



### ACADEMIC REGULATIONS

COURSE STRUCTURE AND DETAILED SYLLABUS

#### FOR

# B. TECH

### Mechanical Engineering

(Batch: 2024-25)

www.davunivesity.org

#### **1.** About the University:

DAV University stands as a pioneer in contemporary education in India, emphasizing 21st-century skills crucial for success in today's competitive landscape. The campus, marked by modern infrastructure and verdant spaces, serves as an inspiring backdrop for academic pursuits, cooperative experiences, and extracurricular activities.

Our curriculum spans engineering, business, sciences, humanities, and social sciences, strategically designed to foster critical thinking, creativity, and adaptability among students. The forward-thinking faculty prioritizes skill development, problem-solving, communication, and collaboration, aiming to prepare graduates for the challenges of the modern world.

DAV network covers 900+ campuses spread over 21 states of India, with nearly 2 million students being trained yearly.

#### 2. About the Department of Academic Affairs:

The Department of Academics Affairs, DAV University works for the continuous improvement of the quality of academic activities of the university. The department is comprised of experienced faculty members and staff contributing from different functional domains and specializations. The department strongly believes that quality in education could only be envisaged with stronger cohesion between the different stakeholders of an academic body. This can only be achieved with an appropriate blend of a constructive teaching pedagogy with the student learning process. The department regularly monitors the quality of teaching-learning process in the university and works to provide necessary solutions as and when desired.

#### 3. Vision:

To ardently seek, consider and implement latest nuances, developments and innovations in Sciences, Languages, Engineering and Technology, Business Studies and Computer Sciences in order to ensure that students develop a holistic acumen for making strategic and judicious decisions in the local and global spectra.

To harness and transform natural, human and technological resources to ensure sustainable development, so that they enhance, enrich and bequest human life with imagination, skills and vision. Thereby, they become instrumental in the integral development of society and mankind.

#### 4. Mission:

To facilitate our stakeholders to have a broad, encompassing access to knowledge & education and to assist individuals unravel deeper dimensions of learning & experimentation.

To enable students become imaginative, integrated beings who constructively and creatively contribute to environment and society and who play a vital role in the advancement of learning and understanding.

#### 5. Goals:

We envision the creation of excellent human resource through the integration of multi-dimensional Personality Development Programme with the university curriculum in order to produce world-class professionals.

Our four main educational goals are:

- Humanized education (to educate an individual to be an intellectual with strong moral character);
- Socialized education (to educate an individual who can willingly serve the community);
- Specialized education (to foster creativity, well balanced with practicality);
- Globalized education (a forward-looking, global-minded individual);

#### 6. Core Values:

- Competence
- Integrity
- Creativity
- Innovation
- Trust
- Excellence
- Community

#### 7. Objectives:

- To provide an academically ambient environment for its stakeholders.
- To develop scientifically superior, socially awake, and responsible citizens.
- To generate industry-oriented competent manpower to meet the needs of globalization.
- To provide state-of-the-art equipment for R&D facilities in the university.
- To provide effective linkage between industry and university for sponsored research and consultancy.
- To ensure regular up-gradation of knowledge and skills of the faculty.
- To attain National and International accreditations.
- To develop centres of excellence in the emerging areas of science and technology.
- Merging of knowledge with the spirit of good ethics, values and Vedic teachings.

#### 8. Eligibility for Admission:

Student must have successfully completed the 10+2 examination with physics and Mathematics as compulsory subjects: Additionally, they should have studies one of the following subjects: Chemistry, Biotechnology, Biology, or Technical Vocational subjects. The applications must have obtained a minimum of 45% marks (40% marks for SC/ST applicants) in aggregate.

The medium of instruction for the entire UG Degree Programme shall be English only.

#### 9. Programme Structure:

The B.Tech. Degree Programmes at DAV University is of 4 Academic Years (8 semesters), with each academic year divided into two semesters of 90 working days in each semester.

#### 10.Choice Based Credit System (CBCS):

The DAV University is followed Choice Based Credit System. All the courses are to be registered by a student in a semester to earn Credits. Credit shall be assigned to each course in a L: T: P (Lecture: Tutorial: Practical).

**One Credit**- for one hour/week/Semester for Theory/Lecture (L) course and Tutorials **One Credit**- for two hour/week/Semester for Laboratory/Practical (P)

Each student shall Register for and secure the specified number of Credits (160 Credits) require for the completion of the B.Tech. Degree in the respective Brach of Engineering.

Each Semester is structured to provide 20 Credits, totalling to **160 Credits** for the entire B.Tech. Programme.

#### **11.Student Attendance System**

- The subject teacher marks online attendance on DAVIS portal and students keep track of their attendance online by using their user ID and password.
- The students are expected to attend all scheduled lectures (theory and practical) regularly. The attendance of the students is taken by their respective teachers at the start of the lecture/ lab session. A student, who reports late for class or leaves before the class is over, is not given attendance by the teacher. All absences are counted, regardless of the reason for the absence. Further, the percentage of attendance of a student in a subject also contributes to the internal marks of that subject.
- The attendance should be recorded in progressive manner. Absent students should be marked 'X' in the student attendance register.

