आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

IFTM University, Moradabad, Uttar Pradesh

NAAC ACCREDITED

Course Structure

&

Syllabus

of

Diploma
Mechanical Engineering

[Applicable w.e.f. Academic Session - 2021-22]

[As per CBCS guidelines given by UGC]

UNIVERSITY POLYTECHNIC
DEPARTMENT OF
MECHANICAL ENGINEERING
IFTM UNIVERSITY, MORADABAD

आईएफटीएम विश्वविद्यालय, मुरादाबाद, उत्तर प्रदेश

IFTM University, Moradabad, Uttar Pradesh

NAAC ACCREDITED

IFTM UNIVERSITY

N.H.-24, Lodhipur Rajput, Delhi Road, Moradabad, Uttar Pradesh-244001

www.iftmuniversity.ac.in

Study & Evaluation Scheme of
Diploma (Mechanical Engineering)
[Session 2021-22]

(As per CBCS guidelines)

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

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

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, and Seminar etc.:** Summer Training, Project, Seminar and other learning-oriented activities shall have associated maximum marks and credits, as stated in the syllabus.
3. **Examination:**
    a. The minimum Grade required to pass in each Theory & Practical paper is 'GRADE D'.
    b. A candidate, in order to pass, minimum CGPA of 4.50 is required in a particular academic year inclusive of both semesters of that academic. And maximum number of Carry over 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 in first semester and fourth semester with 04 credit and 0 credit respectively in 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 subject's 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: Material science & Engineering, Thermal engineering, Introductory Strength of Materials, Manufacturing Science -I, Introductory Machine Design, Introduction to CAD, Manufacturing Science, Introduction to Heat Transfer Automobile Technology, Refrigeration, Introduction to Theory of Machine, Concepts of Production Planning & Control , Mechanical Measurement & Metrology, Introductory Fluid Mechanics, Air Conditioning & 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 CNC & Computer Graphics, Production Automation, Machine Tool Technology & Maintenance, Industrial Engineering & safety 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 one elective out of the two DSE offered in semesrer 5^{th} and 5^{th} respectively. Introduction to CNC & Computer Graphics, Production Automation, Machine Tool Technology & Maintenance, Industrial Engineering & safety. Each student will have to choose two discipline specific elective courses (DSECs) in all chosen; 1 in Semester V and 1 in Semester VI respectively. Each 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 5 open elective courses Industrial Management, 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 Mechanical Engineering Program:

Students completing this program will be able to:

PSO1: Prepare and interpret drawings of engineering components. Use software like AutoCAD and Solid Works to prepare and analyze solid models.

PSO2: Prepare simple jobs as per specifications. Operate conventional machine for machining of components as per specifications.

PSO3: Use cutting tools for machines and machine tools. Carry out casting and welding operation.

PSO4: Use modern machining methods for machining of components. Carry out metal forming by rolling and forging processes to produce parts.

PSO5: Use presses and press tools. Prepare simple jigs, fixtures, and pattern, mould and press tools for production purposes.

PSO6: Use surface coating and protection methods. Prepare CNC part program and use CNC machines to make simple jobs. Interface CAD/CAM machines.

PSO7: Supervise operation of boilers, steam turbines, air compressors, IC engines, refrigeration and air-conditioning equipment. Use hydraulic and pneumatic equipment.

PSO8: Use various measuring and gauging instruments.Use various instruments to measure heat/air related parameters.

PSO9: Use heat treatment processes. Design and modify simple machine elements.

PSO10: Select material as per desired application. Identify and rectify simple and common troubles in automotive vehicles.

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 Mechanical Engineering
Diploma (Mechanical Engineering)
(w.e.f. session 2021-2022)

Cluster of Courses for Diploma (Mechanical 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	DPME -301	Materials Science & Engineering	04
2	DPME -302	Introductory Strength of Materials	04
3	DPME -303	Manufacturing Science -I	04
4	DPME -304	Thermal Engineering	04
5	DPME -305	Introductory Machine Design	04
6	DPME -351	Material Science Lab	01
7	DPME -353	Manufacturing Science –I Lab	01
8	DPME -354	Thermodynamics Lab	01
9	DPME -355	Machine Design Lab	01
10	DPME -401	Introductory Fluid Mechanics	04
11	DPME -402	Manufacturing Science -II	04
12	DPME -403	Environmental Education	04
13	DPME -404	Mechanical Measurement & Metrology	04
14	DPME -405	Concepts of Production Planning & Control	04
15	DPME -451	Fluid Mechanics Lab	01
16	DPME -452	Manufacturing Science –II Lab	01
17	DPME -453	Machine Drawing Lab	01
18	DPME -454	Measurement & Metrology Lab	01
19	DPME -501	Refrigeration	04

20	DPME -502	Introduction to Theory of Machines	04
21	DPME -503	Industrial Engineering & Safety	04
22	DPME -551	Basic Refrigeration & AC Lab	01
23	DPME -552	Basic Theory of Machines Lab	01
24	DPME -601	Introduction to CAD	04
25	DPME -602	Automobile Technology	04
26	DPME -603	Introduction to Heat Transfer	04
27	DPME -651	CAD / CAM Lab	01
28	DPME -653	Heat Transfer Lab	01

4. Discipline Elective Core Courses (DSE)

S. No	Subject Code	Subject Name	Credit
1	DPME -504	Air Conditioning	04
2	DPME -505	Machine Tool Technology & Maintenance	04
3	DPME- 604	Production Automation	04
4	DPME- 605	Introduction to CNC & Computer Graphics	04

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

S. No	Subject Code	Subject Name	Credit
1	DOEC-051	Industrial Management & Entrepreneurship Development	04
2	DOCE-051	Disaster Management	04
3	DOME-061	Total Quality Management	04
4	DOEE-061	Non-Conventional Energy Resources	04
5.	NCC01	NCC General	

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	DPME -553	Field Exposure	01
2	DPME -554	Seminar	01
3	DPME -654	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
							Mid Term Exam			External Exam		
				L	T	P	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 Engineering	3	1	0	20	10	30	70	100	4
5.	CC-14	DPEE-201 / DPME-202	Basic Electrical & Electronics Engineering / Workshop Technology	3	1	0	20	10	30	70	100	4
6.	CC-15	DPME-201 / DPCS-201	Elementary Engineering Mechanics / Computer fundamentals & Programming in C	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
7.	CC-16	DPPH-251	Physics-II Lab	0	0	2	-	-	30	70	100	1
8.	CC-17	DPEE-251 / DPME-252	Basic Electrical and Electronics Engineering Lab / Workshop Lab	0	0	2	-	-	30	70	100	1
9.	CC-18	DPCS -251 / DPME-251	Computer Programming Lab / Engineering Drawing Lab	0	0	2	-	-	30	70	100	1
10.	CC-19	DPCH–251	Chemistry – II Lab	0	0	2	-	-	30	70	100	1
11.	SEC-02	DPGP-201	General Proficiency	-	-	-	-	-	100	-	100	1
			TOTAL	**18**	**06**	**08**	**-**	**-**	**-**	**-**	**1100**	**29**

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

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STUDY AND EVALUATION SCHEME
YEAR II, SEMESTER-III

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
							Mid Term Exam			External Exam		
				L	T	P	CT	AS +AT	Total			
THEORY												
1.	DSC-01	DPME -301	Material Science & Engineering	3	1	0	20	10	30	70	100	4
2.	DSC-02	DPME -302	Introductory Strength of Materials	3	1	0	20	10	30	70	100	4
3.	DSC-03	DPME -303	Manufacturing Science -I	3	1	0	20	10	30	70	100	4
4.	DSC-04	DPME -304	Thermal Engineering	3	1	0	20	10	30	70	100	4
5.	DSC-05	DPME -305	Introductory Machine Design	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
6.	DSC-06	DPME -351	Material Science Lab	0	0	2	20	10	30	70	100	1
7.	DSC-07	DPME -353	Manufacturing Science –I Lab	0	0	2	20	10	30	70	100	1
8.	DSC-08	DPME -354	Thermodynamics Lab	0	0	2	20	10	30	70	100	1
9.	DSC-09	DPME -355	Machine Design Lab	0	0	2	20	10	30	70	100	1
10.	SEC-03	DPGP -301	General Proficiency	-	-	-	-	-	100	-	100	1
			TOTAL	**15**	**5**	**08**	**-**	**-**	**-**	**-**	**1000**	**25**

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

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STUDY AND EVALUATION SCHEME
YEAR II, SEMESTER-IV

S. No.	Section	Course Code	Course Name	Periods			Evaluation Scheme				Course Total	Credit
							Mid Term Exam			External Exam		
				L	T	P	CT	AS +AT	Total			
THEORY												
1.	DSC-10	DPME -401	Introductory Fluid Mechanics	3	1	0	20	10	30	70	100	4
2.	DSC-11	DPME -402	Manufacturing Science -II	3	1	0	20	10	30	70	100	4
3.	DSC-12	DPME -403	Environmental Education	3	1	0	20	10	30	70	100	4
4.	DSC-13	DPME -404	Mechanical Measurement & Metrology	3	1	0	20	10	30	70	100	4
5.	DSC-14	DPME -405	Concepts of Production Planning & Control	3	1	0	20	10	30	70	100	4
PRACTICALS/ PROJECT												
7.	DSC-15	DPME -451	Fluid Mechanics Lab	0	0	2	20	10	30	70	100	1
8.	DSC-16	DPME -452	Manufacturing Science –II Lab	0	0	2	20	10	30	70	100	1
9.	DSC-17	DPME -453	Machine Drawing Lab	0	0	2	20	10	30	70	100	1
10.	DSC-18	DPME -454	Measurement & Metrology Lab	0	0	2	20	10	30	70	100	1
11.	SEC-04	DPGP -401	General Proficiency	-	-	-	-	-	100	-	100	1
			TOTAL	**15**	**05**	**08**	**-**	**-**	**-**	**-**	**1100**	**25**

Ability Enhancement Compulsory Course

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

Note: Industrial Training of 4 – 6 weeks after IV Semester, which will be evaluated in V Semester
Abbreviation: DSC- Discipline Specific Course, AECC - Ability Enhancement Compulsory Course, SEC - Skill Enhancement Course

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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	DPME -501	Refrigeration	3	1	0	20	10	30	70	100	4
2.	DSC-20	DPME -502	Introduction to Theory of Machines	3	1	0	20	10	30	70	100	4
3.	DSC-21	DPME -503	Industrial Engineering & Safety	3	1	0	20	10	30	70	100	4
Departmental Elective (Select any one)												
4.	DSE-01	DPME -504	Air Conditioning	3	1	0	20	10	30	70	100	4
	DSE-02	DPME -505	Machine Tool Technology & Maintenance									
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	NCC01	NCC General	-	-	-	-	-	-	-	-	4
PRACTICALS/ PROJECT												
6.	DSC-22	DPME -551	Basic Refrigeration & AC Lab	0	0	2	-	-	30	70	100	1
7.	DSC-23	DPME -552	Basic Theory of Machines Lab	0	0	2	-	-	30	70	100	1
8.	SEC-5	DPME -553	Field Exposure	0	0	2	-	-	100	-	100	1
9.	SEC-6	DPME -554	Seminar	0	0	2	-	-	100	-	100	1
10.	SEC-7	DPGP -501	General Proficiency	-	-	-	-	-	100	-	100	1
			TOTAL	**15**	**5**	**8**	-	-	-	-	**1000**	**25**

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

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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
							Mid Term Exam			External Exam		
				L	T	P	CT	AS +AT	Total			
THEORY												
1.	DSC-24	DPME -601	Introduction to CAD	3	1	0	20	10	30	70	100	4
2.	DSC-25	DPME -602	Automobile Technology	3	1	0	20	10	30	70	100	4
3.	DSC-26	DPME -603	Introduction to Heat Transfer	3	1	0	20	10	30	70	100	4
Departmental Elective (Select any one)												
4.	DSE-03	DPME- 604	Production Automation	3	1	0	20	10	30	70	100	4
	DSE-04	DPME- 605	Introduction to CNC & Computer Graphics									
Open Elective (Select any one)												
5.	DOE-03	DOME-061	Total Quality Management	3	1	0	20	10	30	70	100	4
	DOE-04	DOEE-061	Non-Conventional Energy Resources									
PRACTICALS/ PROJECT												
6.	DSC-29	DPME -651	CAD / CAM Lab	0	0	2	-	-	30	70	100	1
7.	DSC-30	DPME -653	Heat Transfer Lab	0	0	2	-	-	30	70	100	1
8.	SEC-08	DPME -654	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

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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 **(08 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 **(08 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 **(08 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 scalars 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 quantities in terms of heat and temperature in various processes on different scale.

CO5: Understand the concept of elasticity, surface tension pressures 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 (BhartiBhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (BhartiBhawan)
3. A Text Book of Applied Physics: Eagle Prkashan, Jullandhar

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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DPMA 101: ELEMENTARY MATHEMATICS-I

Objective: - 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 I **(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 II **(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 III **(10 Sessions)**

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

UNIT IV **(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 V **(10 Sessions)**

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

Course Outcomes:

After completion of this course student will able to,

CO1: Demonstrate basic knowledge of AP and GP; Sum of n terms, Exponential and Logarithmic series and also understandthe 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 by khanna Publishers, New Delhi.
3. H.R. Luthra : Applied Mathematics by Bharat Bharti Prakashan & Co. Meerut
4. Kailash Sinha : Applied Mathematics by 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 **(08 Sessions)**

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

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

UNIT II **(08 Sessions)**

Periodic Classification Of Elements: Classification of elements (s, p, d and f block elements), Modern Periodic law, Periodic properties: Ionization energy electro negativity, Electron affinity,

UNIT III **(08 Sessions)**

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

UNIT IV **(08 Sessions)**

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

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

UNIT V **(08 Sessions)**

Solid State and Colloids

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

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

Course Outcome:

Students will able to understand and relate electrochemistry and corrosion.

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)

.

	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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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)

	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.

UNITIII **(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(), Putchar(), 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.

UNITIV **(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.

UNITV **(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:

Students after this course will be able to:

CO1: Define computer, its characteristics and generation of computer.
CO2: Explain about detailed description of the computer's memory and its types.
CO3: Describe about the operating system and its functions.
CO4: Explain about input and output devices.
CO5: Explain the features of the C language, keyword, data type and statements in C.

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

	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://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, hemp, wire edge, cup or circular, Flange, angular and cap. Common defects -Their identification and remedy. Defects due to wrong operation or wrong tool. Safety of Personnel, Equipment & Tools to be observed.

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

Familiarity with the use of Various Tools Used in Mechanical Engineering Workshop: Marking & Measuring, Holding Tools. Cutting Tools. Hack saw (Fixed and Adjustable frame), chisels. Finishing tools-Files. Drills and Allied Tools. Miscellaneous Tools.

UNIT IV **(08 sessions)**

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

UNIT V **(08 sessions)**

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

Course Outcomes:

Students completing this course will be able to:

CO1: Practice workshop safety rules effectively.
CO2: Acquire knowledge and use simple hand tools.
CO3: Acquire knowledge and use of carpentry work.
CO4: Acquire knowledge and use of the metal fabrication work.

CO5: Acquire knowledge about different machines: Lathe, Drilling, Shaper and Planer etc.

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

	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

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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, Kirchhoff'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: The students are able to explain the various types of electrical and electronics circuits.

CO2: Can solve a simple type of electrical network problems.

CO3: It imparted the understanding of single phase and three phase AC supply and also the superiority of three phase supply over single phase supply.

CO4: Students got an idea about magnetic field and how it is utilized.

CO5: The students have got an understanding of applications of semiconductor materials and 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)

	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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FEC-101: Fundamentals of English Communication FEC-101

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) CO1

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

UNIT II: Basic Applied Grammar Continued (08 Sessions) CO2

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) CO3

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) CO4

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) CO5

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 today 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)

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

Suggested Readings:

(1) Professional Communication by Malti Agarwal, Krishna Publications.

(2) High School English Grammar & Composition by Wren & Martin, S. Chand & Company LTD., New Delhi.

Website Sources:

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

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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 inclind 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, angels 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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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: Explain about GUI using windows operating system and DOS commands.
CO2: Make simple C programs.
CO3: Explain about statements in C language and how to use arrays and functions in C programs.
CO4: Make C programs with the help of array, structure and nesting of structure.
CO5: Make 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.htmhttps://en.wikipedia.org/wiki/C_(programming_language)
- https://www.cprogramming.com/

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DPPH 151: PHYSICS-I LAB

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:

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 speedometer.
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 Poissuille 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. Computer Fundamentals B. Ram
2. Computer fundamentals P.K Sinha (BPB Publications)

Suggested Readings:

1. Concept of Physics, Prof. H.C. Verma, Part-1 (BhartiBhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (BhartiBhawan)
3. A Text Book of Applied Physics: EgaleParkashan, 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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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 Phenolphthalium as indicator.
5. To determine the Chloride content in supplied water sample by using Mohr's methods.
6. Determination of temporary hardness of water sample by O- Hener's method.

