UNIVERSITY, MORADABAD
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Diploma (EC) - 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 **(08 Sessions)**

Entrepreneurship Development: 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: Understand 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 of positive attitude and Entrepreneurship Development.

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 resources:

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

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Diploma (EC) - 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
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Diploma (EC) - III Year (V Semester)
(w.e.f. session 2022-2023)
DPEC 551: COMMUNICATION LAB-II

Objective: To know the steps involved in the analysis of digital communication systems. To understand, synthesize a digital communication module with the given specifications.

List of Experiments

1. To study pulse amplitude modulation using sample and hold circuit.
2. To study pulse Width Modulation and Demodulation.
3. To study pulse position Modulation and Demodulation.
4. To study pulse code modulation and demodulation.
5. To study phase shift keying modulation and demodulation.
6. To study amplitude shift keying modulation and demodulation.
7. To study frequency shift keying modulation and demodulation.
8. To obtain the delta modulation and demodulation signals.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand visualization and practical implementation of baseband modulation techniques

CO2: Analyze pulse amplitude modulation using sample and hold circuit

CO3: Analyze PCM, PWM, PPM modulation and demodulation.

CO4: Analyze ASK, PSK and FSK modulation and demodulation techniques with desired specifications.

CO5: Analyze and implement analogue to digital delta modulation and demodulation signals.

Suggested Reading:

1. Singh and Saprey, "Communication system: Analog and digital"-Oxford press.
2. D. Roddy, "Satellite Communication" - PHI 1998.
3. J. Schiller, "Mobile Communication"-Pearson Education IInd Ed.
4. S. Haykin, "Communication System" - John Willy & Sons IV Ed.

Website Sources:

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

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DPEC 552: MICROWAVE LAB

Objective: The objective of this lab is to familiarize with the Microwave bench set up and to acquire the basic knowledge about E-plane T, H-plane T isolator and circulator.

List of Experiments

1. To study microwave bench set up.
2. To study Klystron amplifier.
3. To study V-I characteristic of GUNN diode.
4. To measure coupling coefficient and directivity of directional coupler.
5. To study the E-plane T.
6. To study the H-plane T.
7. To study of Magic-T.
8. To study of isolator and circulator.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand practical knowledge about theories of microwave bench.

CO2: Understand Klystron Amplifier.

CO3: Analyze the characteristic of GUNN Diode.

CO4: Analyze about E- plane T & H- plane T.

CO5: Understand about various "T" isolator and circulator.

Suggested Readings:

1. S. Y. Liao - Microwave Devices and Circuits - PHI III ed.
2. M. L. Sisodia - Microwave - New Age Internationals.

Website Sources:

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

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

DPEC 601: INTRODUCTION TO DATA COMMUNICATION NETWORK

Objective: To develop an understanding of the various aspects of data communications and computer networking systems. Topics include: data transmission, multiplexing, switching, protocols, and architecture, inter networking and ISDN.

UNIT I **(10 Sessions)**

Introduction to Networks & Data Communications, the Internet, Protocols & Standards, Layered Tasks, OSI Model, TCP / IP, Addressing.

UNIT II **(08 Sessions)**

Data Link Layer: Types of error, Error detection: redundancy, parity check and cyclic redundancy check, Error correction: forward error correction, Data Link Control and protocol: Flow Control, Error Control, Introduction to point to point Protocol.

UNIT III **(08 Sessions)**

Multiple Access: Introduction to random access, Brief idea of CDMA, CSMA/CD, CSMA/CA, Channelization: Introduction to FDMA, TDMA and CDMA, Ethernet: Brief idea of Standard Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LANs: IEEE 802.11, Introduction to Bluetooth.

UNIT IV **(06 Sessions)**

Connecting devices: Repeaters, Hubs, Bridges, Routers, Gateways, Two layer of switches, Overview of IPV4 and IPV6 network.

UNIT V **(08 Sessions)**

Transport Layer: User datagram protocol: port number, user datagram and application of UDP, Transmission control protocol: Introduction to port number, TCP services, numbering byte, sequence number, segment and connection, Introduction of ATM, Network Security: Brief idea of Cryptography.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the key technological components of the network.