#### **12.Attendance Requirements:**

- A student failing to attend 75% of the scheduled lectures in Theory & Practical courses will be detained in that course and will not be allowed to appear in the University exam of that course. A student detained in the course(s) would be allowed to appear in the university exam only on having completed the attendance in the course(s), when the course(s) is offered as regular course(s).
- The University is following a semester system for all its programmes. Each semester has elements of Mid Semester Examination (MST), Written Quiz (Objective Type MCQs)/Assignment/Project Work/Seminar (evidence based) and End Semester Examination (ESE). To be eligible for appearing in the ESE (End Semester Examination) each student has to fulfil the following conditions:
  - (i) Minimum 75% attendance of the lecture delivered/classes engaged in each subject.
  - (ii) Maintained discipline and good character in the campus

- (iii) Not involved in any case of criminal nature outside the University during the period of study.
  - A candidate who fails to attain 75% of attendance in any subject, he/she will not be allowed to appear in that subject. However, if the attendance is between 50% to 74.9% in a subject, he /she can complete the attendance in the next academic year, whenever, the subject is offered. He/she will be required to attend the classes to extent he/she reaches the 75% of attendance as required in the subject. He/she will not be eligible for marks reserved for attendance. Candidate will have to pay University fee and examination fee as decided by the University from time to time.
  - If the attendance is between 25% to 49.9%, he/she can complete it in the next two consecutive semesters whenever it is offered in two academic years. By attending 25% in the next academic year remaining in the next-to-next academic year. Candidate has to pay fee and examination fee as decided by the University from time to time. No attendance marks shall be awarded in this case also.
  - Candidate completing the shortage of attendance can appear in the ESE in the next available opportunity i.e. Supplementary/End Semester examination whichever is earlier after paying the necessary fee for this purpose.
  - Where attendance is less than 24.9% the candidate or takes semester off due to unavoidable circumstances will have to repeat the semester by registering the same at the end of the programme whenever offered by paying the applicable semester fee and continuation fee.
  - Under no circumstance a candidate can be allowed to register for two semesters simultaneously.
  - Vice-Chancellor on the recommendation of subject teacher through HOD and Dean (Academics) may condone 1% of attendance in each subject for exceptional cases.
  - A student shall be given a medical leave up to maximum of 15 days in a semester provided medical certificate submitted is from CMO/SMO/MO of a Govt. Hospital or taken from a private hospital/Nursing Home/Doctor it has to be counter signed by Civil Surgeon/CMO/SMO of a Govt. hospital or by the University authorized Doctor/University Doctor. The medical certificate submitted after one week joining the University as fit candidate shall not be entertained.
  - A student shall be given duty leave up to maximum of 20 days per semester to participate in the cultural/NSS/Sports/NCC duly recommended by the Head of the activity in-charge.
  - However, in exceptional cases the duty leave can go maximum up to 50 % of the lecture delivered. The exceptional cases shall be decided by a committee of experts constituted by the Vice-Chancellor. The exceptional cases should participate at National/International level.
  - Candidate missing their MST due to above exigencies a special exam be conducted and if he/she misses ESE a chance in the supplementary examination/next ESE without charge of any examination fee be provided.
  - Non-payment of full semester fee or hostel charges or bus/transport charges or due if any kind: In case of non-payment of semester fee or hostel charges or bus/transport charges or dues, if any by a candidate but who has fulfilled the attendance condition is permitted to appear in the final examination (ESE) but his /her result shall not be declared and will be kept withheld and his/her portal shall be blocked till the time he/she clears his/her dues and will not be eligible for promotion to next semester. Once the pending dues are cleared the result shall be declared and portal be re-opened.

#### **13.Examination Policy/Scheme**

The Examinations/Assessment will be as under:

- 1. **Mid Semester Examination**: Weightage 25% (Question Paper of 25 marks of 1½ hours duration). More than one paper in a day may be held.
- 2. Written Quiz (Objective Type MCQs) and Assignment and Project Work/Seminar (evidence based): Weightage 20% and will be completed at departmental level at least fifteen days before the start of End Semester Examinations/Practical.

**Note:** After the completion of every lecture/module the teacher is required to take a quiz based on the module taught to get an idea of the understanding/learning of the student.

- 3. End Semester Examination: Weightage 50% (Question Paper of 50 marks of 3 hours' duration) (Appearance compulsory)
- 4. Attendance: 5%

Total weightage of the course: 100%

#### Pattern of Question Paper:

 Mid Semester Examination: One MSE per course shall be conducted in the middle of a semester having 50% of syllabus. This MSE shall be subjective type examination of 1½ hours duration with a maximum of 25 marks. The composition of MSE shall be as follows:

Section	Max Marks per question	No. of questions to be attempted	Type of question	Total Marks (25)
A	1	5	Very Short Answer Type: Each Question to be answered with in 5-8 lines. (indicative)	5
В	4	3	Short Answer Type (3 questions out of 5 questions to be attempted). Each question to be answered in maximum 2 pages (indicative)	12
С	8	1	Long Answer Type (One question out of 2 questions to be attempted). Each question to be answered in maximum 4 pages (Indicative)	8

2. Written Quiz (Objective type questions i.e. MCQs) and Assignment/Project Work/Seminar: This has to be conducted at Departmental Level by informing the schedule date to the students well in advance. The department is free to have its own pattern and to be conducted after the conduct of the Mid Semester Examinations and

at least one week before the schedule of the End Semester Examinations/End Term Practical.

Sufficient care should be taken to set the questions out of higher order thinking skills (HOTS) for assignments and out of three assignments given to the students, one must be an open-ended assignment.