Course outcomes:

Students completing this course will able to:

CO1: Demonstrate laboratory techniques in chemistry, includinganalysis 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 Willey & sons, 6th Edition, 2007.
3. Elements of Physical Chemistry, Glasstonne, Samuel B. ELBS, 2005.
4. Organic Chemistry, Finar, I.L.: Addision – 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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DPME 152/DPME 252: WORKSHOP LAB

Objective:

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

1. Carpentry Shop:

EX-1 Introduction & demonstration of tools used in carpentry shop
EX-2 Planning and sawing practice
EX-3 Making of lap joint
EX-4 Making of mortise and tenon joint
Ex-5 Making of briddle 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 taping 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
CO 1 Acquire skills in basic engineering practice.
CO 2 Identify the hand tools and instruments, gain measuring skills and Obtain practical skills in the trades.
CO 3 Read and use a manufacturing drawing as a definition for the manufacturing of a part.
CO 4 Select proper tools and cutting data for a given material and manufacturing process.
CO 5 Learn about different fastening and fabrication processes in effective manner

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 TechnologybyRajender 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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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:

CO 1 The students are able to know the identification and application of the various types of components used in electrical and electronics circuits.

CO 2 Can understand how Ohm's Law works and its limitations.

CO 3 It imparted the understanding of KCL, KVL and their applications.

CO 4 Students got an idea about the variation of resistance with temperature and working principle of an energy meter & its use.

CO 5 The students have got an understanding of working and 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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DPPH 201: ELEMENTARY PHYSICS-II

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

UNIT-I **(08 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 **(08 Sessions)**

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

UNIT-III **(10 Sessions)**

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

UNIT-IV **(10 Sessions)**

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

UNIT-V **(08 Sessions)**

Semi Conductor Physics:Energy bands, Intrinsic and Extrinsic semi conductor, 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 (BhartiBhawan)
2. Concept of Physics, Prof. H.C. Verma, Part-2 (BhartiBhawan)
3. A Text Book of Applied Physics: Eagle Parkashan, Jullandhar

Website sources:

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

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DPMA 201: ELEMENTARY MATHEMATICS-II

Objective: - The course is aimed to 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 I **(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 II **(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 III **(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 IV **(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 V **(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:

The student is able to

CO1: Basic Knowledge of function, limit and derivatives.

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

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

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

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

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

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

Suggested Readings:

1. R.D. Sharma: Mathematics (I& II-XI) [DhanpatRai Publication, Delhi.]
2. B.S. Grewal :Engg. Mathematics by [khanna Publishers, New Delhi.]
3. H.R. Luthra : Applied Mathematics:[Bharat BhartiPrakashan& Co. Meerut]
4. KailashSinha : 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 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 Outcome:

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)

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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/

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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)

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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

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DPCH 251: CHEMISTRY-II LAB

(20 Sessions)

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

1. Determination of pH of Common Substances.
2. Measurement of soil suspension 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. Looking at Acid's Effects on Metals.
6. Paper Chromatography of dyes.
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 determine the pH level of both city water and well water to determine which is more basic and which is more acidic.
10. Determination of temporary and permanent hardness of water sample.

Course Outcome:

CO1: Students are able to prepare the goods like soaps for cottage industry and self employability.
CO2: Ability to know the separation methods to separate different dyes.
CO3:Ability to calculate the temporary and permanent hardness of different samples of water.

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, Glasstonne, Samuel B. ELBS, 2005.
4. Organic Chemistry, Finar, I.L.: Addision – 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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DPPH 251: PHYSICS-II LAB

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 Parkashan, Jullandhar

Website sources:

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

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DPME -301: Material Science & Engineering

OBJECTIVE - Materials Science & Engineering is the study of mechanical, physical, and chemical properties of engineering materials, such as metals, ceramics, polymers, and composites. The objective of thissubject is to predict and control material properties through an understanding of atomic, molecular, crystalline, and microscopic structures of engineering materials.

UNIT 1. **(6 Sessions)**

GENERAL: Brief introduction to the subject metallurgy and its scope in engineering field, classification of materials of industrial importance. Their chemical thermal, electrical, magnetic, mechanical and technological properties and their selection criteria for use in industry.

UNIT 2. **(9 Sessions)**

STRUCTURE OF METALS AND THEIR DEFORMATION: Structure of metals and its relation to their physical, mechanical and technological properties. Elementary idea of arrangement of atoms in metals, molecular structures crystal structures and crystal imperfactions. Deformation of metals, effects of cold and hot working operations over them. Recovery recrystallisation and grain growth, solid solutions, alloys and inter metallic compounds, allotropy of metals, effect of grain size on properties of metals. Corrosion its causes and prevention.

UNIT 3. **(12 Sessions)**

PROPERTIES AND USAGE OF METALS:(1) (a) Ferrous Metals.(b) Non Ferrous Metals.(2) Nonmetallic Materials.

1. METALS:(a) Ferrous Metals: (i) Classification of iron and steel. Sources of iron ores and places of availability. Outline of manufacture of pig iron, wrought iron, cast iron and steel. (Flow diagram only).(ii) Cast iron: Types as per I.S. - White, malleable, grey mottled, modular and alloy, properties and common uses.(iii) Classification of steels according to carbon content and according to use as per I.S. Mechanical properties of various steels and their uses. Name and places of steel plant in India.Availability of various section of steel in market, its forms and specifications.(iv) Alloy Steel : Effect of alloying various elements, viz Cr, Ni, Co, V, W, Mo, Si and Mn on mechanical properties of steel, Common alloy steels, viz,(a) Ni-Steel(b) Ni-Cr-steel(c) Tungsten Steel(d) Cobalt steel(e) Stainless steel

(f) Tool steel- High Carbon Steel, High Speed tool Steel, Satellite Metal, Tungsten Carbide Diamonds.(g) Silicon manganese steel(h) spring steel(i) Heat resisting alloy steels (Nimonic steels).(j) Impact hardening steel

(b) Non-ferrous Materials:(i) Important ores and their metal content, outline of manufacturing methods, trade names, properties (Phy/Mech./Elect.) and use of the followingmetals: Aluminum, Zinc, Copper, Tin, Silver, Lead.(ii) Base metal with principle alloying elements (I.S.I. specification). Important properties and use of the following alloys:(a) Aluminum Alloys: Aluminum-Copper alloy, Al, Zn alloy, Aluminum- Silica Alloy-Al-Ni-Alloy, Duralumnium-derived alloys (R.R. and Y-alloy).(b) Copper Alloys: Brass, Bronze, Gun metal, Phosphor Bronze, Aluminum Bronze, Ni Bronze.(c) Nickel

Silver: Nickel-Copper Alloy (monel metal) inconel, Nickel, Silver.(d) Bearing Metals: Lead base alloys, tin base alloys. (White metals or babbit metals) Copper base alloys.(e) Solders: Solders-(Lead, Tin solder, Plumber solder, Tinman's solder or Tin solder) Silver solder, Brazing alloys (spelter), Inconel alloys.

2. NON-METALIC MATERIALS:(a) Timber: Conversion of Timber: Its meaning necessity, Seasoning of timber, Preservation of Timber : Types of preservation, Methods of application, Defects in timber, Surface treatment, Soaking treatment, Hot and Cold treatment; Common Indian timber specific uses, properties identification, units of purchase. (b) Plastic and Other Synthetic Materials: Plastics-Important sources-Natural and Synthetic, Classification, thermo set and thermoplastic, Varioustrade names, Important Properties and engineering use of plastics. Market forms-Pallets, Granules, Powder and Liquid forms; Uses of Sunglass rexin, Linoleum.

UNIT 4. (5 Sessions)

IDENTIFICATION AND TESTING OF METAL ALLOYS: Selection, specification forms and availability of materials. Testing of materials(Destructive and nondestructive), Identification of metal by giving miniproject.

UNIT 5. (8 Sessions)

HEAT TREATMENT OF METALS: Elementary concept, purpose, Iron-carbon equilibrium diagram. T.T.T. or 'S' curve in steels and its significance, micro structure of steels and martensitic transformation (elementary idea).Hardening, Tempering, Annealing, Normalising and case hardening. Ageing, Various temperatureranges for different metals and alloy (From heat treatment hand book)

Course Outcomes:

CO1: To understand about by material and its structure, about different mechanical properties.

CO2: To understand about the microstructure of the atoms, solids and different other materials with grains size and corrosion effect.

CO3: to understand about different ferrous and non ferrous materials, alloys with its properties.

CO4: To know about different methods of testing the material like destructive and non destructive testing

CO5: To understand different curves used in materials like TTT and iron carbon equilibrium diagram.

PO-CO 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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CO2	3	3	3	2	3	1	2	1
CO3	3	3	3	3	2	1	1	2
CO4	3	3	3	3	2	2	1	1
CO5	3	3	3	2	3	1	1	2

Suggested Readings :

1. K.M.Gupta, Materials Science, Umesh Publication.
2. V. Raghvan - Material Science, Prentice Hall.
3. Narula - Material Science, TMH.

Website Sources:

- https://www.nde-ed.org/EducationResources
- https://www.element.com/materials-testing-services
- https://www.machinedesign.com/materials

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DPME -302: Introductory Strength of Materials

OBJECTIVE - This subject is useful for a detailed study of forces and their effects. This knowledge is very essential for an engineer, to enable him, in designing all types of structure and machine.

UNIT 1. **(10 Sessions)**

STRESS STRAIN AND PROPERTIES OF MATERIALS: Mechanical properties of materials Ductility, Tenacity, Brittleness, Toughness, Hardness, Factor of safety. Different types of loads and stresses, strain in a stepped bar. Determination of stress and elongation of a bolt in a bolted joint when subjected to direct external load only, stresses in compound bars and columns. Equivalent modulus of a compound bar, temperature stresses. Shrinkage of a tyre on a wheel.Temperature stress in compound bar, stress-stain curves for mild steel, Aluminum, cast iron & rubber.

COMPLEX STRESSES: Stresses on an oblique plane in a body subjected to direct load, concept of compound stresses. Principal stress and Principal planes under direct and shear stresses. Graphical determination by Mohr's circle.

UNIT 2 **(9 Sessions)**

SHEAR FORCE AND BENDING MOMENT: Shear force and bending moment for concentrated and uniformly distributed loads on simply supported beams, cantilever and overhanging beam. Shear force and bending moment diagrams. Relationship between shear force and bending moment.Point of contra flexure, calculations for finding the position of contra flexure.Condition for maximum bending moment.

UNIT 3. **(8 Sessions)**

THEORY OF SIMPLE BENDING: Simple bending, examples of components subjected to bending such as beam, axle, carriage spring etc.. Assumptions made in the theory of simple bending in the derivation of bending formula. Section Modulus Definition of neutral surface and neutral axis and calculation of bending stresses at different layers from the neutral surface for beam of different sections, Pure bending, Concept of Moment of Inertia and case study.

STRAIN ENERGY: Meaning of strain energy and resilience. Derivation of formula for resilience of a uniform bar in tension. Proof resilience, modulus of resilience, suddenly applied load, Impact or shock load. Strain energy in a material subjected to uniaxial tension and uniform shear stress. General expression for total strain energy of simple beam subjected to simple bending.

UNIT 4. **(8 Sessions)**

TORSION: Strength of solid and hollow circular shafts. Derivation of torsion equation.Polar modulus of section. Advantages of a hollow shafts over solid shaft. Comparison of weights of solid and hollow shafts for same strength. Horse power transmitted. Calculation of shaft diameter for a given horse power.

S**LOPES AND DEFLECTIONS OF BEAMS:** Definition of slope and deflection, sign convention. Circular bending.Calculation of maximum slope and deflection for the following standard cases by double integration or moment area method. (1) Cantilever having point load at the free end. Cantilever having point load at any point of the span. Cantilever with uniformly distributed load over the entire span Cantilever having U.D.L. over part of the span from free end Cantilever having U.D.L. over a part of span from fixed end (2) Simply supported beam with point load at centre of the span. Simply supported beam with U.D. load over entire span. NOTE: All examples will be for constant moment of inertia without derivation of formula.

UNIT 5. **(5 Sessions)**

COLUMNS AND STRUTS: Definition of long column, short column and slenderness ratio. Equivalent length, Critical load, Collapsing load, End conditions of columns.Application of Euler's and Rankines formula (No Derivation).Simple numerical problems.

Course Outcomes:

CO1: To evaluate the value of stress, strain and deformation subjected to different loading conditions.

CO2: To draw the SFD and BMD to analyze bending stress and shear stress and deflection of symmetrical beam.

CO3: To compute the strain energy under different loading condition and evaluate bending equation.

CO4: To analyze the torsional shear stress acting on circular shaft subjected to twisting couple.

CO5: To analyze Column and struts subjected to axial load.

PO-CO Mapping (Please write 3,2,1 wherever required)
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CO4	3	2	3	3	2	1	3	2
CO5	3	3	3	2	2	2	1	3

Suggested Readings :

1. Mechanics of Materials by Pytel
2. Strength of Materials by Ryder
3. Strength of Materials by Timoshenko and & Y ungs
4. Mechanics of Materials by Bear Jhonson

Website Sources:

- https://unacademy.com/
- https://theconstructor.org/structural-engg
- https://www.rajagiritech.ac.in/

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DPME -303: Manufacturing Science -I

OBJECTIVE - The course is delineated particularly to understand the conventional manufacturing processes like casting, metal forming, and welding process and to understand the working of machine tools such as lathe, shaper, planner, Slotter, milling, hobbing, and grinding. Manufacturing science also imparts knowledge on selection of suitable manufacturing process for the typical component.

UNIT 1. **(4 Sessions)**

GENERAL FORMING PROCESSES:

Classification and elementary idea of metal forming processes on the basis of the properties of deformability (Plasticity), fusibility and divisibility Viz Rolling, Forging, Drawing, Extruding, Spinning, Pressing, Punching, Blanking.

UNIT 2.

WELDING: **(10 Sessions)**

(I) Weldedge preparation, Introduction to various welding processes with procedure equipments and applications such as (i) Electric arc welding. (ii) Resistance welding-Spot welding, Flash butt, Percussion welding. (iii) Thermit welding. (iv) Carbon arc welding (v) Metal-Inert-Gas welding (MIG). (vi) Tungsten arc welding (TIG). (vii) Atomic Hydrogen arc welding. (viii) Stud welding. (ix) Laser Beam, Electron Beam Welding, Explosion Welding, Ultrasonic Welding. (x) Under water welding (xi) Submerged Arc welding

(II) WELDING: Definition, arc initiation, arc structures, types of arc, metal transfer characteristics and influencing parameters, weld bead geometry, various types of electrodes used in various processes. Selection of electrode from catalogue, current and voltage setting from welder's hand book.

UNIT 3. **(10 Sessions)**

WELDING OF SPECIAL MATERIALS: (i) Welding of plastics, equipment, filler, rods, weld ability, procedures and precautions. (ii) Welding of Grey Cast Iron, shielded metal arc gas welding procedures. (iii) Welding of Aluminum, Argon arc and gas welding procedures. (iv) Welding of copper, Brass and Bronze, Gas shielded metallic arc welding, TIG., Oxyacetylene method. (v) Welding of Alloy steels welding, Stainless steel, welding by oxyacetylene process, MIG, TIG. Specification of electrode as per latest I.S. code.

(III) TESTING OF WELDS & RELEVENT WELDING CODES: (a) Destructive methods. (b) Non destructive methods-visual, X-ray, Gamma-ray, Magnetic particles, flaw detection, fluorescent, dye penetrant and ultrasonic testing.

(IV) COST ESTIMATION OF WELDING : Material cost, Fabrication cost, Preparation cost, Welding cost and Finishing cost, Over head cost, Cumulative effect of poor practices on cost, Calculation of cost of welding gas consumption and welding electrodes.

UNIT 4. **(10 Sessions)**

FOUNDRY PRACTICE:

(A) PATTERN AND MOULDING: The pattern materials used, Types of patterns, Allowances and pattern layout, Colour scheme pattern defects, Types of cores and their utility. Moulding Processes: Classification of mould materials according to characteristics, Types of sands and their important test, parting powders and liquids.Sand mixing and preparation, Moulding defects.

(B) MELTING AND POURING: Fuels and metallic materials used in foundry. Melting furnaces used in foundry such as pit furnace, Tilting and cupola furnaces, metals and alloys. Additions to molten metal, Closing and pouring of the moulds.Coring-up, venting and closing, use of ladles, spur and risers, Defects due to closing and spurring.Basic idea of fettling operations. Surface treatment, Salvaging of castings, Factors determining soundness of casting. Handling of molten metal from furnace to mould.

(C) SPECIAL CASTING: Elementary idea of special casting processes-Shell mould casting, die casting, investment mould casting, centrifugal and continuous casting full mould casting. Elementary idea of mechanization of foundries.

UNIT 5. **(6 Sessions)**

POWDER METALLURGY:

Introduction, principle, scope and names of processes.Production of metal powders, compaction, sintering and sizing.Self lubricated bearings. Advantages of the process and its limitations.(Elementary concept only).

Course Outcomes:

CO1: Explain the process of making patterns, preparation of sand mould, various special casting processes and casting defects.

CO2: Describe various fusion, friction and special welding processes, soldering and brazing processes.