CO2: Understand the functioning of data link layer.

CO3: Understand the use of different multiple access techniques in networking.

CO4: Understand the technological trends of computer networking and its connecting devices.

CO5: Understand the functioning of transport layer in networking.

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. B. A. Forouzan, "Data Communications and Networking", TMH, 4th ed. 2007

2. A. S. Tanenbaum, “Computer Networks”, PHI.
3. W. Stallings, “Data and Computer Communication”, PHI.

Website Sources:

- <https://nptel.ac.in/courses/106/105/106105082/>
- https://www.tutorialspoint.com/data_communication_computer_network/index.htm
- <https://www.oreilly.com/library/view/business-data-communications/9781118086834/09-Chapter001.html>

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DPEC 602: FUNDAMENTALS OF CONTROL SYSTEM

Objective: To familiarize students with techniques for basics of the Laplace Transform: Definition of Laplace Transform, Properties of Laplace Transform: Linearity, Scaling, Real Integration, Initial Value and Final Value Theorem, Basics of Inverse Laplace Transform. To familiarize students with basic techniques for stability of Linear Control Systems. To understand the fundamentals of signal flow graph, terminology used in the signal flow graph representation, gain formula, introduction to block diagram reduction using a signal flow graph.

UNIT I **(10 Sessions)**

Basics of Laplace Transform: Definition of Laplace Transform, Properties of Laplace Transform: Linearity, Scaling, Real Integration, Initial Value and Final Value Theorem, Basics of Inverse Laplace Transform.

UNIT II **(08 Sessions)**

Concept of Transfer Function, properties of a continuous system transfer function and Impulse Response.

UNIT III **(08 Sessions)**

Basic Components of a control system, Classification of Control System, Feedback and its effect, types of feedback control systems. Block diagrams. Open Loop System, Closed Loop System, Comparison of Open Loop and Closed Loop System.

UNIT IV **(08 Sessions)**

Block Diagram Representation: Elements of Block Diagram, Advantages and disadvantages of block diagram, Rules for block diagram reduction; Analysis of Multiple input multiple output systems.

UNIT V **(10 Sessions)**

Stability of Linear Control Systems: definition, Bounded-input bounded-output stability criteria, methods of determining stability: Routh Hurwitz criterion, Signal flow graph: fundamentals of signal flow graph, terminology used in signal flow graph representation, gain formula, introduction to block diagram reduction using signal flow graph.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the use of Laplace Transform and its Properties.

CO2: Understand the use of Transfer Function

CO3: Understand the Classification of Control System, block diagrams of Open Loop System, Closed Loop System.

CO4: Understanding the ability to recognize and analyze feedback control mechanisms and elements of feedback control systems.

CO5: Understand the use of Bounded-input bounded-output stability criteria, methods of determining stability: Routh Hurwitz criterion, Signal flow graph.

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. B S Manke, "Linear control system", khanna publications.
2. William A. Wolovich, "Automatic Control Systems", Oxford University Press, 2010.
3. I. J. Nagrath & M. Gopal, "Control System Engineering", New Age International Publishers

Website Sources:

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

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DPEC 603: INTRODUCTION TO OPTICAL FIBER COMMUNICATION

Objective: To expose the students to the basics of signal propagation through optical fibers, fiber impairments, components and devices and system design. Students learn about the advantages, disadvantages and applications of optical fiber communication. Students can aware of basic elements of optical fiber transmission link, fiber modes, configurations and structures. They also understand the different kind of losses, signal distortion and learn about various optical sources, materials and splicing to learn the fiber optic receivers and noise performance in photo detector.

UNIT I **(09 Sessions)**

Overview of Optical Fiber Communication- The general system, Advantages of optical fiber communications, Optical fiber wave guides- Introduction, Ray theory transmission, Optical fiber Modes and configuration, Mode theory for circular Waveguides, Step Index fibers, Graded Index fibers. Single mode fibers.