- (a) Written Quiz (Objective Type MCQs): 10 Marks
- (b) Assignment and Project Work/Seminar (evidence based): 10 Marks
- 3. **End Semester Examination**: One ESE per course will be conducted in the end of a semester. This ESE shall be subjective type examination of 3 hours' duration with a maximum of 50 marks. The composition of ESE shall be as follows:

Section	Max Marks per questio n	No. of questions to be attempted	Type of question	Total Marks (50)
A	1	10	Very Short Answer Type. Each Question to be answered with in 5-8 lines. (indicative)	10
В	4	6	Short Answer Type (6 Questions out of 10 questions to be attempted). Each Question to be answered in maximum 2 pages) (indicative)	24
C	8	2	Long Answer Type (2 Questions to be attempted out of 4 questions). Each question to be answered in maximum 4 pages. (indicative)	16

4. Attendance: 5 marks

75%	0 marks
More than 75% and less than 80%	1 marks
80% and less than 85%	2 marks
85% and less than 90%	3 marks
90% and less than 95%	4 marks
95% and above	5 marks

Note: The weightage in the End Semester Examination paper be given as under to cover whole of the syllabi of the course:

- i. 25% of the ESE paper be set from the first half of the syllabi covered in the Mid Semester Examination.
- ii. 75% of the ESE paper be set from the rest of the half of the syllabi taught after mid semester examination.
  - 5. To qualify for the grant of credits for a particular course, a candidate must get at least 40% pass marks. In case a course contains both theory and practical in a single course code, a candidate must get at least 40% pass marks in theory and practical together.
  - 6. In case course code of theory and practical are different then the candidate has to pass separately in both practical and theory.
  - 7. Candidates' appearance in End Term Examination is compulsory and should score at least pass marks separately in each paper other than the marks obtained in other components of assessment.
  - 8. If a student fails in a particular course by not getting minimum of 40% marks, he/she will be awarded 'R' grade in that course. In such case, a student will be allowed to reappear as under:
  - i. Reappear examination will be conducted only for those students who are unable to attain minimum passing grade 'P', i.e. 40%
  - ii. The Reappear Practical Examination will be conducted only for ESE for those students who are unable to attain minimum passing grade, i.e. 40% till his/her last attempt of re-appear examination.
  - iii. Number of attempts other than the regular one will be given to a student to qualify the course in which he/she is having reappear grade within time limit to qualify the degree i.e. +2 years.
  - iv. In each of the attempts, a student would be allowed to appear in re-appear examination by paying a fee of Rs. 2000/- per course or as per the University fee decided from time to time.
  - v. Re-appear examination shall be conducted in every semester in the month of September/October and March/April for candidates who are unable to get grade required to pass. The Re-appear examination shall have the same template as that of ESE and the weightage shall be 100%.
  - vi. If a student gets re-appear in a course which contains theory as well as practical, then he/she has to re-appear in theory examination only and marks/weightage of practical examination shall be carried forwarded till he/she passes the course will be kept as it is.
  - vii. Maximum Duration: The maximum duration allowed to complete a course will be 2 additional years across the Programmes irrespective of the normal duration of the programme.

The student who fails to qualify the Programme within the maximum duration allowed. The Governing Body shall be authorized to review individual hardship cases where a student fails to clear all chances available and permit to him/her a golden chance.

viii. Chances for Improvement in Marks (Scores) – The students shall also be provided along with the re-appear examination, chance for improvement in their earlier marks (scores). This would be available for all the courses. A student will have to pay an improvement fee of Rs. 4000/- per course per chance or as per the University fee

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decided from time to time. This chance however will be offered along with reappear examination when that particular course is being offered. In case a student opting for improvement examination scores less marks than the previous, his/her original result will stand.

- ix. In case of On Job Training/Live Project Training which ranges for a period of three months to 6 months, student shall be evaluated on the basis of report submitted by the industry/organization on the prescribed Proforma and the report submitted by the surprise team of the university visiting the industry/organization to assess the student's performance of On Job Training/Live Project Training. For the award of marks, 50% weightage of each industry and university evaluation will be considered.
- 9. The University has adopted 10-point scale grading system of evaluation as recommended by UGC as per details below:

Class Interval (Percentage)	Letter Grade	Grade Point
> 90 - < =100	O (Outstanding)	10
> 80- < =90	A+ (Excellent)	9
>70- < =80	A (Very Good)	8
>60- < =70	B+ (Good)	7
>50- < =60	B (Above Average)	6
>40- < =50	C (Average)	5
40	P (Pass)	4
Below 40	R (Re-appear)	0

Formula for Equivalent Percentage = 10 x CGPA

In addition, the following grading systems would be adopted as per the contingency:

Description	Letter Grade	Grade Point
Detained	F	0
Absent	Ab	0
Incomplete	I	0
UMC/Fee	RL	0
Default/Indiscipline		
Issue/Any other reason		
Satisfactory*	S	0
Unsatisfactory*	U	0

\*Satisfactory grade and unsatisfactory grade will be given in the courses which have no grade point and are qualifying in nature to complete the programme as per the requirements of the statutory bodies such as ICAR, AICTE, etc.

- 10. To take cognizance of Unfair Means of Conduct (UMC) cases reported during various examinations, UMC Committee constituted will decide the matter to deal with such cases, the decision of the Committee shall be final.
- 11. To maintain transparency in the evaluation system, every student shall be given a chance to scrutinize his/her answer sheet free of cost within the notified period after the conduct of examination and declaration of result by the concerned teacher.
- 12. In case candidate fails to turn up for scrutiny on time it will be presumed that he/she has no objection and will lose chance to scrutinize the paper in future.
- 13. Controller of Examination will send a sample of question papers and a sample of evaluated answer sheets to external experts to maintain the quality in Examination process with prior permission of Dean Academics and Vice-Chancellor.
- 14. The medium of instructions for teaching and examination is English.