CO3: Employ the appropriate metal forming techniques to produce components like a hexagonal bolt, nut etc.

CO4: Illustrate the various sheet metal forming processes for a specific application.

CO5: Describe the properties and bonding techniques of plastics and various plastic molding techniques.

PO-CO Mapping (Please write 3,2,1 wherever required)
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CO4	3	1	2	3	3	2	2	2
CO5	2	3	3	2	1	2	3	3

Suggested Readings :

1. Manufacturing Science by Ghosh and Mallik
2. Production Engg. Science by P.C. Pandey

Website Sources:

- https://www.enggbharat.com/
- http://www.iitg.ac.in/
- https://www.collinsdictionary.com/

IFTM University, Moradabad
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DPME -304: Thermal Engineering

OBJECTIVE -To impart knowledge on the principles of energy quality and the significance of the same for industrial and domestic applications of thermal systems and different thermodynamic property relations and their applications.

UNIT 1. **(12 Sessions)**

FUNDAMENTAL OF THERMODYNAMICS : Definition, concept of thermodynamic system and surroundings. Closed system, open system, isolated system, thermodynamics definition of work. Zerothlow of thermodynamics.First law of thermodynamics for cyclic and noncyclic processes.Idea of internal energy and enthalpy.Thermodynamic processes - constant volume, constant pressure, constant temperature (Isothermal) processes, adiabatic process polytropic process, their representation on P-V diagram and calculation of work done. Application ofthe first law of these process. Simple numerical problems.Second law of thermodynamic concept of perpetual motion machine of first order and that of second order.Concept of heat engine, heat pump and refrigerator.Carnot cycle efficiency for heat engine and cop for refrigeratr and heatpump.

ENTROPY - its physical concept and significance, reversibility and efficiency, Irreversibility and entropy. Expression for change of entropy in various thermodynamic processes.Simple numerical problems concerning the above.

UNIT 2. **(5 Sessions)**

PROPERTIES OF STEAM : Idea of steam generation beginning from heating of water at 0oC to its complete formation into saturated steam. Pressure temperature curve for steam.Idea of dry saturated steam, wet steam and its dryness fraction, super heated steam and its degree of super heat.Enthalpy, entropy, specific volume and saturation pressure and temperature of steam.Use of steam table and mollier chart.Simple numerical problems.

UNIT-3. **(6 Sessions)**

STEAM GENERATORS: Types of steam generators - Low pressure and High pressure boilers, Modern high pressure high discharge boiler -Stirling boiler, Lamont, Loefflor, Benson, Velox, ramsin and Schmidi-Hartmann boiler, Computer controlled accessories, Equivalent evaporation, Boiler performance efficiency.

A STEAM TURBINE : Classification, details of turbine, working principle of impluse and reaction turbine, compounding methods of steamturbine, efficiency bleeding, concept of steam nozzles, governing of turbine.

B. STEAM CONDENSER : Principle of operation, classification, A brief concept of condenser details.

UNIT-4. **(9 Sessions)**

GAS TURBINE : Elements of gas turbine, working principle, fuel and fuel system, open and close cycle, methods of testing, operating characteristics, Atkinson cycle, Brayton cycle, Heat exchanger, Inter cooler, Reheater, Applications, Performance. Brief concept of heat exhanger.

AIR COMPRESSOR : Definition and their use, Difference between reciprocating and rotary compressor, their types and working work done during compression in single stage and two stage, Heat rejected and inter cooling in tow stage compression, volumetric efficiency, compressor lubrication.

UNIT-5. (8 Sessions)

INTEGRAL COMBUSTION PLANT : Engine classification, Engine cycle, C.I. engine combustion, S.I. engine combustion, Engine structure, Fuel admission system, Air intake system, Engine cooling system, Lubrication system, Engine starting system, I.C. engine in steam plant-Features and working.

Course Outcomes:

CO1: Understand the concept of thermodynamic system and surroundings, various laws of thermodynamics with its PV and TS diagrams and entropy.

CO2: Understand the concept of steam with its types and different diagrams.

CO3: Understand the concept of steam generators, its efficiency curves, steam turbine with its types, Steam condenser and its types.

CO4: Understand the concept of Gas turbine with its types, Air compressor with its type and various PV and TS diagrams.

CO5: Understand the concept of I.C Engines, types of engines (2 stroke and 4 stroke engines), Lubrication System and its uses.

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

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

Suggested Readings :

1. Applied thermodynamics by Onkar Singh, New Age International (P) Publishers Ltd.
2. Basic and Applied Thermodynamics by P.K. Nag, Tata McGraw Hill Pub.
3. Thermal Engg. By P.L. Ballaney, Khanna Publisher
4. Theory of Stream Turbine by W.J. Kearton
5. Steam & Gas Turbine by R.Yadav, CPH Allahabad
6. Thermal Engg. By R.K. Rajput, Laxmi Publication
7. Gas Turbine, by V. Ganeshan, Tata McGraw Hill Publishers.

Website Sources:

- https://unacademy.com/
- https://mechanic37.com/turbine-in-hindi.html
- https://www.vssut.ac.in/lecture_notes

IFTM University, Moradabad
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DPME -305: Introductory Machine Design

OBJECTIVE -To apply mechanical engineering design theory to identify and quantify machine elements in the design of commonly used mechanical systems and to illustrate the variety of mechanical components available and emphasize the need to continue learning. To teach students how to apply the concepts of stress analysis, theories of failure and material science to analyze, design and/or select commonly used machine components.

UNIT 1. **(7 Sessions)**

INTRODUCTION TO DESIGN: General design consideration in machine parts. Mechanical properties of materials of construction, steps in machine design. Factor of safety, Selection of materials.

MACHINE PARTS SUBJECTED TO DIRECT LOADS AND SHEAR LOADS: Threaded connections, core and nominal diameter of screw, boiler-Stay. Design for number of studs or bolts and their diameter for cylinder covers due to external forces. Punching and shearing. Design of cotter and Knuckle joints.

UNIT 2. **(6 Sessions)**

RIVETED AND WELDED JOINTS: Types of riveted joints, possible failure of riveted joints. Strength and efficiency of riveted joint.Unwins formula.Determination of safe load and pitch of rivets.Design of lap and butt joints.Common type of welded joints, definition of leg length, throat thickness and size of weld. Simple design for 'V' butt welded joint, Transverse fillet and parallel fillet welded joints.

UNIT 3. **(9 Sessions)**

MACHINE PARTS SUBJECTED TO BENDING MOMENT: Design for the diameter of railway-Wagon axle, axle used in road-vehicles. Semi-elliptic Laminated spring-Proof load and proof stress stiffness. Expression for max.stress and deflection. determination of different dimensions number of Laminations, Central deflection in a Laminated spring.

MACHINE PARTS SUBJECTED TO TWISTING MOMENT: Design of solid and hollow shafts. Close-coiled helical spring. Maximum shear stress induced for given axial load. Expression for axial deflection, spring index, solid length and stiffness.Calculation for number of coils, mean coil dia and dia of spring wire for axial gradual loads.Simple cases of composite springs.Design of keys and coupling bolts for a rigid flanged coupling.

UNIT 4. **(12 Sessions)**

MACHINE PARTS SUBJECTED TO COMBINED BENDING AND TWISTING MOMENT: Theory of failures (i) Maxm. Principal stress theory. (ii) Maxm. shear stress theory concept of equivalent bending moment, equivalent torque, Design of over hung crank pin. Design of shaft dia for over hung pulley in a belt drive.

MACHINE PARTS SUBJECTED TO COMBINED DIRECT AND BENDING STRESS: Eccentric load and eccentricity. Max. and minimum stress intensities. Reversal of stress. Design for safe load on small columns. Design of brackets and clamps for eccentric loading.

UNIT 5. **(6 Sessions)**

DESIGN OF GEAR: Selection of material, Design analyzing, Lewis equation, Stress concentration, Dynamic load, Surface compressive stress, Beam strength, Bending stress, check or plastic deformation, Design procedure for Spur gear and Helical gear.

Course Outcomes:

CO1: Understand the Importance of design and materials. To determine the selection of material for various applications.
CO2: To develop the Knowledge on Basic failure mechanisms of riveted joints & welded joints.
CO3: Understand the design Procedure for the different machine elements.
CO4: Understand the principles behind various theories of failure and design Procedure for the different Shafts.
CO5: Understand the design procedure of gears.

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

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

Suggested Readings :

1. RS Khurmi, Machine-Design Textbook, S. Chand
2. R L Norton, Machine Design An Introduction, Pearson.
3. R G Budynas, and K J Nisbett, Shigley's Mechanical Engineering Design, McGraw-Hill
4. V B Bhandari, Design of Machine Elements, 3/e, McGraw Hill.

Website Sources:

- https://unacademy.com/lesson
- https://edurev.in/studytube
- https://www.hindilibraryindia.com/industries-2

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DPME -351: Material Science Lab

OBJECTIVE - The main objectives of the course are to learn the principles of materials science and engineering, though lab investigation; To learn the basic skills required to properly use materials science instruments; To learn to organize the lab results in a logic, concise and accurate report.

List of Experiments: Say minimum 08 experiments out of the following:

1. To determine the ultimate tensile strength, its modulus of Elasticity, Stress at yield point,% Elongation and contraction in x-sectional
area of aSpecimen by U.T.M. through necking phenomenon.
2. To determine the ultimate crushing strength of materials like steel and copper and compare their strength.
3. To determine Rock Well Hardness No. and Brinell Hardness No. of a sample.
4. To estimate the Shock Resistance of different qualities of materials by Izod's test and charpy test.
5. To determine the bending moment at a given section of a simply supported beam for different loading.
6. To determine the various parameters of helical coil spring.
7. To determine the angle of twist for a given torque by Torsion apparatus and to plot a graph between torque and angle of twist.
8. Study of diamond polishing apparatus.
9. Study metallurgical microscope.
10. (a) To prepare specimens for microscope examination (For Polishing and etching).
(b) To examine the microstructure of the above specimens under metallurgical microscope.

Course Outcomes:

CO1: Material properties are directly influenced by their microstructures.

CO2: Understanding structure-property relationships allow modification or engineering of materials to perform well in a specific application.

CO3: Metals are micro structurally the simplest to characterize.

CO4: A thorough knowledge of the structure-property relationships of metals can be beneficial in the study of ceramics and polymers.

CO5: Due to time constraints and lab capabilities only certain properties, primarily mechanical, of certain common metals can be studied in depth.

Suggested Readings :

1. K.M.Gupta, Materials Science, Umesh Publication.
2. V. Raghvan - Material Science, Prentice Hall.
3. Narula - Material Science, TMH.

Website Sources:

- https://www.gopracticals.com/mechanical
- https://www.hardnesstesters.com/test-types
- http://www.atri.edu.in/

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DPME -355: Machine Design Lab

OBJECTIVE -To understand and apply national and international standards while drawing machine component. To understand the concept of various tolerances and fits used for component design.To familiarize in drawing assembly, orthographic and sectional views of various machine components.

NOTE: At least 6 practical out of the following are to be performed:

1. Design for static load
2. Design for fluctuating load
3. Design of riveted joint
4. Design of welded joint
5. Design of shaft
6. Design of coupling
7. Design of Keys
8. Design of screw jack
9. Design of springs

Course Outcomes:

CO1: Apply the principle of solid mechanics to design machine member under variable loading.

CO2: Calculate design parameters of permanent and temporary joint on various loading applications.

CO3: Calculate the diameter of shafts based on strength, rigidity and design various types of coupling based on application.

CO4: Calculate the design parameter for an energy storage element like Keys and couplings.

CO5: Calculate the design parameters of various types of springs and screw jack.

Suggested Readings :

1. RS Khurmi, Machine-Design Textbook, S. Chand
2. R L Norton, Machine Design An Introduction, Pearson.
3. R G Budynas, and K J Nisbett, Shigley's Mechanical Engineering Design, McGraw-Hill
4. V B Bhandari, Design of Machine Elements, 3/e, McGraw Hill.

Website Sources:

- https://unacademy.com/lesson
- https://mechstuff.com/
- https://www.slideshare.net/

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DPME -354: Thermodynamics Lab

Objective -The objective of this experiment is to examine a few fundamental concepts of thermodynamics. Particular interest will be given to ideal gas laws internal energy, adiabatic compression and the first law of thermodynamics.

List of Experiments: Say minimum 08 experiments out of the following:

1. Determination of temperature by (i). Thermo couple (ii).Pyrometer.
2. Study of constructional details and specification of high pressure boilers and sketch.
3. Demonstration of mounting and accessories on a boiler for study and sketch.
4. Performance testing of steam boiler.
5. Study of steam turbines through models.
6. Study of fuel supply and lubrication system in I.C. engine.
7. Study of battery ignition system of a multi-cylinder petrol engine stressing on ignition timing, setting fixing order and contact breaker
gap adjustment.
8. Determination of Indicated H.P. of I.C. Engine by Morse Test
9. Morse test on multi-cylinder petrol engine
10. To prepare heat balance sheet for diesel/petrol engine.
11. Study and working of two stroke petrol / Diesel Engine.
12. Study and working of four stroke petrol / Diesel Engine.

Course Outcomes:

CO1: Sketch the valve timing diagram and port timing diagram for single cylinder, four stroke diesel engines and two stroke petrol engine.

CO2: Calculate the mechanical efficiency of four stroke SI engine by Morse test.

CO3: Evaluate the performance of four stroke, single cylinder CI engine & Predict actual diagram.

CO4: Evaluate the performance of steam generator and steam turbines.

CO5: Measure the flash and fire point of various fuel/lubricants.

Suggested Readings :

1. Basic and Applied Thermodynamics by P.K. Nag, Tata McGraw Hill Pub.
2. Thermal Engg. By P.L. Ballaney, Khanna Publisher
3. Steam & Gas Turbine by R.Yadav, CPH Allahabad
4. Thermal Engg. By R.K. Rajput, Laxmi Publication

Website Sources:

- https://www.slideshare.net/
- https://www.britannica.com/technology/diesel-engine

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DPME -353: Manufacturing Science -I Lab

OBJECTIVE -To impart hands-on practical exposure on manufacturing processes and equipment, To expose the students to a variety of manufacturing processes, including their typical use and capabilities and teach the thermal and mechanical aspects, such as force, stress, strain, and Temperature, of the most common processes.

1. PATTERN MAKING: Making Patterns (At least two):

(i) Solid one piece pattern. (ii) Split two piece pattern. (iii) Split three piece pattern. (iv) Gated pattern. (v) Four Piece pattern. (vi) Sweep pattern.

2. SAND PREPARATION AND TESTING: Sand Testing (At Least 2 Experiments):

(i) Grading (Grain Size). (ii) Determination of Moisture content (iii) Determination of Clay content. (iv) Determination of Permeability for gases.

3. MOULDING: (a) Making at least 8 sands moulds of different forms with different types of pattern using:

(i) Floor Moulding. (ii) Two Box Moulding. (iii)Three Box (or more) Moulding.

(b) At least one of the following: (i) Making and setting of cores of different types. (ii) Making one shell mould apparatus.

4. MELTING AND POURING: (Each to be demonstrated at least once in the session).

(a) Demonstration of Melting of cast iron in: (i) Pit Furnace. (ii) Cupola.

(b) Demonstration of melting a Non-Ferrous metal in: (i) Pit Furnace. (ii) Tilting Furnace.

5. ADVANCE WELDING SHOP:

1. Arc Welding practice of mild steel (M.S.) and Spot welding on stainless steel jobs.
2. Practice of Gas cutting manually.
3. Practice of Gas cutting by cutting machine.
4. Practice of Arc cutting.
5. Study of Welding defects.
6. Inspection and Tests of welded joints.
7. Practice of Spot and Seam welding.

6. Press work experiment such as blanking/piercing, washer making etc.

7. Tube bending with the use of sand and on tube bending m/c.

8. Injection molding with plastics.

Course Outcomes:

CO1: Perform the taper turning operation for a given specification.

CO2: Perform thread cutting operation as per the diagrams and compare with standard thread gauges.

CO3: Calculate the eccentricity value for the required stroke length and practice eccentricity turning operation on a lathe.

CO4: Produce square head using the shaper machine as per given drawing and estimate the machining time.

CO5: Calculate the material removal rate and perform Hexagonal head shaping on a given cylindrical work piece as per given drawing.

Suggested Readings :

1. Manufacturing Science by Ghosh and Mallik

2. Production Engg. Science by P.C. Pandey

Website Sources:

- https://www.enggbharat.com/
- http://www.iitg.ac.in/
- https://www.collinsdictionary.com/

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DPME -401: Introductory Fluid Mechanics

OBJECTIVE- The main objective is to apply the concepts of mass, momentum and energy conservation to flow and to develop an appreciation for the properties of Newtonian fluids.Study analytical solutions to variety of simplified problems.