UNIT II **(09 Sessions)**

Signal Distortion in Optical Fibers- Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, introduction to Dispersion and its type, Optical fiber Connectors: Joints, Couplers and Isolators.

UNIT III **(08 Sessions)**

Optical Sources- Construction, Principle and operation of LEDs, Quantum efficiency, Power, Modulation, Power bandwidth product, Laser Diode: Basic concepts, Classifications, Introduction to Semiconductor injection Laser: Modes, Threshold conditions, External quantum efficiency.

UNIT IV **(06 Sessions)**

Source to Fiber Power Launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture.

UNIT V **(08 Sessions)**

Optical Detectors: Introduction, material and types of photodiode, Operation principles of PIN and APD, Detector response time, Bandwidth, Temperature effect on Avalanche gain.

Course Outcomes:

Students completing this course will be able to:

- CO1: Be familiar with optical fiber communication system and its parameters.
- CO2: Understand the losses occurred due to signal distortions produced in optical fibers.
- CO3: Be familiar with optical sources such as laser diode, LEDs.
- CO4: Understand the power launching techniques in optical fiber.
- CO5: Understand the properties of optical sources and detectors.

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. John M. Senior, "Optical Fiber Communications", PEARSON, 3rd Edition, 2010.
2. Gerd Keiser, "Optical Fiber Communications", TMH, 4th Edition, 2008.
3. Govind P. Agrawal, "Fiber Optic Communication Systems", John Wiley, 3rd Edition, 2004.
4. Joseph C. Plais, "Fiber Optic Communication", Pearson Education, 4th Ed, 2004

Website Sources:

- <https://nptel.ac.in/courses/117/104/117104127/>
- <https://nptel.ac.in/courses/117/101/117101054/>
- https://en.wikipedia.org/wiki/Fiber-optic_communication

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DPEC 604: MODERN CONSUMER ELECTRONICS APPLIANCES

Objective: The objective of this course is to familiarize with the electronic equipment based on different principles, electronic control and various testing standards.

UNIT I **(06 sessions)**

Audio systems: Construction, Working principle and application with basic block diagram of microphone, Loud speakers, Sound recording: Digital sound recording on disc CD system.

UNIT II **(08 sessions)**

Optical Electronics Appliances: Working principle and basic block diagram of Remote control of T.V., Laser Printer, Scanner, Xerox machine..

UNIT III **(08 sessions)**

Domestic Electronics Appliances: Working principle and basic block diagram of calculator, Digital watch/clock, Cellular phones, LCD and LED TV.

UNIT IV **(10 sessions)**

Satellite and Cable TV: Basic Principle, Working and Operation of introduction to Cable TV, DTH system, DTH receiver, HD TV.

UNIT V **(08 sessions)**

Induction Stove and Microwave Oven: Basic Principle, Working and Operation of Induction Stove and Microwave Oven.

Course Outcomes:

Students completing this course will be able to:

CO1: Acquire the basic knowledge of various electronic audio and video devices and systems.

CO2: Acquire the basic knowledge of various Optical Electronics Appliances.

CO3: Analyze the working principles of various home appliances.

CO4: Acquire the basic knowledge of various Satellite and cable TV and DTH system.

CO5: Understand about microwave energy and Microwave Oven.

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 Reading:

1. Consumer Electronics - J.S.Chitode Technical Publications Pune

Website Sources:

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

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DPEC 605: ELECTRONICS EQUIPMENT TESTING

Objective: To familiarize students with the fundamentals of Identification of basic electronic components, ICs, PCBs, Battery & Sensors, Basics of electricity, waveform, frequency, peak value, average value of voltage and current, Probes. To enhance the knowledge of Electronic Test Equipment: Awareness of tools, testing and measuring instruments: CROs, Multimeter, Power supplies, Signal Generator. To familiarize students with basic techniques for Types of Product Testing: Acceptance Testing, Type Testing, Identification of legends, symbols, colour codes, safety standards.

UNIT I **(10 Sessions)**

Fundamentals of Electricity and Electronics: Identification of basic electronic components, ICs, PCBs, Battery & Sensors, Basics of electricity, wave form, frequency value, peak value, average value of voltage and current, Probes.