#### **14.** Earning Credits through Massive Online Open Courses (MOOC'S)

- Students can avail a facility of earning up to a maximum of 40% credits of their degree requirements through MOOC's.
- MOOC's eligible for this purpose are the courses offered by NPTEL/SWAYAM courses only
- MOOC's can be taken in respective area only in lieu of Elective courses, such as HSS Electives, Science Electives, Open electives, Departmental Electives. No core, lab or project courses can be dropped in lieu of MOOC's.
- A student desirous of opting for a MOOC's shall submit an application not later than one week prior to the scheduled normal date of semester registration to the concerned HoD/ Dean Faculty) giving the following details:

a) Course Title, Agency offering MOOC, Examination System and Credits of the Course.

b) Timing and duration of the course and its examination centres.

c) Centres for conducting of examination, facilities at the centre of the examination.

d) The course to be dropped in lieu of the MOOC, transcript and electives opted in current semester.

e) Fee and other charges, if any, payable to MOOC providing and certification agency shall be borne by concerned student at his/her level.

f) The student shall submit to the COE the original certificate issued by MOOC authorities along with a photocopy of the same. The original will be returned after verification and verification shall be certified by the COE on the photocopy which shall be kept in records.

g) An equivalent Grade corresponding to grade/marks awarded by MOOC agency shall be determined by a committee consisting of Dean (Faculty) and an HoD. This equivalent Grade shall be shown in the transcript and accounted in the SGPA and CGPA calculations.

#### **15. Mentor-Mentee System**

At the start of the session, a student group consisting of 20-30 students is allotted to a faculty mentor of the respective department. Mentors then serve as thought partners for students in their academic journey and help to become autonomous learners and agents of their change. They express understanding of student's aspirations, and fears & support their success by acting as an advocate for their best interests. Mentors interact with students on a regular basis (at

least one lecture per week) to assess their academics and discuss their difficulties. Students are also counseled by their respective mentors individually to know the reasons for poor performance in Internal Assessment Tests.

#### 16. Feedback of the Faculty by the students

The student feedback of the faculty is scheduled twice a semester (online). The students can submit their feedback through an online link shared by the department of academic affairs. Feedback from the students to strengthen the quality of teaching-learning environment and to look for opportunities to improve teacher's performance in classroom engagement to bring excellence in teaching and learning.

#### **17. Teaching Learning Pedagogies**

- Activity-based learning: Various indoor and outdoor activities are designed, developed, and implemented in all the departments to ensure that students become more aware of design and team processes. Various activities like Mind Mapping, Concept Map, Ball of Knowledge, etc. are conducted in the class during each semester.
- **Problem Solving Learning**: Open assignments, tutorials, crosswords, puzzles, and quizzes as per the Bloom Taxonomy levels are given to the students to enhance their learning.
- **Project-based learning:** Most of the UG and PG courses have projects/dissertation as the subject of their curriculum. The students are encouraged to work on projects using the latest technologies. Students are encouraged to take capstone projects with industry participation.

#### **Department of Mechanical Engineering**

#### Vision

The Mechanical Engineering Department aims to be recognized as an **outstanding educational centre** to **develop innovative engineers** who are proficient in advanced fields of engineering and technology and can **contribute effectively to the industry** as well as for socio-economic up liftment of the **society**.

#### Mission

**M1**: To impart outcome-based education with a research orientation to the students to develop them as globally competitive engineers.

**M2**: To imbibe the students with academic, leadership and entrepreneurship skills needed by the industry in particular and society in general.

**M3**: To adopt flexibility and dynamism in designing the programme structures to cope up with emerging market needs.

**M4**: Establishment of liaison with top R & D organizations/Industries and leading educational institutions for practical exposure of the students and faculty as well as to the state of the art.

In the **B.Tech. Mechanical Engineering** programme, students build upon their foundational knowledge of science and mathematics acquired in school to delve into various disciplines of mechanical engineering. Through a diverse range of courses, students explore topics such as materials science, solid and fluid mechanics, thermodynamics, heat transfer, control systems, product design, and manufacturing processes.

#### **PROGRAMME EDUCATIONAL OBJECTIVES (PEO's)**

**PEO:1** To develop professional engineers in the field of manufacturing, design, thermal, industrial and automation engineering by imparting sciences and engineering pedagogies.

**PEO:2** To nurture students towards creativity and innovation to develop out of the box thinking, respond effectively to the needs of the industry and the ever-changing world scenario.

**PEO:3** To impart the highest quality education to students to build their capacity and enhance their skill to expand their reasoning, communication, and problem-solving abilities and to make them globally competitive mechanical engineers.

**PEO:4** To provide students with academic environment of excellence, leadership, ethical guidelines, and lifelong learning needed for a long productive career & entrepreneurship skill.

#### **PROGRAMME OUTCOMES (POs)**

After the successful completion of undergraduate course, Mechanical Engineering, graduates will be able to:

**PO1: Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.

**PO2: Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3: Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

**PO4: Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5: Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modeling to complex engineering activities, with an understanding of the limitations.

**PO6: 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.

**PO7: Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8: Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9: Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10: Communication:** Communicate effectively on complex engineering activities with the engineering community and with the society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11: Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12: Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### PROGRAMME SPECIFIC OUTCOMES (PSO's)

**PSO1: Academic Competence:** Apply mechanical and interdisciplinary knowledge to analyze, design and manufacture products to address the needs of the society.