UNIT 1. **(8 sessions)**
INTRODUCTION: Fluid, Fluid Mechanics, Hydraulics, Hydro-statics, Hydro dynamics, Ideal fluid.
HYDROSTATICS: Properties of fluids, Pressure and depth relationship, Hydrostatic pressure, pascal's law, total pressure on flat surfaces, Centre of pressure on flat surfaces. (Simple Numerical Problems)

UNIT 2. **(8 sessions)**
BUOYANCY: Buoyancy,Condition of equilibrium of a floating body, Meta centre and Meta centric height. (Simple Numerical Problems)
FLUID FLOW: Different types of flow, Reynolds's number, Equation of continuity and its applications. (Simple Numerical Problems)

UNIT 3. **(7 sessions)**
ENERGY AND MOMENTUM EQUATION: Types of energies, Energy equation and its application. Bernoulli'stheorem flow measurement instruments where energy equation is used e.g. Venturimeter, Orifice meter, Flow nozzle, pitot tube, Prandtle tube. (Simple Numerical Problems)

UNIT 4. **(9 sessions)**
ORIFICES: Flow through orifices, Co-efficient of contraction, Coefficient of velocity, Co-efficient of discharge, Large vertical orifices, Drowned orifice, time of emptying a rectangular and circular tanks with flat bottoms. (Simple Numerical Problems)
NOTCHES &WEIRS: Different types of notches, Measurement of discharge over rectangular notch, V-notch, Francis and Brazin's formula for rectangular weirs. Submerged weirs, Broad crested weirs. (Simple Numerical Problems)

UNIT 5. **(8 sessions)**
FLOW THROUGH PIPES: Losses in pipe flow due to friction, sudden enlargement, contraction and bends, Elbow & Tee. (Simple Numerical Problems)
CHANNELS: Characteristics of flow, Uniform flow through channels. Rectangular and Trapezoidal channels, Application of Chezy's, Manning and Kutter's formula.Most economical channel sections of retangular and trepozoidal shapes. (Simple Numerical Problems)

Course Outcome:
After studying this subject students should be able to:

CO1: Identify the importance of various fluid properties at rest and in transit.
CO2: Derive and apply general governing equations for various fluid flows
CO3: Understand the concept of boundary layer theory and flow separation.
CO4: Evaluate the performance characteristics of hydraulic turbines and pumps.
CO5: Study and applications of different channels and flow through pipes of different diameters.

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

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

Suggested Readings:

1. S Narasimhan : First Course in Fluid Mechanics , University Press
2. Som, S.K. &Biswas G. : Introduction of fluid mechanics & Fluid Machines, TMH, 2000, 2nd edition.
3. M M Das : Fluid Mechanics &Turbomachines , Oxford University Press
4. S.K.Agarwal : Fluid Mechanics & Machinery, TMH
5. I.H.Shames, .Mechanics of Fluids., McGraw Hill, Int. Student, Education, 1988.
6. Fluid Mechanics by JagdishLal

Websites Sources:

- http://nptel.ac.in/
- www.learnerstv.com
- http://www.mne.psu.edu/cimbala/Learning/Fluid/fluid.htm
- http://www.efluids.com/efluids/pages/edu_tools.htm

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DPME -402: Manufacturing Science –II

OBJECTIVE- The main objective of Manufacturing science is to understand the working of machine tools such as lathe, shaper, planner, Slotter, milling, hobbing, and grinding. Manufacturing science also imparts knowledge on selection of suitable manufacturing process for the typical component.

UNIT 1. **(4 sessions)**

INTRODUCTION: Concept of manufacturing processes, classification and application.

UNIT 2. **(10 sessions)**

METAL FORMING PROCESSES:

(a) FORGING: Hammer forging, drop-forging, dies for drop-forging, drop hammers, press forging, forging machines or up setters, forging tools, forging defects and remedies. Concept of losses in forging operation, estimation of stock required for hand forging considering scale and shear losses

(b) ROLLING: Elementary theory of rolling, hot and cold rolling, types of rolling mills, rolling defects and remedies.

(c) PRESS FORMING: Types of presses, working, selection of press dies, die-material. Press operation-Shearing, piercing trimming, shaving, notching guering or rubber forming, embossing, stamping, punching.

(d) Drawing, extrusion, pipe and tube drawing.

(e) Energy forming technique - Explosive forming, electromagnetic forming.

UNIT 3.

CONVENTIONAL METAL CUTTING PROCESSES: **(10 sessions)**

(a) Gear manufacturing process- Gear hobbing, gear shaping gear shaving, gear generating, gear burnishing, forming 'V' generator, straight bevel gear manufacturing, spiral bevel gear manufacturing.

(b) External threading process-Roll threads, thread milling, thread grinding, thread rolling, thread chasing, Die heads.

(c) Machining of cylindrical holes - Multiple spindle drill press, gang drill press, drilling deep holes and small diameter holes, boring, coordinate method of locating holes, Jig boring machine.

UNIT 4.

METAL FINISHING PROCESS: **(6 sessions)**

Grinding Process, Diamond machining, Honing, Lapping, Super finishing, Polishing and buffing.

UNIT 5. **(10 sessions)**

SURFACE TREATMENT & FINISHING: Meaning of the terms surface treatment and its purpose. Elements of surface treatment cleaning protecting, Coloring, Altering surface properties.Surface Treatment Processes-Wire brushing.Belt sanding. Alkaline cleaning, Vapor degreasing. Pickling.Ultrasonic cleaning.Solvent cleaning.Painting application by dipping.Hand spraying.Automatic spraying. Electrostatic spray finishing. Electro coating.Hot dip coating.Phosphate coating- Packerising and Bondersing.Buffing. Blackening, Anodizing. Electro Nickel Plating.Nickel carbide plating.Sputtering.

Course Outcome:
On successful completion of the course, the student will be able to,

CO1: Explain the features and applications of lathe, milling, drilling and broaching machines.

CO2: Discuss features and applications of reciprocating machine tools like shaper, planer and slotting machine.

CO3: Select suitable manufacturing process for typical components.

CO4: Explain the concept of forging, rolling process and drawing.

CO5: Understand different types of material removal processes with machinery and its 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)

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

Suggested readings-

1. Manufacturing Science-A. Ghosh and A.K. Mallik,Affiliated East-West Press.
2. Fundamentals of Metal Machining and Machine Tools-Geoffrey Boothroyd, CRC Press.
3. Production Technology-R.K. Jain Khanna Publishers.
4. Introduction to Manufacturing Processes-John A. Schey, McGraw-Hill.
5. Production Engineering Science-P.C. Pandey, Standard Publishers Distributors.
6. Modern Machining Processes-P.C. Pandey& H.S. Shan, McGraw-Hill.
7. Degarmo's Materials and Processes in Manufacturing-Ernest P. De Garmo, J. T. Black, Ronald A. Kohser, Wiley.
8. Fundamentals of Metal Cutting & Machine Tools-B.L. Juneja& G.S. Shekhon Wiley.
9. Process & Materials of Manufacturing-R.A. Lindburg, Pearson Eductaion.

Websites Sources:

- https://nptel.ac.in/content/storage2/courses/112105127/pdf/LM-01.pdf
- https://make.3dexperience.3ds.com/processes/introduction-to-finishing-processes
- https://www.kellertechnology.com/blog/8-common-types-of-surface-treatments-for-metal-parts/
- http://www.vssut.ac.in/lecture_notes/lecture1423905443.pdf
- http://www.iitg.ac.in/engfac/ganu/public_html/Metal%20forming%20processes_full.pdf

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DPME -403: Environmental Education

OBJECTIVE- The main objective of this course is tounderstand the concept of environment, ecology and Education and to grasp the significance of environmental education. It further aims to make them to understand the nature and scope of environmental education with regard to Indian policies and to have faith in the conservation of bio-diversity and understand population and the environment.

UNIT 1. **(8 sessions)**

INTRODUCTION: - Basics of ecology, Ecosystem, Biodiversity Human activities and its effect on ecology and eco system.
- Lowering of water level, Urbanization.
- Biodegradation and Biodegradibility, composting, bio remediation, Microbes .Use of biopesticidies and biofungicides.
- Global warning concerns, Ozone layer depletion, Green house effect, Acid rain, etc.

UNIT 2. **(8 sessions)**

POLLUTION: Sources of pollution, natural and manmade, their effects on living environments and related legislation.
WATER POLLUTION: - Factors contributing water pollution and their effect.
-Brief description of Domestic waste water and industrial waste water. Heavy metals, microbes and leaching metal.(no details explanation)
- Brief description of Physical, Chemical and Biological Characteristics of waste water. .(no details explanation)
- Brief description of Indian Standards for quality of drinking water. .(no details explanation)

UNIT 3. **(8 sessions)**

AIR POLLUTION: Definition of Air pollution, types of air pollutants i.e. SPM, NOX, SOX, GO, CO2, NH3, F, CL, causes and its effects on the environment.
- Monitoring and control of air pollutants, Control measures techniques. Introductory Idea of control equipment in industries i.e.
A. Settling chambers B. Cyclones C. Scrubbers (Dry and Wet) D. Multi Clones E. Electro Static Precipitations F. Bog Filler
- Vehicular Pollution and Its control with introduction to Euro-I, Euro-II, Euro-III and Euro IV.

UNIT 4. **(8 sessions)**

OTHER TYPE OF POLLUTION
NOISE POLLUTION: Sources of noise pollution, its effect and control.
RADIOACTIVE POLLUTION: Sources and its effect on human, animal, plant and material, means to control and preventive measures.
SOLID WASTE MANAGEMENT: Municipal solid waste, biomedical waste, Industrial and Hazardous waste, Plastic waste and its management.

UNIT 5. **(8 sessions)**

DISASTER MANAGEMENT:
Definition of disaster - Natural and Manmade, Type of disaster management, How disaster forms, Destructive power, Causes and Hazards, National policy- Its objective and main features, National Environment Policy, Need for central intervention, State Disaster Authority- Duties and powers.

Course Outcome:
On successful completion of the course, the student will be able to,

CO1: Describe the structure and functions of different ecosystem and global warming, green house effect and acid rain etc

CO2: Identify the various causes, effects and control measures of different types of pollution and like water pollution etc

CO3: It gives an idea about the factor of air pollution, cyclone and settling and vehicular pollution.

CO4: It provides an overview on radioactive, noise and solid waste management system.

CO5: Understand the concept of disaster management and its type like natural and man made and how to control it.

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

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

Suggested readings-

1. BharuchaErach (ed) Text Book of Environmental Studies., University Press (India) Pvt. Ltd.
2. BharuchaErach, 2003. The Biodiversity of India, Mapin Publishing Pvt. Ltd, Ahmedabad – 380013,
3. IndiaSantra S.C, (ed), Environmental Science, New Central Agency Pvt Ltd. Kolkata, India.
4. Kaushik, Anubha&Kaushik, C.P. 2006. Perspectives in Environmental Studies, New Age International (P) Ltd. Publisher, New Delhi.
5. Singh Savindra 2003. Environmental Geography, PrayagPustakBhawan, Allahabad.

Websites Sources:

- https://www.physio-pedia.com/Disaster_Management
- https://www.iberdrola.com/environment/what-is-noise-pollution-causes-effects-solutions
- https://www.nrdc.org/stories/air-pollution-everything-you-need-know
- https://wwf.panda.org/knowledge_hub/teacher_resources/webfieldtrips/water_pollution/

IFTM University, Moradabad
Diploma (Mechanical Engineering) Program
Diploma (ME) II Year (IV Semester)
(w.e.f. session 2021-2022)

DPME -404: Mechanical Measurement & Metrology

OBJECTIVE- The main objective of this course is to make students familiar with the mechanical measuring systems, and the standard measurement methods. It further aims to make them to understand the basic measurement systems in the real time engineering applications.

UNIT 1. **(8 sessions)**

INTRODUCTION: Meaning and scope of metrology in field of engineering. standards and types of measurements (Line and Wave length, Primary, Secondary and Tertiary measurement concept only). Limits, Fits and Tolerances.Interchangeability, precision and accuracy, Sources of error.

PRINCIPLES AND CLASSIFICATIONS OF MEASURING INSTRUMENTS: (A) Principle of Mechanical Measuring Instruments: Lever method, vernier method, screw and screw nut method, compound gearing and helical spring methods. (B) Principles of Optical Instruments: Reflection, Refraction, Interference, Polarization, Optical prisms, Lenses and Optical projection (Magnification) (C) Principle of Electrical measuring instruments (D) Principle of Hydraulic and Pneumatic Instruments.

UNIT 2. **(10 sessions)**

TRANSDUCERS: Definition, various types of transducers such as resistive, capacitive, inductive, electromagnetic, photo electric, piezo electric and their use in instrumentation.

COMPARATORS: General principles of constructions, balancing and graduation of measuring instruments, characteristics of comparators, use of comparators, difference between comparators, limit gauges and measuring instruments. Classification of comparators, construction and working of dial indicator, johanssen "Mikrokator", read type mechanical comparator, mechanical-optical, zeissoptotest, electro limit, electromechanical, electronics, pneumatic comparators, gauges, tool makers microscope.

SURFACE FINISH: Geometrical characteristics of surface roughness- Waviness. Lay, flaws. Effect of surface quality on its functional properties.Factor affecting the surface finish. Drafting symbols for surface roughness. Evaluation of surface finish.RMS and CLA values.Methods of measuring surface roughness.Qualitative and quantitative methods.Comparison of surfaces produced by common production methods.

UNIT 3. **(10 sessions)**

VARIOUS TYPES OF INSTRUMENTS USED FOR: (i) (a) Physical Measurements such as - Length, Depth height, Thickness, Gaps, Curvature , Angle, Taper, Area, Undulations, Surface finish, Thread and Gear measurement. (b) Liquid Level & Viscosity - Liquid level measuring methods and devices Viscometer - Plate and Cone viscometer, Two float viscometer, Rheo viscometer. (ii) Mechanical Quantities : (a) Displacement, velocity, acceleration, speed, torque-Use of transducers and electronic counters, stroboscope, vibrating reeds and tachometers. (b) Pressure and Vacuum - Idea of atmospheric pressure, Gauge pressure and vacuum - Use of instruments such as manometers and pressure gauge using elastic elements such as diaphragm, Capsule, Bellows, Bourdon tube and various transducers and thermo couple, vacuum gauges. (c) Strain Gauge - Use of strain gauge and load cells.

UNIT 4. **(6 sessions)**

TEMPERATURE MEASUREMENT: Various types of thermometers, thermocouples, pyrometers (Radiation and optical type).

SPECIAL MEASURING DEVICES: Computerized 3-D measuring machine (Working Only).

UNIT 5. **(6 sessions)**

MEASUREMENT OF VIBRATIONS: Use of seismic Accelerometer, Potentio metric type and L. V. D. T. type, Piezoelectric type accelerometer.

INSPECTION OF GEOMETRICAL ERRORS: Construction and working of auto collimator, checking of straightness, flatness, squareness and parallelism, circularity (By dial gauge and telerod).

Course Outcome:

On successful completion of the course, the student will be able to

CO1: Selecting suitable mechanical measuring instruments for basic and special requirement in the industries.

CO2: Calibrating and analyzing the characteristics of measuring instruments.

CO3: Designing the fits and tolerances to improve the existing performance.

CO4: Determine error and analysing uncertainty in the measurements.

CO5: Work in quality control and quality assurances divisions in industries.

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

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

Suggested readings-

1. Jain R K, "Engineering Metrology", Khanna Publishers, New Delhi (2003)
2. Kumar D S, "Mechanical Measurements and Control Engineering" Metropolitan Book Company, New Delhi (2001)
3. Sawney R, "Instrumentation and Mechanical Measurements", DhanpatRai and Sons, New Delhi (2003)
4. Holeman J P, "Experimental Methods for Engineers", Tata McGraw Hill Publishing Company, Delhi (1998)
5. Beckwith T H, "Mechanical Measurements", Addison Wesley, New York (1990).

Websites Sources:

- http://nptel.ac.in/courses/112106138
- https://www.sciencedirect.com/topics/engineering/vibration-measurement
- https://automationforum.co/classification-of-measuring-instruments/
- https://www.elprocus.com/transducer-types-and-their-applications/

IFTM University, Moradabad
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(w.e.f. session 2021-2022)

DPME-405: Concepts of Production, Planning & Control

OBJECTIVE - The main objective of production planning and control is to ensure the coordinated flow of work so that the required number of products is manufactured in the required quantity and of the required quality at the required time at optimum efficiency.

UNIT 1. **(9 sessions)**

PRINCIPLES OF MANAGEMENT : Definition of management, Administration organization, Functions management, Planning, Organizing, Co-ordination and control, Structure and function of industrial organizations, Leadership- Need for leadership, Factors to be considered for accomplishing effective leadership, Communication -Importance, Processes, Barriers to communication, Making communication, Effective, formal and informal communication, Motivation - Factors determining motivation, Positive and negative motivation, Methods for improving motivation, Incentives, Pay promotion and rewards, Controlling - Just in time, Total quality management, Quality circle, Zero defect concept. Concept of Stress Management

UNIT 2. **(7 sessions)**

HUMAN RESOURCE DEVELOPMENT : Introduction, Staff development and career development, Training strategies and methods.

HUMAN AND INDUSTRIAL RELATIONS : Human relations and performance in organization, Understand self and others for effective behavior, Industrial relations and disputes, Characteristics of group behavior and Trade unionism, Mob psychology, Labor welfare, Workers participation in management.