UNIT II **(08 Sessions)**

Familiarisation with Electronic Test Equipment: Awareness of tools, testing and measuring instruments: CROs, Multimeter, Power supplies, Signal Generator etc.

UNIT III **(08 Sessions)**

Types of Product Testing: Acceptance Testing, Type Testing, Safety Testing, Identification of legends, symbols, colour codes, safety standards, Awareness on ISO 17025, ISO 9001, Calibration and Uncertainty of measurements, Awareness on disposal of Electronic waste.

UNIT IV **(08 Sessions)**

Testing Procedures: Testing of Basic Electronic Components: Resistor (Parameter to be measured: Resistance Value), Capacitor (Parameter to be measured: Capacitance Value, IR at rated Voltage), Inductor (Parameter to be measured: Inductance Value, DC Resistance), Diode (Parameter to be measured: Resistance in forward direction and reverse direction).

UNIT V **(10 Sessions)**

Testing of Amplifiers and Other Linear ICs: testing of Zener diode, typical Op-Amp circuits and Fault diagnosis in Op-Amp circuits.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand the techniques involved in the PCB, Basics of electricity.

CO2: Understand testing & measurement of electronic equipment.

CO3: Aware about testing and Indian and International standards.

CO4: Familiar about the testing procedures.

CO5: Understand different combinational circuits, Zener diode.

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 Reading:

1. A.K Sawhney and Puneet Sawhney, "A Course in Electrical and Electronics Measurement and Instrumentation"-Dhanpat Rai Publications.
2. Dr R.S. Khandpur, "Troubleshooting Electronic Equipment: Includes Repair and Maintenance", McGraw Hill Education (India) Private Limited IInd Edition.

Website Sources:

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

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DOME 061: TOTAL QUALITY MANAGEMENT

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 qualityManagement, 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/cmmi/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:

Students completing this course 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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DPEC 651: CONTROL SYSTEM LAB

Objective: The objective of this lab is to familiarize with DC and AC motor functions and to acquire the basic knowledge about speed control and running mode.

List of Experiments:

1. To study the effect of loading on the speed of the Motor in the open loop.
2. To study the effect of loading on the speed of the Motor in the closed loop.
3. Testing of electronic fan speed regulator.
4. To study the speed control of a DC Motor.
5. To study the speed control of a AC Motor.
6. Study of stepper motor in full step, single phase, step and free running mode.

Course Outcomes:

Students completing this course will be able to:

CO1: Understand theories of speed of motor in open and closed loop.

CO2: Analyze testing of electronic fan speed regulator.

CO3: Analyze the potentiometer constant and speed control of DC motor.

CO4: Analyze the potentiometer constant and speed control of AC motor.

CO5: Understand about stepper motor.

Suggested Readings:

1. Ch. Chengaiah And G. V. Marutheswar, BS Publication, “Control systems”,

Website Sources:

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

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DPEC 652: OPTICAL FIBER COMMUNICATION LAB

Objective: The objective of this lab is to familiarize with OFC link, losses, numeric aperture and to acquire the basic knowledge about Time division multiplexing.

List of Experiments:

1. To setting up fiber optic analog link.
2. To setting up fiber optic digital link.
3. Study and measurement of losses in optical fiber.
4. Study of bending losses in optical fiber.
5. Study and measurement of numerical aperture of optical fiber.
6. Study and perform time division multiplexing (digital).
7. Study of framing in time division multiplexing.
8. Study and measure characteristics of fiber optic LED's and photo detector.

Course Outcomes:

Students completing this course will be able to:

CO1: Develop practical knowledge about theories of optical fiber communication.

CO2: Analyze the fiber optic link setting, bending loss.

CO3: Analyze and measure numerical aperture of optical fiber

CO4: Understand about T.D.M. Time Division Multiplexing.

CO5: Understand the operation of photo detector.

Suggested Readings:

1. John M Senior, Pearson, "Optical Fiber Communications", Wiley

Website Sources:

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