**PSO2:** Professional Competence: Apply state of the art tools and techniques to conceptualize, design and introduce new products, processes, systems and services.

Code	Definitions
L	Lecture
Т	Tutorial
Р	Practical
HS Courses	Humanities & Social Science
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Program Elective Courses
OE	Open Elective Courses
EEC	Employment Enhancement Courses (Project/Summer
AEC-C	Internship/Seminar)
VAC-C	Ability Enhancement Course-Common
	Value Added Course-Common

#### Mapping of PEO with PO

Mapping of PEO with PSO

	PEO1	PEO2	PEO3	PEO4
PEOs				
POs				
PO1			Y	Y
PO2			Y	Y
PO3	Y		Y	Y
PO4			Y	Y
PO5	Y	Y	Y	Y
PO6	Y	Y	Y	Y
PO7	Y	Y	Y	Y
PO8			Y	Y
PO9			Y	Y
PO10				Y
P011				Y
PO12	Y	Y	Y	Y

PSOs PEOs	PSO1	PSO2
PEO1	Y	Y
PEO2	Y	Y
PEO3	Y	Y
PEO4	Y	Y

#### Scheme of Courses B. Tech Mechanical Engineering Semester-1

S.NO.	Course Code	Course Title	L	т	Ρ	Cr	Nature of Course
1.	MAT151	Engineering Mathematics-I	3	1	0	4	BS
2.	PHS151	Engineering Physics	3	0	2	4	BS
3.	EED101	Basic Electrical Engineering	3	0	0	3	ES
4.	EED102	Electrical Engineering Laboratory	0	0	2	1	ES
5.	MED101	Engineering Graphics and Design	0	0	6	3	ES
6.	MED103	Design Thinking and Idea Lab	0	0	2	1	ES
7.	HVE101	Human Values and Ethics	2	1	0	3	VAC-C
8.	ENH111	Cambridge English-I	1	0	2	2	AEC-C
							Fotal=21CR

L: Lectures T: Tutorial P: Practical Cr: Credits

#### Scheme of Courses B. Tech Mechanical Engineering Semester-2

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MAT152	Engineering Mathematics-II	3	1	0	4	BS
2.	CHM151	Chemistry	3	0	2	4	BS
3.	MED102	Manufacturing Practice	0	0	4	2	ES
4.	CST100	Programming for Problem Solving	3	0	0	3	PC
5.	CST102	Programming for Problem Solving Laboratory	0	0	4	2	PC
6.	EVS104	Environmental Studies	2	0	2	3	VAC-C
7.	ENH112	Cambridge English-II	1	0	2	2	AEC-C
	Total=20CR						

L: Lectures T: Tutorial P: Practical Cr: Credits

#### Scheme of Courses B. Tech Mechanical Engineering Semester-3

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MAT256	Numerical Methods	3	0	2	4	PC
2.	MED201	Applied Thermodynamics	3	1	0	4	PC
3.	MED202	Kinematics and Dynamics of Machines	3	0	2	4	PC
4.	MED203	Engineering Mechanics	3	1	0	4	PC
5.	MED204	Machine Drawings	0	0	8	4	PC
6.	MED205	Swachh Bharat	0	0	2	1	VAC-C
7.	CEC103	Community Engagement Course	1	0	2	2	AEC-C
			-			T	otal=22CR

L: Lectures T: Tutorial P: Practical Cr: Credits

#### Scheme of Courses B. Tech Mechanical Engineering Semester-4

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of	
1		Heat and Mass Transfor	2	0	2	1		
1	IVIEDZJI		3	U	2	4	FC	
2	MED252	Fluid Mechanics & Hydraulic Machines	3	1	0	4	PC	
3	MED253	Mechanics of Deformable Solids	3	0	2	4	РС	
4	ECEXXX	Basic electronics Engineering	3	0	2	4	ES	
5	MED254	Engineering Materials & Applications	3	1	0	4	РС	
6		Mechanical Engineering Laboratory -I	0	0	4	2	DC	
		(Fluid Mechanics & Hydraulic Machines)	0			2	r C	
	Total=20CB							

#### L: Lectures T: Tutorial P: Practical Cr: Credits

**Note:** At the end of the examination of 4<sup>th</sup> Semester the students will undergo compulsory industrial training for a period of 4 weeks duration in reputed industries. Every student will submit the "Training Report along with Minor Project" within two weeks from the start of teaching for 5<sup>th</sup>Semester. The marks for this will be included in the 5<sup>th</sup> Semester.

Scheme of Courses
<b>B. Tech Mechanical Engineering</b>
Semester-5

S.NO.	Course Code	Course Title	ь т		Ρ	Cr	Natur e of Cours e
1	MED301	Machine Element & System Design	3	1	0	4	PC
2	MED302	Mechatronics, Robotics & Control	3	0	2	4	PC
3	MED303	Manufacturing Processes	3	1	0	4	PC
4	MED304	Measurement & Metrology	3	0	2	4	PC
5	MEDXXX	Program Elective-I	3	0	0	3	PE
9	MED305	Mechanical Engineering Laboratory -II (Design)		0	4	2	РС
	MED306	Industrial Training	0	0	0	2	AE
				•	•	To	tal=23CR

## L: Lectures T: Tutorial P: Practical Cr: Credits Note:

• Program elective-I should be from the basket of "Program Elective-I."