UNIT 3. **(9 sessions)**

PERSONNEL MANAGEMENT : Responsibilities of human resource management - Policies and functions, Selection - Mode of selection - Procedure - training of workers, Job evaluation and Merit rating - Objectives and importance wage and salary administration - Classification of wage, Payment schemes, Components of wage, Wage fixation.

FINANCIAL MANAGEMENT : Fixed and working capital - resource of capital, Shares, types preference and equity shares, Debenture types, Public deposits, Factory costing, Direct cost, Indirect cost, Factory over head, Fixation of selling price of product, Depreciation- Causes, Methods.

UNIT 4. **(7 sessions)**

MATERIAL MANAGEMENT : Objective of a good stock control system - ABC analysis of inventory, Procurement and consumption cycle, Reorder level, Lead time, Economic order quantity, Purchasing procedure, Stock keeping, Bin card.

LABOUR, INDUSTRIAL AND TAX LAWS : Importance and necessity of industrial legislation, Types of labor laws and dispute, Factory Act 1948, Payment of Wages Act 1947, Employee State Insurance Act 1948, Various types of taxes - Production Tax, Local Tax, Trade tax, Excise duty, Income Tax.

UNIT5. **(8 sessions)**

ENTREPRENEURSHIP DEVELOPMENT : Concept of entrepreneurship, need of entrepreneurship in context of prevailing employment conditions of the country. Successful entrepreneurship and training for entrepreneurship development. Idea of project report preparation.

INTELLECTUAL PROPERTY RIGHTS : Introduction to IPR (Patents, Copy Right, Trade Mark), Protection of undisclosed information, Concept and history of patents, Indian and International Patents Acts and Rules, Patentable and No patentable invention including product versus Process

Course Outcome:
After studying this subject students should be able to:
CO1: It gives information about the importance of management in an industry, Organization and its type of structure.
CO2: It gives information about human resource management and industrial relations
CO3: It gives information about personnel management and development and also about the financial management.
CO4: It gives info about how industries manage raw materials and inventory. It also tells about laws laid in the constitution for both employee and employer
CO5: It gives information about concept of entrepreneurship and explains how one can be a successful entrepreneur.

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

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

Suggested Readings:

1. K C Jain and L N Agarwal, Production Planning and Control, 6th edition, Khanna Publishers, 2008.
2. M Mahajan, Production Planning and Control, DhanpatRai& Co., 2010.
3. R Paneerselvam, Production & Operations Management, 2nd edition, PHI Publications, 2006.
4. E S Baffa and R K Sarin, Modern Production & Operation Managements, 8th edition, Wiley Publications, 2009.
5. O P Khanna, Industrial Engineering and Management, DhanpatRai& Co., 2009.

Websites Sources:

- www.informs.org
- http://nptel.iitm.ac.in/video.php?subjectId=112102106
- http://nptel.iitm.ac.in/video.php?subjectId=112107143
- http://www.youtube.com/watch?v=zlZaOnBbpUg
- http://www.youtube.com/watch?v=b143Y7dTfIA

IFTM University, Moradabad
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DPME -451: Fluid Mechanics Lab

OBJECTIVE -The main objective of this course is to enrich the concept of fluid mechanics and hydraulic machine and demonstrate the classical experiments in fluid mechanics and hydraulic machinery. It further aims to correlate various flow measuring devices such as Venturimeter, orifice meter and notches etc.

A. Demonstration of the following for study & sketch.

1. Piezometer tube, Mechanical flow meter, Manometers, Pressure gauge.

B. Performance Experiments :-

1. Measurement of discharge over notches and its verification.
2. To verify Bernoulli's theorem.
3. To determine coefficient of discharge of a Venturimeter.
4. To determine coefficient of contraction, coefficient of velocity and coefficient of discharge for a given orifice.
5. To determine the loss of head of water due to friction in a water pipe line.
6. To study the performance of a: i. Centrifugal Pumpii. Reciprocating Pump.
7. To measure the velocity of water flow in a open channel by a current meter.
8. To study the transition from laminar to turbulent flow and to determine the Lower critical Reynolds number.
9. Impact of Jet experiment.

Course Outcome:

On successful completion of the course, the student will be able to

CO1: To understand the basic physics of fluids and its properties

CO2: Gaining knowledge to calculate and design engineering applications involving fluid.

CO3: Understanding of analyzing flow systems in terms of mass, momentum, and energy balance.

CO4: Having knowledge about current research topics about fluid mechanics.

CO5: To understand the types of flow based on different parameters and numbers

Suggested Readings:

1. S Narasimhan : First Course in Fluid Mechanics , University Press
2. Som, S.K. &Biswas G. : Introduction of fluid mechanics & Fluid Machines, TMH, 2000, 2nd edition.
3. M M Das : Fluid Mechanics &Turbomachines , Oxford University Press
4. S.K.Agarwal : Fluid Mechanics & Machinery, TMH
5. I.H.Shames, .Mechanics of Fluids., McGraw Hill, Int. Student, Education, 1988.
6. Fluid Mechanics by JagdishLal

Websites Sources:

- https://uta.pressbooks.pub/appliedfluidmechanics/chapter/experiment-2/
- https://aybu.edu.tr/muhendislik/makina/contents/files/VENTURIMETER%20EXPERIMENT(1).pdf
- https://www.powerzone.com/resources/glossary/centrifugal-pump

IFTM University, Moradabad
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(w.e.f. session 2021-2022)

DPME -452: Manufacturing Science -II Lab

OBJECTIVE –The main objective of this course is to emphasize the importance manufacturing sciences in the day-to-day life, and to study the basic manufacturing processes and tools used. The course is delineated particularly to understand the conventional manufacturing processes like casting, metal forming, and welding process.

List of Experiments: Say minimum 8 experiments out of the following:

1. Turning, boring, internal threading of cylindrical solid rod.
2. Marking and drilling holes in cylindrical solid rod.
3. Boring hole in cast iron pulley and cutting key way slot.
4. Turning bottom shaft of cycle and milling cotter slot.
5. Turning and internal threading of cone of cycle.
6. Turning plug gauge.
7. Study of twist drill & drilling Machine
8. To prepare a butt joint by oxy acetylene gas welding.
9. Bolt making on Lathe machine.
10. Soldering & Brazing Experiment.
11. Machining a block on shaper machine.
12. Sheet Bending on sheet bending machine.

Course Outcome:

On successful completion of the course, the student will be able to

CO1: Students will learn principles, operations and capabilities of various moulding, metal casting, metal forming, press working, metal joining processes & also processing of plastics.

CO2: Upon completion of this course, students shall understand the importance of manufacturing processes and be able to select and apply suitable processes for an engineering product.

CO3: It provides the idea about different types of welding processes.

CO4: It provides the working on different machines like lathe and fabrication of different articles on lathe machine.

CO5: It provides the idea about different types of threading and bending machines for sheets

Suggested Readings:

1. Manufacturing Science-A. Ghosh and A.K. Mallik,Affiliated East-West Press.
2. Fundamentals of Metal Machining and Machine Tools-Geoffrey Boothroyd, CRC Press.
3. Production Technology-R.K. Jain Khanna Publishers.
4. Introduction to Manufacturing Processes-John A. Schey, McGraw-Hill.
5. Production Engineering Science-P.C. Pandey, Standard Publishers Distributors.

Websites Sources:

- https://openoregon.pressbooks.pub/manufacturingprocesses45/chapter/chapter-unit-1-the-engine-lathe/
- http://engineering.myindialist.com/2009/principle-and-working-of-milling-machine/
- https://www.infotrade.in/blogs-Shaper_Machine

IFTM University, Moradabad
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(w.e.f. session 2021-2022)

DPME -453: Machine Drawing Lab

OBJECTIVE– Machine drawing is used to communicate the necessary technical information required for manufacture and assembly of machine components. These drawings follow rules laid down in national and International Organizations for Standards (ISO). Hence the knowledge of the different standards is very essential.

Introduction: Graphic language, classification principles of drawing, IS codes for machine drawing, lines, scales, dimensioning, standard abbreviations.

Orthographic projection: First & third angle projection, drawing and sketching of machine elements.

Threaded fasteners: Introduction, nomenclature, forms of thread, thread designation, Representation of thread, Foundation bolt.

Keys and cotter: Keys and cotter joint

Shaft couplings: Introduction, rigid and flexible coupling.

Riveted joint: Introduction, Rivets and riveting, Rivet head, Classification.

Assembly drawing: Introduction, Engine parts, Stuffing box, screw jack.

Free hand sketching: Introduction, need for free hand sketching, Free hand sketching of some machine component.

Course Outcome:

On successful completion of the course, the student will be able to

CO1: Ability to apply Knowledge of Engineering Graphics, Machine Drawing, Basic Science and Basic Applied Mathematics in Machine Drawing.

CO2: Develop Logical and Analytical ability to apply Knowledge of various theories of failures for design of Mechanical components use in Industries like Joints, Bolts, Shafts etc.

CO3: Understand different stress on Power Screws and Bolted Joints and able to apply its knowledge for design of screw jack and simple bolted joint.

CO4: Understand the concepts of riveting and its classification based on application

CO5: To give the knowledge of different types of projection used in engineering drawing.

Suggested Readings:

1. Machine Drawing by / Bhattacharyya / Oxford
2. Machine Drawing with Auto CAD / GouthamPohit, GoutamGhosh / Pearson
3. Machine Drawing / Ajeet Singh / McGraw Hill
4. Machine Drawing / N.D. Bhat / Charotar

Websites Sources:

- https://www.slideshare.net/rikss2004/example-to-solve-for-orthographic-projections
- https://www.slideshare.net/habibkhan5680899/final-38860233
- https://nptel.ac.in/content/storage2/courses/112105125/pdf/Module-4_lesson-4.pdf

IFTM University, Moradabad
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Diploma (ME) II Year (IV Semester)
(w.e.f. session 2021-2022)

DME -454: Measurement & Metrology Lab

OBJECTIVE- Measurement & Metrology used to Identify and classify different measuring tools related to the experiments. Identify, define, and explain accuracy, precision, and some additional terminology. Conduct, Analyze, interpret, and present measurement data from measurement experiments. Identify sources of variability, error, and uncertainties.

List of Experiments: Say minimum 8 experiments out of the following:

1. Measurement of angle with the help of sine bar/vernier Bevel protractor.
2. Study and sketch of various types of optical projectors.
3. Use of comparators for measurement.
4. To test the squareness of a component with autocollimator.
5. To measure the pitch, angle and form of thread of a screw.
6. Measurement of gear elements by using gear tooth vernier.
7. To measure the straightness of the edge of a component with the help of autocollimator.
8. Use of linear measuring instrument such as vernier caliper and micrometer.
9. Use of height gauge and verniercallipers.
10. Calibration of verniercallipers/micrometers with slip gauge.
11. Calibration of height gauge/depth gauge with slip gauge.
12. Measurement of Thread Parameter by using tool maker's microscope.
13. Use of slip gauge in measurement of centre distance between two pin.
14. Checking of accuracy of a plug gauge with micrometer.
15. Measurement of surface roughness of a surface.
16. Use of feeler, wire, radius and fillet gauges for checking of standard parameters.
17. Study of Pressure & Temperature measuring equipment.
18. Study and understanding of limits, fits & tolerances.

Course Outcome:
On successful completion of the course, the student will be able to

CO1: The student shall be measuring the various parameters like length, height, angle, displacement, flatness etc., by using various instruments like vernier calipers, micrometer, dial indicator, etc.

CO2: The student shall be able to measure the threads, gear tooth profiles and surface roughness using appropriate instruments and analyze the data.

CO3: The student shall be able to recognize various types of governors and gyroscopes, and improve their performance as per requirement.

CO4: The student shall be able to check alignment of various components in various mechanisms using advanced scientific tools.

CO5: It gives an idea about how can a student a particular measuring device for the particular measurement.

Suggested Readings:

1. Jain R K, "Engineering Metrology", Khanna Publishers, New Delhi (2003)
2. Kumar D S, "Mechanical Measurements and Control Engineering" Metropolitan Book Company, New Delhi (2001)
3. Sawney R, "Instrumentation and Mechanical Measurements", DhanpatRai and Sons, New Delhi (2003)
4. Holeman J P, "Experimental Methods for Engineers", Tata McGraw Hill Publishing Company, Delhi (1998)
5. Beckwith T H, "Mechanical Measurements", Addison Wesley, New York (1990).

Websites Sources:

- https://www.hindilibraryindia.com/industries-2/tools/vernier-bevel-protractor-construction-reading-hindi-industries/20197
- https://unacademy.com/lesson/vernier-callipers-introduction-in-hindi/X87C8GA3
- https://www.infotrade.in/blogs-detail.php?blogId=37

IFTM University, Moradabad
Diploma (Mechanical Engineering) Program
Diploma (ME) II Year (IV Semester)
(w.e.f. session 2021-2022)

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 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)

	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:

- https://en.wikipedia.org/wiki/Professional_communication
- https://www.thoughtco.com/professional-communication-1691542
- https://coccoer.pressbooks.com/chapter/professional-communications/

IFTM University, Moradabad
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(w.e.f. session 2021-2022)

DPME – 501: Refrigeration

Objectives: This subject gives the concept about refrigeration process and system that are used in household appliance and industrial units. This subject is also deals with the various system like vapour compression refrigeration system and vapour absorption system that have various components like compressor, evaporator, expansion valve etc.

UNIT 1. **(Sessions:7)**

REFRIGERATION: Its meaning and application, Unit of refrigeration, various methods of refrigeration.

ABSORPTION REFERIGERATION: Basic system, Ammonia system, improved absorption system, Electrolux refrigerator. Simple problems on basic and improved system.

UNIT 2. **(Sessions:10)**

VAPOUR COMPRESSION SYSTEM: Simple saturated vapor compression cycle, Standard vapor compression cycle, Study of P-h chart and T-S chart, Numerical analysis of vapor compression cycle with P-h and T-S chart, Wet and dry compression, Factor effects the COP of system, Departure of actual vapor compression cycle from Theoretical cycle of vapor compression, By passing of evaporator, Flash chamber, Accumulator, Pre cooler and Sub cooler, System modification by multi compression and expression, System modification by compound compression with inter cooling, Dual and multi effect compression, Multi load system of refrigeration.

AIR CYCLE REFERIGERATION: Ideal air cycle, boot strap system, application. Revered carnot cycle, Bell coleman cycle. Simple numerical problems.

UNIT 3. **(Sessions:10)**

COMPRESSORS: Introduction types and classification of compressors.

(a) RECIPROCATING COMPRESSORS: Construction and arrangement of cylinders, types and construction of piston, Suction and discharge valve (types and construction), Poppet valves, ring plate valves, flexing valves, valve location, Bore and stroke relation of a compressor. Construction of cranks, connecting rod, crank shaft seal and gaskets, lubricants, their properties, Lubrication recommendations (Small systems, industrial refrigeration, miscellaneous equipment) methods of lubrication, Liquid refrigerant in compressor crank case. Method of reducing oil foaming at the compressor start

(b) ROTARY COMPRESSORS: Construction and working, cylinder construction and fitting rotar construction, blade construction, crank shaft construction, valve construction, crank shaft seal and gaskets. Lubrication of rotary compressors.

(c) CENTRIFUGAL COMPRESSORS: Construction and working of compressor, sealed unit rufflers and their advantages, hermatic rotary compressors, Regulation of compressor capacity, Starting of compressor, shutting down of a compressor.

UNIT 4. **(Sessions:7)**

CONDENSORS: Definition, type of condensers, air cooled, water cooled and evaporator type. Air cooled condensers- Natural convection, Mechanically cooled finned tube, Plate type, Wire mesh, induced and forced type, Chesis mounted and remote type, air quantity and velocity for an air cooled condenser and rating and selection of air cooled condensers. Water cooled condensers, Evaporative condensers.

UNIT 5. **(Sessions:6)**

EVAPORATORS AND COOLERS: Definition, design, over all heat transfer co-efficient, L.M.T.D., Evaporator T.D., Effect of evaporator T.D. on space humidity, other factors of evaporator selection. Types of evaporators, Flooded and dry expansion evaporators. Classification according to type of construction, Bare tube, Plate surface and finned, Natural convection evaporators. Rating and selection of natural convection evaporators.Forced Convection evaporators rating and selection of unit coolers, liquid chilling evaporators (Chillers), double pipe coolers, advantage, disadvantage, application.

Course outcomes:

After studying this subject students should be able to:

CO1: Understand the concept of refrigeration, its application and various methods of refrigeration, Absorption refrigeration system .

CO2: Understand the concept of vapour compression refrigeration system, Air refrigeration working cycles like Carnot cycle, Boot strap and Bell Coleman cycles etc with PV and TS diagrams

CO3: Understand the compressors with its uses and types, working and constructional details of reciprocating, rotary and centrifugal compressors.

CO4: Understand the concept of condensers, its types and different processes with different combinations as per the applications.

CO5: Understand the concept of evaporators and its types with different processes and diagrams, coolers with its types and applications of evaporator and different coolers used in the Industry.

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**3**	**3**	**2**	**1**	**1**	**1**	**2**	**2**
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**	**2**	**1**	**1**	**1**	**2**	**2**

Suggested Readigs:

1. Refrigeration and Air conditioning, by Manohar Prasad, New Age International (P) Ltd.Pub.
2. Refrigeration and Air conditioning by C.P Arora.
3. Refrigeration and Air conditioning by Arora&Domkundwar.
4. Refrigeration and Air conditioning by stoecker& Jones.
5. Refrigeration and Air conditioning by Roy J. Dossat.

Website Sources:

- www.sciencedirect.com
- berg-group.com
- www.araner.com
- nptel.ac.in
- link.springer.com

IFTM University, Moradabad
Diploma (Mechanical Engineering) Program
Diploma (ME) III Year (V Semester)
(w.e.f. session 2021-2022)

DPME – 502: Introduction to Theory of Machines

Objective - This subject gives the understanding to the students to develop a solution oriented approach by knowledge of mechanism and machine. This also deals with kinematic and dynamic analysis of the machine. This gives the fundamental understanding of balancing of mass or machine.

UNIT 1. **(Sessions:7)**

MECHANISMS AND MACHINES: Definition, Kinematic pairs, types of mechanism, Special types of mechanism, Space mechanisms.

KINEMATIC ANALYSIS & SYNTHESIS: Displacement, Velocity and Acceleration of plane mechanism, Graphical and analytical techniques, Synthesis of mechanisms - Crank Rockers, Four Bar Mechanisms, Slider Crank Mechanisms.

UNIT 2. **(Sessions:7)**

DYNAMICS OF MACHINES: Static and dynamic force analysis, Graphical and analytical approaches, Engine mechanisms, Turning moment diagram, Flywheel analysis, Gyroscopic action in machines.

GOVERNORS: Types and classification, Principle of working of gravity controlled and spring controlled governors, Stability, Isochronisms, Sensitivity and capacity.

UNIT 3. **(Sessions:8)**

UNBALANCE IN MACHINES, ENGINES AND BALANCING: Origin of unbalanced forces and moments and effects of unbalance, Unbalance n rotating bodies and balancing of discs and rotors, Balancing machines, Field balancing of discs and rotors, Unbalance in reciprocating machines -engine, Compressor, Presses. Unbalance force and moment in a single cylinder engine and balancing, Multi cylinder engine balancing in Line engine, V and Radial engines, Lanchestor balancing techniques.

UNIT 4. **(Sessions:8)**

CAMS AND CAM FOLLOWER MECHANISMS: Purpose of using cam- Follower mechanisms, types of cams and cam follower mechanisms, Nomenclature synthesis of disc cam profiles for prescribed follower motion, determination of basic dimension, Graphical and analytical approaches for different types of followers, Dynamics of cam – follower systems - Jump and crossover stock.

UNIT 5. **(Sessions:10)**

GEARS AND GEAR DRIVES: Power transmission by gears and fundamental law of gearing, Involutes profile and conjugate action, Characteristics of involute tooth gear - Pinon to system, Under cutting and interference, Minimum number teeth, types of gears, Various gear drives - Spur, Helical, worm and Bevel gear, Gear train - Simple compound and epicycle gear trains, Differential gears.

VIBRATION: Vibration of single degree of freedom, Systems, Free forced, Damped and undamped vibration, Frequency response and resonance, Bare excitation - Transmissibility and Isolation, Free vibration 2 DOF system - Concept of normal mode, vibration absorber, Multidegree of freedom systems, Free vibration of bars, Shafts and beams, Energy methods and approximate methods.

Course outcomes:

After studying this subject students should be able to:

CO1: Identify mechanisms in real life application & perform kinematic analysis of simple mechanisms. Drawing velocity and acceleration diagrams for different mechanisms.

CO2: Analyze dynamic force analysis of slider crank mechanism and design of flywheel. Understand the difference in working of flywheel and governor.

CO3: Understand balancing of reciprocating and rotary masses.

CO4: Drawing cam profile diagram for followers executing different types of motions and various configurations of followers.

CO5: Selecting gear and gear train depending on application. Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	2	3	2	2	1	1	2	2
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	3	2	1	2	1	1	1	1

Suggested Readings:

1. Theory of Machines - Thomas Bevan
2. Theory of Machines and Mechanisms- Shigley
3. Theory of Machines and Mechanisms-Ghosh&Mallik
4. Theory of Machines and Mechanisms- Rao&Dukkipati
5. Theory of Machines-S.S. Rattan
6. Kinematics of Machines-Dr. Sadhu singh
7. Mechanics of Machines . V. Ramamurti

Website Sources:

- www.researchgate.net
- nptel.ac.in
- link.springer.com
- en.wikipedia.org

IFTM University, Moradabad
Diploma (Mechanical Engineering) Program
Diploma (ME) III Year (V Semester)
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DPME – 503: Industrial Engineering & Safety

Objective - This subject deals with industrial engineering problems. It helps to solve the problem by inspection and by doing a case study and by proper planning. Material handling can also reduce the inventory cost.

UNIT 1. **(Sessions:9)**

INSPECTION: Inspection, Need and its planning, objective. Types of inspection.Inspection standards.Duties of inspector in inspection. Inspection needs.

WORK STUDY: Method Study-Process chart, Flow process chart, Flow diagram, Man and Machine chart, Gang process Chart. Work Measurement-Time study, Tools used in time study, Performance rating, Allowance and use of time standard, Time and Motion study. Principle of human motion economy, Micromotion study, Memomotion study, Therbligs, left hand and right hand chart.

UNIT 2. **(Sessions:7)**

PRODUCTION, PLANNING AND CONTROL: Methods of production-Unit, Batch, mass. Sales forecasting and its use. Planning-Products, process parts, materials, Optimum Batch quantity for production and Inventory, Theory and Analysis of M/C capacity, Batch quantity, Loading and Balancing-Scheduling M/C loading. Preplanning activities, Routing, Dispatching, Follow up activities.

UNIT 3. **(Sessions:7)**

MATERIAL HANDLING AND MATERIAL HANDLING EQUIPMENT: Factors in material handling problems, Cost reduction through improved material handling, Reduction in time of material handling, Material handling equipments –Lifting lowering devices, Transporting devices, Combination devices, Maintenance of material handling equipments.

UNIT 4. **(Sessions:10)**

PLANT LAYOUT: General plant location factors, Influence of location on plant layout, selection of plant site, Product layout, Process layout. Advantages and disadvantage of process layout.

QUALITY CONTROL: Concept of quality control, Quality assurance elements of quality control, Statistical quality control, Acceptance sampling, control chart for variable and attributes, Uses of X, R, "P" and "C" chart - O.C. curve, Concept of Total Quality Management

UNIT 5. **(Sessions:7)**

COST ESTIMATION: Introduction and function of cost estimation, estimation procedure, elements of cost, depreciation - methods of calculating depreciation, overhead expenses, distribution of over head expenses, calculation of cost for machining and metal forming process and break even analyzer.

ACCIDENTS AND SAFETY: Classification of accidents, causes of accidents, Effects of accidents, Action to be taken in case different types of Accidents, Safety - needs, consciousness, procedures, measures. General safety devices used on machines, Safe working condition and productivity.

Course outcomes:

After studying this subject students should be able to:

CO1: To identify, formulate, and solve engineering problems.

CO2: To develop a proper planning regarding production. So that the controlling has done easily.

CO3: To develop a proper material handling and material handling equipment.

CO4: To develop a proper plant layout as per the requirement.

CO5: To calculate cost estimate and to protect from the accidents also.

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

	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	2	3	2	2	1	1	2	2
CO5	3	2	2	1	2	2	3	3

Suggested Readings:

1. Industrial Engineering & Management by M.Mahajan
2. Industrial Engineering and Management by Ravi Shankar

Website Sources:

- www.safetyinfo.com
- nptel.ac.in
- www.shiksha.com
- en.wikipedia.org
- safetyprofessionals.in

IFTM University, Moradabad
Diploma (Mechanical Engineering) Program
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(w.e.f. session 2021-2022)

DPME – 504: Air Conditioning

Objective - This subject gives the idea of learning the fundamental principles and different methods of refrigeration and air conditioning and the study of various refrigeration cycles and evaluates performance using mollier charts and/ or refrigerant property tables. In this the comparative study of different refrigerants with respect to properties, applications and environmental issues. Subjects also deals with the basic air conditioning processes on psychometric charts, calculate cooling load for its applications in comfort and industrial air conditioning.

UNIT 1. **(Sessions:10)**

PSYCHOMETRY: Definition, composition of air, Daltons Law of partial pressure, Gas and vapor mixture, Dry and wet bulb temperature, Wet bulb depression, Dew point, Dew point depression, Saturated air, Humidity (Specific humidity, Absolute humidity, Degree saturated, Relative humidity), Humid specific volume and Humid specific heat, Enthalpy of moist air, Study and use of Psychometric chart and tables. Psychometric Process and Their Methods: Sensible heating and cooling, Adiabatic cooling, Humidification and Dehumidification, Cooling and Humidification, Cooling and Dehumidification, Heating and Humidification, Heat and Dehumidification, Humidification Efficiency.

UNIT 2. **(Sessions:10)**

COMFORT AIRCONDITIONING: Fundamentals of comfort conditioning, Thermodynamics of a human body, Comfort chart, Effective temperature, Factors governing optimum, Effective temperature, Economic consideration for selecting the comfort point, comfort air conditions recommended far inside design conditions for air conditioning.

AIRCONDITIONING LOAD CALCULATIONS:

A. COLLING LOAD CALCULATIONS: Design conditions for cooling space, sensible heat gains in the space (i) Heat transmission load through building structure in through wall door and windows, Roof and Floor, (ii) Solar radiation heat lock (iii) Infiltration heat load (iv) Occupants heat load (v) Electric appliances heat load (vi) Product cooling load above freezing and below freezing (vii) Outside ventilation air load (viii) Other internal heat sources. (ix). Miscellaneous items for latent heat load.

B. HEATING LOAD CALCULATIONS: Sensible heat loss- (i) Heat Transmission loss through building structure (ii) Infiltration heat loss (iii) Product heat loss (iv) Other materials heat loss. Latent Heat loss - (i)

Infiltration heat loss (ii) Miscellaneous items for latent heat loss. Auxiliary heat source, Net heating capacity, intermittently heat building.

UNIT 3. **(Sessions:7)**

AIR CONDITIONING SYSTEM: 1. Unit air-conditioning system (Window air conditioning system), Remote and split air conditioners.2. Package air conditioning system i. Package A.C. with water cooled condenser ii. Package A.C. with air cooled condenser.3. Central Air conditioning system i. D.X system with air handling unit ii.Chilled and Hot water system with fan coil unit.

HEAT RECOVERY SYSTEM AND HEAT PUMP: Heat recovery with parallel condensers. Heat well, Basic principle of heat pump, Heat source and sink. Application of heat pump, co-efficient of performance of heat.

UNIT 4. **(Sessions:7)**

FLUID FLOW, DUCT DESIGN AND AIR DISTRIBUTION SYSTEM: Pressure drop through duct, conversion from circular section to rectangular section duct design - Equal friction loss (Pressure drop) method, The Static Regain Method, Velocity Reduction Method, Advantages and disadvantages of the above methods. AIR DISTRIBUTION SYSTEM: Duct System - the perimeter system, EXTENDED PLENUM SYSTEM: Different methods of air distribution.

UNIT 5. **(Sessions:7)**

AIR CONDITIONING EQUIPMENTS: Air contaminants, Purpose and methods of air cleaning, Different types of air filters and humidifiers, Fans and Blowers, grills and registers. AIR FILTERS, HUMIDIFIERS, FAN AND BLOWERS: (i) Axial flow (ii) Radial flow. **EVAPORATICE COOLING:** Evaporative cooling - Thermodynamics of evaporative cooling, Types of evaporative coolers - Spray type, Pad type, Rotating type, Efficiency of evaporative cooling, Limitation of evaporative cooling, Indirect or, Modified evaporative cooling system.

Course Outcomes:

After studying this subject students should be able to:

CO1: Understand the concept of psychrometry, Properties of air and different methods to change the properties of air with the help of psychometric chart.

CO2: Understand the concept of Comfort air conditioning, Thermodynamics of human body & Cooling & heating load calculation.

CO3: Understand the concept of Types of air conditioning system, concept of heat source and sink.

CO4: Understand the concept of Air distribution system with the help of ducts, calculation of losses and duct design.

CO5: Understand the concept of Air filtration, uses of air filters and cooling and heating devices.

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	**2**	**3**	**2**	**2**	**1**	**1**	**2**	**2**
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**

Suggested Readings:

1. Refrigeration and Air conditioning, by Manohar Prasad, New Age International (P) Ltd.Pub.
2. Refrigeration and Air conditioning by C.P Arora.
3. Refrigeration and Air conditioning by Arora&Domkundwar.
4. Refrigeration and Air conditioning by stoecker& Jones.
5. Refrigeration and Air conditioning by Roy J. Dossat.
6. Refrigeration and Air conditioning by P.L. Baloney.

Website Sources:

- www.carel.com
- www.sciencedirect.com
- scribd.com
- nptel.ac.in
- www.academia.edu

IFTM University, Moradabad
Diploma (Mechanical Engineering) Program
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(w.e.f. session 2021-2022)

DPME – 505: Machine Tool Technology & Maintenance

Objective - This subject helps the students to impart knowledge of basic machine tools like lathe, shaper, planner etc. and to develop skilled professional who can operate and maintain machine tools. This subject gives the idea how to repair and maintain various types of machine tools and create awareness of new technologies and trends in machine tools.

UNIT 1. **(Sessions:7)**

BASIC FEATURES AND KINEMATICS: Various types of machining operations and machine tools. Common features of all basic machine tools, work holding and tool holding devices, Drive systems, sources of power, Bed, body or frame. Mechanical drive system for providing reciprocating, oscillating and rotational movement. Systems of stepped and step less, friction and positive drives. Principle of setting upper, Lower and Intermediate speeds. Mechanical methods of providing automaticity in machine tools.

UNIT 2. **(Sessions:10)**

CENTRE LATHE: The centre lathe and its principle of working. Types of lathes, Lathe specification and size, Features of lathe bed.Head stock and tail stock. Feed mechanism and change-gears, carriage saddle, Cross slide, Compound rest, Tools post, Apron mechanism, lathe accessories, Chucks, Face plate, Angle plate, Driving plate, Lathe dogs, mandrills, Steady rest, Lathe attachments. Lathe operations-plane and step turning, Taper turning, Screw cutting, Drilling, Boring, reaming, Knurling, Parting off, Under cutting, Relieving. Types of lathe tools and their uses.Brief description of semi automatic and automatic lathes such as capstan and turret lathes, their advantages and disadvantages over centre lathe, types of job done on them.General and periodic maintenance of a centre lathe.

UNIT 3. **(Sessions:7)**

SHAPING, PLANING & SLOTTING MACHINES: Working principles of planer, shaper and slotter. Differences and similarities among them, quick return mechanism applied to the machines. Types of work done on them, types of tools used their geometry. General and periodic maintenance of a shaper.

DRILLING & BORING MACHINES: Types of tools used in drilling and boring. Classification of drilling and boring machines, principle of working and constructional details of simple and radial drilling M/C and general and periodic maintenance. Operations like facing, counter boring, tapering.

UNIT 4. **(Sessions:7)**

MILLING MACHINES: Types of milling machines, constructional features of horizontal milling M/C. general maintenance of the machine, types of milling cutters, milling operations like plane milling, space milling, angular milling form milling, straddle milling, gang milling, Negative rack milling, cutting speed and speed for different tools in up and down milling. Simple compound and differential indexing, milling of spur gears and racks.General and periodic maintenance of milling machine.

UNIT 5. **(Sessions:9)**

JIGS AND FIXTURES: Object of Jigs and Fixture. Difference between jigs and fixtures.Principle of location.Principle of clamping. Locating and clamping devices. Types of jigs -Simple open and closed (or box) jigs. Drill jigs- Bushes (Fixed liner, Renewal slip). Template. Plate jigs. Channel jigs, Leaf jigs. Simple example of milling, turning, grinding, horizontal boring fixtures and broaching fixtures.Welding fixtures, devices.

COOLING PROCESS: Coolants and cutting fluids difference between coolant and cutting fluid, Function and action of cutting fluids.Requirement of good cutting fluids, their selection for different materials and operations.

Course Outcomes:

After studying this subject students should be able to:

CO1: It gives an idea about basic machining and different tools used in machining.

CO2: It covers lathe machine and types of lathe machine with its operations.

CO3: This part helps you for the maintenance of machine as well as machine tools in a proper manner by different prevention methods.

CO4: It gives the information about the gear manufacturing process, its types and machines used to manufacture gear.

CO5: To understand the concept of jigs and fixtures used in different machines.

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

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	3	3	2	1	1	1	2	2
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	2	1	1	1	2	2

Suggested Readings:

1. Machine Tools Design & Numerical Controls .N.K. Mehta, T.M.H. New Delhi.
2. Design of Machine Tools . S.K. Basu Allied Publishers.
3. Principles of Machine Tools, Bhattacharya A and Sen.G.C. New Central Book Agency.