#### Scheme of Courses B. Tech Mechanical Engineering Semester-6

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MED351	CAD & Analysis	3	0	2	4	PC
2.	MED352	Manufacturing Automation	3	0	2	4	PC
3.	MED353	Production & Operation Management	3	1	0	4	РС
4.	MED354	Product innovation & Entrepreneurship	3	1	0	4	РС
5.	MEDXXX	Program Elective-II	3	0	0	3	PE
6.	MED355	Mechanical Engineering Laboratory -III (Manufacturing)	0	0	4	2	РС
7.	MED356	Engineering Project-I (Literature Review) 0		0	4	2	EEC
						Т	otal=23CR

#### L: Lectures T: Tutorial P: Practical Cr: Credits

Note:

- Program Elective-II should be from the basket of "Program Elective-II".
- At the end of the examination of 6<sup>th</sup> Semester the students will undergo compulsory industrial training for a period of 6 weeks duration in reputed industries. Every student will submit the

"Training Report along with Major Project" within two weeks from the start of teaching of  $7^{th}$  Semester. The marks for this will be included in the  $7^{th}$  semester.

#### Scheme of Courses B. Tech Mechanical Engineering Semester-7

S.NO.	Course Code	Course Title L T P		Cr	Natur e of Cours e		
1.	MEDXXX	Program Elective-III	3	0	0	3	PE
2.	MEDXXX	Program Elective-IV	3	0	0	3	PE
3.	MEDXXX	Open Elective-I	3	0	0	3	OE
4.	MED401	Industrial Training	0	0	0	3	AE
5.	MED402	Seminar/Technical Report Writing	0/2	0/0	4/0	2	AE
6.	MED403	Engineering Project-II (Design and Analysis)	0	0	10	5	EEC
						To	tal=19CR

#### L: Lectures T: Tutorial P: Practical Cr: Credits

#### Note:

- Program elective-III should be from the basket of "Program Elective-III."
- Program elective-IV should be from the basket of "Program Elective-IV, Open Elective Basket and
- Interdisciplinary course."
- Open elective-I should be from the "Open Elective Basket or MOOC Course."

#### Scheme of Courses B. Tech Mechanical Engineering Semester-8

	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MED451	Engineering Project-III (Prototyping and Testing)	0	0	14	7	PC
2.	MEDXXX	Open Elective-II	3	0	0	3	PC
							Total=10CR

#### L: Lectures T: Tutorial P: Practical Cr: Credits

Note:

- Student can also opt OJT (On job Training) in 8th sem.
- Open elective-II should be from the "Open Elective Basket or MOOC Course."

#### Program Elective-I

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MED311	Finite Element Method	3	0	0	3	Design
2.	MED312	Tool Design	3	0	0	3	Manufacturing
3.	MED313	Total Quality Management	3	0	0	3	Industrial
4.	MED314	Refrigeration and Air Conditioning	3	0	0	3	Thermal
5.	MOOC Courses			0	0	3	

#### Program Elective-II

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MED361	Mechanical Vibrations	3	0	0	3	Design
2.	MED362	Flexible Manufacturing System	3	0	0	3	Manufacturing
3.	MED363	Entrepreneurship development and Management	3	0	0	3	Industrial
4.	MED364	Gas Dynamics	3	0	0	3	Thermal
5.	MOOC Courses		3	0	0	3	

#### Program Elective-III

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MED411	Advanced Materials	3	0	0	3	Design
2.	MED412	Non-Destructive Testing	3	0	0	3	Manufacturing
3.	MED413	Industrial Safety	3	0	0	3	Industrial
4.	MED414	Non-conventional Energy Resources	3	0	0	3	Thermal
5.	MOOC Courses			0	0	3	

**Program Elective-IV** 

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1.	MED461	Mechanical Behaviour of Materials	3	0	0	3	Design
2.	MED462	Product Design and Development	3	0	0	3	Manufacturing
3.	MED463	Ergonomics and Workplace Design	3	0	0	3	Industrial
4.	MED464	Power Plant Engineering	3	0	0	3	Thermal
5.	MOOC Courses		3	0	0	3	

#### Note:

In addition to above program electives courses if the topics or subjects- a group of students requires to opt like- Machine drawing, IC engines, Optimization Techniques, Automobile Engineering, Maintenance and Reliability, Machine Learning, Artificial Intelligence, Python Programing, Internet of Things and Metlab programming etc can also be offered by mapping total credit.

#### **Open Elective**

S.NO.	Course Code	Course Title	L	т	Р	Cr	Nature of Course
1			3	0	0	3	OE

Note:

• List of open electives provided by other departments

	B Tech ME 2024-25 Course Structure								
CBCS	Nature of Courses	Core	EI	ective Cour	ses	Ability Enh	Total Credits		
Year	Course Structure	Core	Dissertation/ Project (EEC)	Open Elective /MOOC Courses	Program Elective/ MOOC Courses	Ability Enhance ment Compuls ory Courses	Value Added Courses		
2023	B.TECH ME	109	15	6	12	8	10	160	

Core	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology	Engineering Sciences (ES) including Materials, WS, ED, Basics of EE/ME/CSE	Discipline Core	Total Credits
58	24	27	27	136

# **Detailed Syllabus**

In	hou		
L	Т	Ρ	Credit
3	1	0	4

Course Code	MAT151						
Course Title	Engineerin	Engineering Mathematics-I					
Course Outcomes	On the completion of the course, the student will gain the following knowledge and skills: CO1: Understand the theory of matrices used in solving the problems in mechanics and other streams. CO2: Understand the concept of partial differentiation, Euler's theorem and its extension, total derivative, maxima and minima of a function of two variables, and Lagrange's method of multipliers. CO3: Understand the concept of ordinary differential equation and their solutions (Homogeneous, differential equation, Exact differential equations). CO4: Understand the solution of differential equations with constant coefficients by method of variation of parameters and simultaneous linear differential equations.						
Examination Type	Theory		-	_	_		
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	Attendance
Weightage	10	10 10 25 0 50					5
Examination Mode	Theory						
Syllabus	Unit 1: (15hours)CO1Rank of matrices, Inverse of Matrices, Gauss Jordan Method, reduction to normal form, Consistency and solution of linear algebraic system of equations, Gauss Elimination Method, Eigen values and Eigen vectors, Diagonalisation of Matrix, Cayley Hamilton theorem. Orthogonal, Hermition and unitary matrices.				CO1		
	Unit 2: (15hours)CO2Concept of limit and continuity of a function of two variables, Partial derivatives, Homogenous Function , Euler's Theorem Total Derivative, Differentiation of an implicit function, chain rule Change of variables, Jacobian, Taylor's and McLaurin's series, Maxima and minima of a function of two and three variables: Lagrange's method of multipliers.				CO2		
	Maxima and minima of a function of two and three variables: Lagrange's method of multipliers. <b>Unit 3: (15hours)</b> Formation of ordinary differential equations, solution of first order differential equations by separation of variables Homogeneous equations, Reduce to Homogenous Exact differential equations, equations reducible to exact form by integrating factors Equations of the first order and higher degree, clairaut's equation.				CO3		

	Unit 4: (15hours) Solution of differential equations with constant coefficients Method of differential operators. Homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters Simultaneously Linear differential equation	CO4
Reference Books:	<ol> <li>Grewal, B.S. Higher Engineering Mathematics. New Delhi: Khanna Publication, 2009.</li> <li>Jain, R K, and K Iyengar S R. Advanced Engineering Mathematics, New Delhi: Narosa Publishing House, 2003.Artificial Intelligence by Rich and Knight, The McGraw Hill, 2017.</li> <li>Kreyszig, Erwin. Advanced Engineering Mathematics. New Delhi: Wiley Eastern Ltd., 2003.</li> <li>Thomas, George B. and Finney Ross L. Calculus and Analytic Geometry. New Delhi Addison Wesley, 1995.</li> </ol>	

In	hou		
L	Т	Ρ	Credit
3	0	2	4

Course Code	PHS151						
Course Title	Engineeri	ng Physics					
Course Outcomes	On the completion of the course, the student will gain the following knowledge and skills: CO1: To generate Knowledge of wave optics with particular emphasize on interference, diffraction, polarization CO2: To enhance understanding LASER, its working mechanism and various types. Knowledge of fibre optics CO3: To create cognizance of superconductivity, Quantum Physics and Nanophysics CO4: To make students cover the bridge between theory and practical by analysing the obtained data.						
Examination Type	Theory + F	Practical (30 hrs)					
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	ATTENDANCE
Weightage	10		25	0	35	25	5
Examination Mode	Theory + F	Theory + Practical					
Syllabus	Onit 1: (IShours)COIInterference: Division of wave front, Fresnel's biprism, division of amplitude, Newton's rings and applicationsDiffraction: Difference between Fraunhofer and Fresnel diffraction, Fraunhofer diffraction through a slit, plane transmission diffraction grating, its dispersive and resolving powerPolarization: Polarized and unpolarised light, double refraction, Nicol prism, quarter and half wave plates.						
	Unit 2: (19 LASER: 5 Character Semicond FIBRE OPT single mod	Unit 2: (15hours)CO2LASER: Spontaneous and stimulated emission, Laser action, Characteristics of laser beam, concept of coherence, He-Ne laser, Semiconductor laser, Ruby laser and applications, Holography FIBRE OPTICS: Propagation of light in fibers, numerical aperture, single mode and multimode fibers, applicationsCO2				CO2	
	single mode and multimode fibers, applications Unit 3: (15hours) Difficulties with Classical physics, Introduction to quantum mechanics, Black Body radiation, Planck's Law of radiation, Photo electric effect , Wave particle duality, Heisenberg uncertainty principle, Time dependent and Time independent Schrodinger's wave equation concept of wave function. Introduction to Nano science and Nanotechnology, Electron confinement, Nanomaterial, Nanoparticles, Quantum structure, CNT, Synthesis of Nanomaterial and Application of Nanomaterial. Introduction (experimental survey), Meissner effect, Type I and			СО3			