Website Sources:

- www.imtma.in
- cstaricalcutta.gov.in
- cribd.com
- nptel.ac.in
- www.academia.edu

IFTM University, Moradabad
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(w.e.f. session 2021-2022)

DOEC 051: INDUSTRIAL MANAGEMENT & ENTREPRENEURSHIP DEVELOPMENT

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

UNIT I **(08 Sessions)**

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

UNIT II **(08 Sessions)**

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

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

UNIT III **(08 Sessions)**

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

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

UNIT IV **(08 Sessions)**

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

UNIT V

Entrepreneurship Development: **(08 Sessions)**

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

Course Outcomes:

Students completing this course will be able to:

CO1: Exhibit the attitude and skill required for the application of Industrial Management.
CO2: Understand the human factors affecting the management in the industrial environment.
CO3: Differentiate various organizational structures in terms of their merits and demerits.
CO4: Understand how the production planning and control is carried out in the industries.
CO5: Understand faster values positive attitude and interpersonal relations.

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

	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**

Suggested Readings:

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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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 andresponsibilities 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: Understand the fundamentals of disasters and its impacts.

CO2: Understand the cyclones, local storms and floods.

CO3: Know the procedures to prevent, mitigate and prepare community-based disaster risk reduction

CO4: Types of manmade disasters and its effects on society

CO5: Comparative study of disaster globally

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

	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, IIPE, Delhi
2. Anil, K. Gupta a nd 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:

- http://cwc.gov.in
- http://ekdrm.net
- http://www.emdat.be
- http://www.nws.noaa.gov

IFTM University, Moradabad
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(w.e.f. session 2021-2022)

DPME – 551: Basic Refrigeration & AC Lab

Objective - The Basic Refrigeration & AC Lab provide various numbers of experiment so that the following objective will be obtained:

- To understand the theoretical concept of refrigeration and air-conditioning by performing the experiment.
- To determine the coefficient of performance of refrigeration systems.
- It provides the understanding of repairs and maintenance of this system.
- To conduct the experiments on the refrigeration and air-conditioning equipment.

List of Experiments: Say minimum 08 experiments out of the following:

1. Study and use of different refrigeration tools and equipments.
2. Practice in cutting, Bending, Flaring, Soldering and Brazing, soldering of copper tubes.
3. Study of open type reciprocating compressor used in a refrigeration system.
4. To determine the capacity for window type air conditioner

5 Proper methods of setting and adjusting

i. thermostat

ii. Low pressure and high pressure cutout

iii. Thermostat expression ball.

6. Wiring of refrigerator, water cooler, desert cooler, room air conditioner, packed air conditioner, panel board.
7. Study of a reciprocating Hermetically Sealed Compressor.
8. Study of electric controls such as - Over Lead Protector, Starting Relay, Potential Relay, and thermostat, Solenoid Valve, Humidistat, High Pressure Control and Low Pressure Control.
9. Heat testing, Evacuation, Dehydration and Charging of a Refrigerating machine (Sealed Unit and Open Unit).
10. Study of Refrigerator (Vapor compression and Vapor absorption type).
11. Study of water cooler and calculation of water cooling rate.
12. Study of different refrigerant flow controls.
13. Study of refrigeration trainer and determine its C.O.P.
14. To find out air properties such as Dry Bulb Temperature, Wet Bulb Temperature, D. P. T., Relative Humidity, Specific Humidity, Specific Volume and Enthalpy of air with the half of sling Psychrometer and Psychometric chart and compare the results thus obtained.

15. Study of window type air conditioner.
16. To find out bypass factor of cooling coil, heating coil.
17. Study of desert cooler and find out its humidifying or cooling efficiency.
18. Study of air-conditioning trainer and find out its C.O.P.

Course outcomes:

By performing these experiments the students are able:

CO1: It helps to understand the working principle of refrigeration system.
CO2: To operate the refrigeration and air-conditioning system.
CO3: To calculate the coefficient of performance of the system.
CO4: To know the different equipment are used in the system.
CO5: To repair the refrigeration system.

Suggested Readigs:

1. Refrigeration and Air conditioning, by Manohar Prasad, New Age International (P) Ltd.Pub.
2. Refrigeration and Air conditioning by C.P Arora.
3. Refrigeration and Air conditioning by Arora&Domkundwar.
4. Refrigeration and Air conditioning by stoecker& Jones.
5. Refrigeration and Air conditioning by Roy J. Dossat.

Website Sources:

- nptel.ac.in
- www.brcmcet.edu.in
- www.sciencedirect.com
- en.wikipedia.org
- scribd.com
- www.academia.edu

IFTM University, Moradabad
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(w.e.f. session 2021-2022)

DPME – 552: Basic Theory of Machines Lab

Objective - The Basic Theory of MachinesLab provides various numbers of experiment so that the following objective will be obtained:

- To demonstrate the concepts discussed in the subjects Theory of Machine.
- To impart knowledge about kinematic analysis of mechanisms.
- To impart knowledge about dynamic analysis of mechanisms and balancing.
- To familiarize about gyroscopes and flywheels.
- To give understanding various aspects of mechanical vibrations and their control

List of Experiments: Say minimum 08 experiments out of the following:

1. Study of simple linkers/models/mechanisms.
2. Exp. on Velocity acceleration.
3. Exp. on cam.
4. Exp. on Governor.
5. Exp. on critical speed of shaft (whirling of shaft)
6. Exp. on Gyroscope
7. Exp. on Balancing (static & dynamic)
8. Exp. on 4-bar mechanism
9. Exp. on Gears (tooth profile, interference etc.)
10. Exp. on Gear trains.
11. Exp. on Brakes
12. Exp. on clutch
13. Exp. on synthesis of planner linkages
14. Exp. on Mechanism
15. Exp. on Vibration (spring)
16. Exp. on Vibration (beam)
17. Exp. on Vibration (Torsional)
18. Exp. on Engine

Course outcomes:

By performing these experiments the students are able:

CO1: Be proficient in the use of mathematical methods to analyze the forces and motion of complex systems of linkages, gears and cams.

CO2: Be able to design linkage, cam and gear mechanisms for a given motion or a given input/output motion or force relationship.

CO3: Be able to analyze the motion and the dynamical forces acting on mechanical systems composed of linkages, gears and cams

CO4: To analyze the forces and motion of complex systems of linkages, gears and cams.

CO5: Be able to design linkage, cam and gear mechanisms for a given motion or a given input/output motion or force relationship.

Suggested Readings:

1. Theory of Machines - Thomas Bevan
2. Theory of Machines and Mechanisms- Shigley
3. Theory of Machines and Mechanisms-Ghosh&Mallik
4. Theory of Machines and Mechanisms- Rao&Dukkipati
5. Theory of Machines-S.S. Rattan
6. Kinematics of Machines-Dr. Sadhu singh
7. Mechanics of Machines . V. Ramamurti

Website Sources:

- www.iitg.ac.in
- www.oreilly.com
- en.wikipedia.org
- onlinelibrary.wiley.com
- bcrec.net.in

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DPME – 601: Introduction to CAD

Objective - To introduce the student to the basic tools of computer-aided design (CAD). To expose the student to contemporary computer design tools for mechanical engineers. To prepare the student to be an effective user of a CAD system.

UNIT 1. **(Sessions: 8)**

CAD Hardware

1.1 Different types of graphics display devices - Stroke writing, Raster, Beam Penetration color CRT, Shadow mark color CRT, TFT Monitor.

1.2 Input devices such as mouse, digitizer, light pen, joy stick, thumb wheel, track ball, Scanner.

1.3 Graphics output devices - plotters and printers.

UNIT 2. **(Sessions: 9)**

INTERPOLATION AND APPROXIMATION OF CURVES AND SURFACES:

2.1 Introductory remarks

2.2 Classical methods: Lagrange and Hermit Interpolation

2.4 Interpolation with B-splines

2.4 The Hidden surface problem

2.5 Solids

UNIT 3. **(Sessions: 8)**

Graphic Package

3.1 Ground rules for graphics package

3.2 Graphics package

UNIT 4. **(Sessions: 8)**

CAD Software - Application of CAD Software.

2-D & 3-D transformations Translation, scaling, rotation, mirror and share, Zooming, Panning and Clipping.

UNIT 5. **(Sessions: 7)**

Design process and role of computers in design process. Benefits of CAD

Course Outcomes:

Students completing this course will be able to:

CO1: It gives the knowledge of different computer hardware used in general as well as in designing

CO2: It includes different types of curves used in Industrial application

CO3: To understand the concept of graphic packages used in CAD

CO4: It gives the idea of practical implementation of CAD Software in 2-D, 3-D and Solid modelling

CO5: It provides information about Design process of component and the role of CAD Software over the conventional methods of designing

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

	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 Readings:

1. Computer Aided Analysis & Design of Machine Elements (Rao&Dukkipati)
2. Computer Oriented Numerical Methods – Rajaraman (Prentice Hall)
3. Computer Aided Design by R.K.Srivastava
4. CAD/CAM Theory and Practice – Ibrahim Zeid (McGraw Hill International)

Website Sources:

- www.engr.uvic.ca
- www.caddprimer.com
- www.oreilly.com
- www.3dcadworld.com

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DPME – 602: Automobile Technology

Objective - The purpose of this course is to impart adequate knowledge in both practical and theoretical, covering the various types of power-driven vehicles and to familiarize the students with the fundamentals of Automotive Engine System, Chassis and suspension system, braking and transmission system, and cooling system. The students are acquainted with the operation, maintenance and repairs of all components of the various transportation vehicles.

UNIT 1. **(Sessions: 9)**

AUTO TRANSMISSION SYSTEM:

(a) CLUTCH: Function of clutch in an auto mobile, Construction detail of single plate and multi plate friction clutches, Centrifugal and semi centrifugal clutch. Construction and working of fluid flywheel.

(b) GEAR BOX: Its function, Assembly detail and working of sliding Mesh, constant mesh, Synchromesh and epicycle gear boxes. Simple concept of over drive, overrunning clutch, transfer case and torque converter.

(e) WHEELS AND TYRES: Sizes of tyres used in Indian vehicles, over inflation, under inflation and their effect. Causes of tyre wear, Tyre retreading, idea of Toe in, Toe out, Camber, Caster, King pin inclination. Advantages of tube less tyres over tyres with tubes. Wheel alignment and balancing, Tyre rotation, Difference between radial and cross ply.

UNIT 2. **(Sessions: 8)**

STEERING SYSTEM: Its function, Principle of steering.Ackerman and Devis steering gears, Steering gear types, Worm and nut, Worm and wheel, Worm and roller, Rack and pinion type. Concept of steering system commonly used in Indian Vehicles. Concept of steering locking assembly, introduction to power steering.

BRAKING SYSTEM: Construction details and working of mechanical, Hydraulic and Vacuum brakes, disc brake, air brake, Introduction to power brake. Details of master cylinder, Wheel cylinders, Concept of brake drum and brake linings and brake adjustment.

UNIT 3. **(Sessions: 8)**

SUSPENSION SYSTEM: Function of suspension system. Types of suspension systems, Working of leaf springs, Coil springs. Shock absorbers, Torsion bar suspension and stabilizers.Mac phersion system.

Storage Battery: Storage Battery constructional detail of lead acid cell battery. Battery charging from D.C. mains, A.C. mains, Battery charger-Charging circuit, care and maintenance of batteries. Checking of cells for voltage and specific gravity of electrolyte.

UNIT 4. **(Sessions: 7)**

DYNAMO AND ALTERNATOR: Introduction to Dynamo and its details, Regulators-Voltage, current and compensated types. Charging of battery from alternator.Use of battery, dynamo/alternator in an automobile.

ENGINE STARTING: Engine starting circuit, Drive motor and its characteristics, Conditions of starting and behavior of motor at starting. Turbo charging and inter-cooling.

UNIT 5. **(Sessions: 8)**

AUTOMOBILE WIRING & LIGHTING SYSTEM: Earth returns and insulated return systems-6 volts, 12 volts and 24 volts systems, Positive and negative earthing,Fuse in circuit, Automobile cables-Specifications and color code. Diagram of typical wiring systems. Principle of auto illumination, Lighting requirement-Head lamp mounting and construction, sealed beam lamp, Parking brake, Direction indicators. Electric horns, Revolution counter, Speedometer, Fuel gauge, Pressure gauge, and Temperature gauge, Wind screen wipers, and stereo system and speaker, introduction to remote sensing devices. Microprocessor control of automobile.

STUDY OF SPECIFICATION FOR DIFFERENT UNITS: Clutch, Gear Box, Propeller Shaft, Final Drive, Wheel and tyre manufactured in India.

Course Outcomes:

Students completing this course will be able to:

CO1: It gives the information about the transmission system used in automobile like clutch, gear box and wheels with tyres

CO2: It provide the idea about steering and braking system

CO3: It provides the details about sytem and its work ,shock absorbers and the storage batteries with its its different uses.

CO4: It gives information about the voltage and current genetaion in automobile and types of motors and its behavior at the time of starting.

CO5: It provide the idea about the automobile wiring system like parking, brake, speedometer, pressure gauge and temperature gauge etc.

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

	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**	**1**	**2**	**1**	**1**	**1**	**1**
CO5	**3**	**2**	**2**	**1**	**2**	**2**	**3**	**3**

Suggested Readings:

1. I.C Engine Analysis & Practice by E.F Obert.
2. Internal Combustion Engine Fundamentals, by John B. Heywood, Tata Mcgraw Hill Publishers.
3. Engine Emission, by B. B. Pundir, Narosa Publication.
4. Engineering Fundamentals of Internal Combustion Engines by W.W. Pulkrabek, Pearson Education.
5. Fundamentals of Internal Combustion Engine by Gill, Smith, Ziurs, Oxford & IBH Publishing CO.
6. Fundamentals of Internal Combustion Engines by H.N. Gupta, Prentice Hall of India.

Website Sources:

- www.q8oils.com
- carbiketech.com
- www.cedengineering.com
- web.iitd.ac.in

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DPME – 603: Introduction to Heat Transfer

Objective - Understand the fundamentals of heat transfer mechanisms in fluids and solids and their applications in various heat transfer equipment in process industries.

UNIT 1. **(Sessions: 8)**

Introduction to Heat Transfer: Introduction and concepts of the mechanisms of heat flows; Conduction (Fourier's law), convection and radiation; Effect of temperature on thermal conductivity of materials; Introduction to combined heat transfer mechanism.

UNIT 2. **(Sessions: 8)**

Conduction: One-dimensional general differential heat conduction equation in the rectangular, cylindrical and spherical coordinate systems; Initial and boundary conditions.

Fins: Heat transfer from extended surfaces, Type of fins, Fins of uniform cross-sectional area.

UNIT 3. **(Sessions:10)**

Forced Convection: Basic concepts; Hydrodynamic boundary layer; Thermal boundary layer; approximate integral boundary layer analysis; Analogy between momentum and heat transfer in turbulent flow over a flat surface; mixed boundary layer. Empirical heat transfer relations; Relation between fluid friction and heat transfer; Liquid metal heat transfer.

Natural Convection : Physical mechanism of natural convection; Buoyant force; Empirical heat transfer relations for natural convection over vertical planes and cylinders, horizontal plates and cylinders, and sphere ; Combined free and forced convection.

UNIT 4. **(Sessions: 8)**

Thermal Radiation: Basic radiation concepts; Radiation properties of surfaces; Black body radiation Planck's law, Wein's displacement law, Stefan Boltzmann law, Kirchoff's law; ; Gray body; Shape factor; Black-body radiation.

UNIT 5. **(Sessions: 6)**

Heat Exchanger : Types of heat exchangers; Fouling factors; Overall heat transfer coefficient; Logarithmic mean temperature difference (LMTD) method; Effectiveness-NTU method; Compact heat exchangers.

Course Outcomes:

Students completing this course will be able to:

CO1: It implies theoretical as well as numerical awareness about different modes of heat transfer
CO2: It implies theoretical as well as numerical awareness about heat transfer in different coordinate system
CO3: It Implies theoretical as well as numerical awareness about force convection and natural convection
CO4: It gives awareness about basic concept of radiation and its applications in general life as well as industrial applications
CO5: It gives awareness about applications of heat exchanger.

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

	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	1	2	1	1	1	1
CO5	3	2	2	1	2	2	3	3

Suggested Readings:

1. Fundamentals of Heat and Mass Transfer, by Incroperra& DeWitt, John Wiley and Sons
2. Heat and Mass Transfer by Cengel, McGraw-Hill
3. Heat Transfer by J.P. Holman, McGraw-Hill
4. Heat and Mass Transfer by Rudramoorthy and Mayilsamy, Pearson Education
5. Heat Transfer by Ghoshdastidar, Oxford University Press
6. A text book on Heat Transfer, by Sukhatme, University Press.
7. Heat Transfer by Venkateshan, Ane Books Pvt Ltd
8. Schaum's outline of Heat Transfer by Pitts & Sisson McGrawHill
9. Heat and Mass Transfer by R Yadav, Central Publishing House

Website Sources:

- hyperphysics.phy-astr.gsu.edu
- www.thermal-engineering.org
- www.nat.vu.nl
- physicscatalyst.com

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DPME – 604: Production Automation

Objective – To gain knowledge of fundamental concepts of automation in manufacturing and Understand the techniques of automation in manufacturing for industrial operations.

UNIT 1. **(Sessions: 6)**

GENERAL: Automation-Definition, Scope, its types and their merits, Reasons for automation. Its appreciation and criticism.Introductory Idea and meaning of the terms CNC, DNC, Adaptive control, FMS & CIM and machining centre.Current trends in NC, CAD, CAM.Introduction to Robotics.

UNIT 2. **(Sessions: 10)**

FUNDAMENTALS OF MANUFACTURING AND AUTOMATION: Types of Industries- Manufacturing, Processing; Basic producers, Converter, Fabricators. Manufacturing-Functions- Processing- Basic processing, secondary processing; Operations enhancing physical properties and finishing operations; Assembly, Material handling and Storage; Inspection and test and control, their meaning with automation point of view.Manufacturing Process Inputs- Raw materials, Equipments (Machine tools), Tooling and fixtures, Energy and Labor. Outputs- Finished product and Scrap/Waste. Plant Layout- Its meaning and concept of fixed position layout, Process layout, Product layout and Group technology layout.

Organization and Information Processing Business functions, Product design, manufacturing planning and manufacturing control.

UNIT 3. **(Sessions: 6)**

PRODUCTION ECONOMICS: Methods evaluating investment alternatives, Constraints in manufacturing, Break Even Analysis, Unit Cost of Production, Cost of manufacturing lead time and work in process.

UNIT 4. **(Sessions: 10)**

ASSEMBLY SYSTEM AND LINE BALANCING: The assembly process, Assembly system, Manual assembly lines, Line balancing problems. Computerized line balancing methods. Other ways to improve the line balancing, flexible manual assembly line, Partial Automation.

AUTOMATED ASSEMBLY SYSTEMS: Design for automated assembly, Types of automated assembly systems, Parts feeding devices, Part orienting devices, Feed tracks, Escapements and Part placing mechanism, Role of industrial robot in automatic assembly.

UNIT 5. **(Sessions: 9)**

NUMERICAL CONTROL PRODUCTION SYSTEM: Numerical machine Tool, Binary System, Coordinate system and Machine motions, Types of N.C. systems, Machine tool applications, Economics of NCS.

N.C. PART PROGRAMMING: Tape and Tape format, Methods of N. C. part programming, Computer assisted part programming, The APT Language, Manual data inputs, N. C. part programming using CAD/CAM, use of computer as support in design and manufacturing, and Case study.

Course Outcomes:

Students completing this course will be able to:

CO1: To understand the basics of production and automation like NC, CNC and DNC which are use in production for grow the productivity.

CO2: This helps to understand the techniques of automation in manufacturing for industrial operation.

CO3: It gives an overview about public spending

CO4: It gives an iformation about line balancing at the time of production and challenges.

CO5: This helps to understand CAD/CAM approach to NC part programming, several aspects of the procedure are automated.

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

	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	1	2	1	1	1	1
CO5	3	2	1	2	1	1	1	1

Suggested Readings:

1. MikellP.Groover ,Automation , Production Systems and Computer IntegratedManufacturing, Second edition, Prentice Hall of India.
2. Ibrahim Zeid ,CAD/CAM theory and Practice, Tata McGraw Hill Publishing Co. Ltd.,Company Ltd., New Delhi. YoramKoren,Control of machine tools,McGraw Hill.
3. Hearn & Baker, Computer Graphics, Prentice Hall of India
4. Sunil Kumar Srivastava, Computer Aided Design: A Basic and Mathematical Approach, I K International Publishing House
5. P.Radhakrishnan, ,CAD/CAM/CIM, New Age International (P) Ltd., New Delhi

Website Sources:

- www.economicsdiscussion.net
- www.investopedia.com
- www.britannica.com
- www.uotechnology.edu.iq
- www.philadelphia.edu.jo

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DPME – 605: Introduction to CNC and Computer Graphics

Objective: Students will be introduced to CAD/CAM/CAE concepts and learn steps in upgrading from FMS to CIM.. They will be learning about the importance of data generation and management in CIMS

Unit-I **(Sessions:5)**

INTRODUCTION: Computer Graphics, Interactive Devices, General purpose Graphics Software, display of solids object.

INPUT DEVICES: Pointing and positioning Devices, Mouse lets the light pen, Three Dimensional input devices. Curve and Surface

Unit-II **(Sessions: 5)**

DISPLAY TECHNIQUES AND DEVICES: Display Techniques and Devices: Point Plotting Technique Coordinate systems and incremental methods, Line-Drawing Algorithms, circle Generators, Display Devices, CRT, Inherit Memory Devices, The storage tube display.

Unit-III **(Sessions: 6)**

GRAPHIC PACKAGES AND DISPLAY FILES: A Simple Graphics package Segments, Functions for Segmenting the Display files, Segment naming schemes, appending the Segment display file structure. Geometric Models. Defining symbols procedures, Display Procedure.

Unit-IV **(Sessions:12)**

CNC MACHINE AND COMPONENTS

CNC Machines: Numerical control – definition – components of NC systems –development of NC – DNC –adaptive control systems – working principle of a CNC system – Features of CNC machines - advantage of CNC machines –difference between NC and CNC – Construction and working principle of turning centre – Construction and working principle of machining centers – machine axes conventions turning centre. Spindle drive – dc motor – Feed drives – dc servo motor and stepper Motor, feedback devices – linear and rotary transducers – Encoders - in process probing.

Unit-V **(Sessions: 12)**

PART PROGRAMMING: NC part programming – methods – manual programming – conversational programming – APT programming - Format: sequential and word address formats - sequence number – coordinate system –types of motion control: point-to-point, paraxial and contouring – Datum points: machine zero, work zero, tool zero NC dimensioning – reference points – tool material – tool inserts - tool offsets and compensation - NC dimensioning –preparatory functions and G codes, miscellaneous functions and M codes – interpolation: linear interpolation and circular interpolation

Course Outcomes:

Students completing this course will be able to:

CO1: It helps to understand the concept and knowledge about Computer Aided Quality control and Process Planning Control

CO2: Will be able to Design Flexible manufacturing cell after carrying out Group technology study and finally creating FMS.

CO3: Will be able to apply knowledge about various methods of communication in CIMS

CO4: It helps to understand the concept of data management and its importance for decision making in CIMS environment

CO5: It gives an idea about part programming with its coding system.

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

	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	1	2	1	1	1	1
CO5	3	2	2	1	2	2	3	3

Suggested Readings:

1. Hearn, Baker – "Computer Graphics (C version 2nd Ed.)" – Pearson education
2. Z. Xiang, R. Plastock – "Schaum's outlines Computer Graphics (2nd Ed.)" – TMH
3. F. Rogers, J. A. Adams – "Mathematical Elements for Computer Graphics (2nd Ed.)" – TMH
4. J.S NARANG.-"COMPUTER AIDED MANUFACTURING (CNC & ROBOTICS)" DHANPAT RAI & CO. (P) LTD.
5. S K Sinha "CNC Programming" Galgotia Publications Pvt Ltd

Website Sources:

- www.tutorialandexample.com
- www.mepits.com
- www.ncbi.nlm.nih.gov

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DOME-061: TOTAL QUALITY MANAGEMENT (TQM)

Objective: The main objective of this course is to improve the quality of an organization's outputs, including goods and services, through the continual improvement of internal practices. Total quality management aims to hold all parties involved in the production process accountable for the overall quality of the final product or service.

UNIT -I: **(08 Sessions)**

Quality Concepts:

Evolution of Quality control, concept change, TQM Modern concept, Quality concept in design.

Manufacturing Quality: Methods and Techniques for manufacture, Inspection and control of product, Quality in sales and services, Guarantee, analysis of claims.

UNIT -II: **(08 Sessions)**

Quality Management:

Organization structure and design, Quality function, decentralization, Designing and fitting organization for different types products and company,

TQM Principles: Leadership, strategic quality planning; Quality councils- employee involvement, motivation; Empowerment; Team and Teamwork; Quality circles, recognition and reward, performance appraisal; Continuous process improvement.

UNIT -III: **(08 Sessions)**

Tools and Techniques: Seven QC tools (Histogram, Check sheet, Ishikawa diagram, Control chart, flow chart).

Control Charts: Theory of control charts, measurement range, construction and analysis of R charts, process capability study, use of control charts, P-charts and C-charts.

UNIT -IV: **(08 Sessions)**

Defects Diagnosis and Prevention: Defect study, identification and analysis of defects, corrective measure, factors affecting reliability, Building reliability in the product, evaluation of reliability, interpretation of test results, reliability control, maintainability, zero defects, quality circle.

UNIT -V: **(08 Sessions)**

ISO and its concept of Quality Management: Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements, documentation, requirements and benefits TQM implementation in manufacturing and service sectors, Auditing, Taguchi method, JIT in some details.

Course Outcomes:

On successful completion of the course students will be able to:

CO1: Understand the fundamental principles of Total Quality Management

CO2: Choose appropriate statistical techniques for improving processes.

CO3: Develop research skills that will allow them to keep abreast of changes in the field of Total Quality Management.

CO4: Explain the various types of Techniques are used to measure Quality.

CO5: Apply various Quality Systems and Auditing on implementation of TQM.

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

	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:

- Total Quality Management, by Dale H. Besterfield, Pearson India.
- Beyond Total Quality Management, Greg Bounds, McGraw Hill.
- 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:

1. https://qcmr-1.itrcweb.org/2-quality-concepts/
2. https://www.lucidchart.com/blog/8-total-quality-management-principles
3. https://blog.kainexus.com/improvement-disciplines/lean/control-charts/an-introduction-to-process-control-charts
4. https://ndiastorage.blob.core.usgovcloudapi.net/ndia/2004/cmmi/CMMIT5Tue/Root_CauseAnalysis.pdf
5. https://www.iso.org/iso-9001-quality-management.html

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DOEE 061: NON-CONVENTIONAL ENERGY RESOURCES

Objective: The electrical diploma holder must be made aware about saving and conserving Electrical Energy and tackle the problems of environmental pollution as they will have to face this challenge in future life.

UNIT I **(08 Sessions)**

Introduction: Different forms of energy, Energy chain, Classification of energy resources: Primary and secondary sources, Commercial and non-commercial sources, Conventional and non-conventional sources, Classification of non-conventional energy resources

UNIT II **(08 Sessions)**

Solar Energy: Basics of photovoltaic energy conversion, Types of solar photovoltaic cells, Solar photovoltaic module, V-I and P-V characteristics of PV module, Efficiency of PV module, Applications of Solar photovoltaic systems, Solar Thermal Power Plant, Efficiency of solar thermal power plant, Solar water heater

Wind Energy: Wind energy conversion, Types of wind power plants, merits and demerits of wind power generation

UNIT III **(08 Sessions)**

Geothermal Energy: Introduction to geothermal energy, Resources of geothermal energy, geothermal power plants, Merits and demerits of geothermal power generation, applications of geothermal energy

Magneto-Hydro-Dynamic (MHD) Power Generation: Introduction to MHD power generation, Open cycle MHD system, closed cycle MHD system, working principle of MHD power generation, Advantages of MHD power generation

UNIT IV **(08 Sessions)**

Fuel Cells: Working principle and operation of fuel cells, Types of fuel cells, Performance analysis of fuel cell, advantages of fuel cells, limitations of fuel cells, applications of fuel cells

Bio Energy-Biomass and Biogas: Biomass conversion process, biogas generation, factors affecting generation of biogas, types of biogas plants, selection of site for biogas plant

UNIT V **(08 Sessions)**

Ocean Thermal Energy Conversion (OTEC): Working principle of OTEC, availability, types of OTEC systems, advantages of OTEC, limitations of OTEC power plant, applications of OTEC power plant

Ocean Wave energy and Tidal Energy: Wave energy, Tidal energy, Tidal Power plants, Classification of tidal power plant, Advantages and Limitations of tidal power

Course Outcomes:

After undergoing the subject, the students will be able to:

CO1: Understand the importance of non-conventional energy sources for the present energy scenario.
CO2: Understand various alternate sources of energy like solar and wind energy.
CO3: Understand basic conversion technologies of geo-thermal & magneto hydrodynamics
CO4: Understand various fuel cells and its applications.
CO5: Understand Ocean Thermal Energy & Tidal energy for power plants and other applications.

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

	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-Convential 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

IFTM University, Moradabad
Diploma (Mechanical Engineering) Program
Diploma (ME) III Year (VI Semester)
(w.e.f. session 2021-2022)

DPME – 651: CAD / CAM Lab

Objective:

- To gain practical experience in handling 2D drafting and 3D modeling software systems.
- To study the features of CNC Machine Tool.
- To expose students to modern control systems (Fanuc, Siemens etc.,)
- To know the application of various CNC machines like CNC lathe, CNC Vertical Machining centre, CNC EDM and CNC wire-cut and studying of Rapid prototyping.

List of Experiments: Say minimum 08 experiments out of the following:

1. Development of simple graphic package using 2-D and 3-D transformation and algorithms for generation of lines and circles (programming using C)
2. Development of wire frame models of simple 3-D objects like box, cylinder, cone, pyramids, and prisms and sphere (programming using C)
3. FEM Mesh generation
4. Stress analysis / heat conduction analysis using standard FEM package.
5. Stress analysis of cantilever using U.D.L.
6. Stress analysis of simply supported beam using point load.
7. Benching of circular plate and analysis of stress and strain.
8. Heat conduction analysis using circular bar.
9. Design and analysis of crank shaft.
10. Writing a part-programming (in word address format or in APT) for a job for drilling operation (point-to-point) and running on NC machine.
11. Writing a part programming (in word address format or in APT) for a job for milling operation (contouring) and running on NC machine.
12. Experiment on Robots and it programs.
13. Experiment on Transfer line/Material handling.
14. Experiment on difference between ordinary machine and NC machine, study or retrofitting.
15. Experiment on study of system devices such as motors and feedback devices.
16. Study of Robot structure.
17. Writing a part-programming (in word address format or in APT) for turning operation.

Course Outcomes:

Upon successful completion of this course, students should be able to meet the program outcomes listed below:

CO1: Demonstrate safe operation and practices of equipment and identifies the complete design and the process from concept to completion.

CO2: Identify the major functions of a manufacturing system, their characteristics, related to design, process routing and lean manufacturing.

CO3: Demonstrate computer competency required for CAM applications including CNC programming, setup, data transmission and the use of CAD/CAM editing software.

CO4: Analyze, design and add or remove material for physical systems in emerging fields, including medical applications, alloyed metals, composites and exotic materials.

CO5: Plan, design and implement the sequence of operations including tooling, machines, time studies, automation and robotic integrated manufacturing.

Suggested Readings

1. Computer Aided Design by R.K.Srivastava.
2. CAD/CAM Theory and Practice – Ibrahim Zeid (McGraw Hill International)
3. Computer Aided Analysis & Design of Machine Elements (Rao&Dukkipati)
4. Computer Oriented Numerical Methods – Rajaraman (Prentice Hall)

Website Sources:

- www.engr.uvic.ca
- www.caddprimer.com
- www.oreilly.com
- www.3dcadworld.com

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DPME – 653: Heat Transfer lab

Objectives: The laboratory course is aimed to provide the practical exposure to the students with regard to the determination of the amount of heat exchange in various modes of heat transfer including condensation & boiling for several geometries.

List of Experiments: Say minimum 08 experiments out of the following:

1. Conduction - Composite wall experiment
2. Conduction - Composite cylinder experiment
3. Convection - Pool Boiling experiment
4. Convection - Experiment on heat transfer from tube-natural convection.
5. Convection - Heat Pipe experiment.
6. Convection - Heat transfer through fin-natural convection.
7. Convection - Heat transfer through tube/fin-forced convection.
8. Any experiment on radiation - Such as on Stefen's Law, determination of emissivity, etc.
9. Any experiment on radiation - Such as on solar collector, etc.
10. Heat exchanger - Parallel flow experiment
11. Heat exchanger - Counter flow experiment
12. Any other suitable experiment such as on critical insulation thickness.
13. Conduction - Determination of thermal conductivity of fluids.
14. Conduction - Thermal Contact Resistance Effect.

Course Outcomes:

The students should enable to:
CO1: Determine the overall heat transfer coefficient for a composite slab
CO2: Determine the thermal conductivity of a lagged pipe apparatus
CO3: Determine the thermal conductivity of a concentric sphere apparatus
CO4: Determine the effectiveness and the efficiency of fins in pin fin apparatus
CO5: Determine the thermal conductivity in transient mode

Suggested Readings:

1. Fundamentals of Heat and Mass Transfer, by Incroperra& DeWitt, John Wiley and Sons
2. Heat and Mass Transfer by Cengel, McGraw-Hill
3. Heat Transfer by J.P. Holman, McGraw-Hill
4. Heat and Mass Transfer by Rudramoorthy and Mayilsamy, Pearson Education
5. Heat Transfer by Ghoshdastidar, Oxford University Press

Website Sources:

- www.sciencedirect.com
- hyperphysics.phy-astr.gsu.edu
- www.thermal-engineering.org
- www.nat.vu.nl
- physicscatalyst.com