	type II superconductors, London equation, Elements of BCS theory, Applications of superconductors.	
	<ul> <li>Unit 4: (15hours)</li> <li>Experimental skills: General Precautions for measurements and handling of equipment, representation of measurements, Fitting of given data to a straight line, and Error analysis, Significant figures and interpretation of results. <ol> <li>To determine wavelength of sodium light using Newton's Rings.</li> <li>Study of Solar Cell characteristics.</li> <li>To compare the focal length of two lenses by Nodal slide method.</li> <li>To determine the beam divergence of the He-Ne laser.</li> <li>To compare the two unknown capacitances of two capacitors by using De Sauty's bridge.</li> <li>To find our out the unknown inductance by using the Anderson's bridge method.</li> <li>To determine the Refractive Index of the Material of a given Prism using Sodium Light.</li> <li>Determination of Plank's constant using photoelectric effect.</li> <li>To study the capacitance by flashing/quenching of Neon bulb kit.</li> <li>To study the specific rotation of sugar solution Laurent's balf shade Polari meter method</li> </ol> </li> </ul>	CO4
Reference Books:	<ol> <li>Beiser, A. Perspective of Modern Physics. New Delhi: McGraw Hill Ltd., 2002</li> <li>Verm, N.K Physics for Engineers. New Delhi: Prentice Hall., 2014.</li> <li>Malik,H.K and Singh, A.K. Engineering Physics. New Delhi: McGraw Hill Ltd., 2017(second edition).</li> <li>Sear, F.W. Electricity and Magnetism. London: Addison- Wesley, 1962</li> <li>Resnick and Halliday. Physics.New York: Wiley, 2002.</li> <li>Jenkins, and White. Fundamental of Physical Optics. New York: Tata McGraw-Hill, 1937</li> </ol>	

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	EED101	EED101					
Course Title	Basic Elect	trical Engineering					
Course Outcomes	On the co and skills: CO1: Appl circuits. CO2: Form electroma CO3: Unde CO3: Unde CO4: Ident CO5: Appl devices as	On the completion of the course, the student will gain the following knowledge and skills: CO1: Apply the knowledge of Electrical Engineering principles to solve DC and AC circuits. CO2: Formulate and analyse electrical circuits. Understand basic principles of electromagnetism CO3: Understand electrical machines and transformers CO4: Identify and select various electrical machines according to the applications. CO5: Apply the ethical principles for troubleshooting & amp; installation of safety devices as per norms.					
Examination Type	Theory			<u>+</u>			
Assessment Tools	Written Quiz	Assignment/Pr oject Work	MSE	MSP	ESE	ESP	ATTENDANCE
Weightage	10	10	25	0	50	0	5
Examination Mode	Theory	Theory					
Synabus	Unit 1: (11hours)CO1D.C Circuit Analysis:Voltage source, current source, dependent and independent sources, analysis of D.C circuit by KCL and KVL, Nodal and Mesh analysis, Superposition theorem, Maximum Power Transfer Theorem, Thevenin and Norton Theorems						
	Unit 2: (12hours)CO2A.C Circuit Analysis: Review of single phase A.C. circuit under sinusoidal steady state, RMS Value, Average Value, Form factor, Peak factor solution of RL, RC, R.L.C. Series circuit, the j operator, complex representation of impedance, solution of series circuit, series resonance, 3 phase A.C. Circuit, star and delta connections, line and phase quantities solution of 3 phase circuits, balance supply voltage and balanced supply voltage and balance load, Phasor diagram, measurement of power and power factor.			CO2			
	Phasor diagram, measurement of power and power factor. Unit 3: (12hours) Magnetic Circuit & Transformers: H Curve, saturation leakage and fringing. Hysteresis and eddy currents. Single phase transformer, basic concepts constructional, voltage, current Transformation, Ideal transformer and its Phasor diagram, voltage regulation, OC/SC test, losses and efficiency, Autotransformer.			CO3			

	Unit 4: (12hours) Rotating Electrical Machines: Basic concepts, working principle and general construction of DC machines (motor/generators), torque and EMF expression. Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Electrical Installations Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Various faults in Battries, Elementary calculations for energy consumption, power factor improvement and battery backup.	CO4
Reference Books:	<ol> <li>M.S. Sukhija, T.K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford University Press, 2012.</li> <li>Ashfaq Husain, HarsoonAshfaq, "Fundamentals of Electrical Engineering, 4th Edition, Dhanpat Rai and Co., 2013</li> <li>V.N. Mittle, "Basic Electrical Engineering", 2nd Edition, Tata McGraw Hill Publication.</li> <li>B.L. Theraja, A.K. Theraja, "A Text Book of Electrical Technology, Volume-1, S. Chand Publication</li> <li>Debashisha Jena, "Basic Electrical Engineering", 1st edition, Wiley India Publication, 2012.</li> <li>B.L. Theraja, R.S. Sedha, "Principles of Electric Devices and Circuits", S. Chand Publication, 1st edition, 2006</li> </ol>	

In	hou		
L	Т	Ρ	Credit
0	0	2	1

Course Code	EED102	EED102					
Course Title	Electrical	lectrical Engineering Laboratory					
Course Outcomes	<ul> <li>CO1 Identify DC and AC circuits.</li> <li>CO2 Formulate and analyze electrical circuits for voltage, current and power measurements.</li> <li>CO3 Apply the ethical principles for troubleshooting &amp; installation of safety devices as per norms of engineering practice.</li> <li>CO4 Interpret basic principles of electromagnetism to implement in electrical machines and transformers.</li> <li>CO5 Recognize and select various electrical machines according to the applications.</li> </ul>						
Examination Type	Practical		1				
Assessment Tools	Lab Perform ance	Assignment/Pr oject Work	MSE	MSP	ESE	ESP	ATTENDA NCE
Weightage	20	0	0	30	0	50	0
Examination Mode	Practical	Practical					
1	Basic safe instrumen	Basic safety precautions. Introduction and use of measuring CO instruments digital multi meter.					CO1
2	Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor)				CO1		
3	To verify k	Kirchhoff's Current	t Law and Kirchh	off's Vol	tage Lav	v.	CO2
4	To verify T	hevenin's theore	m.				CO3
5	To verify S	superposition theo	orem.				
6	To study frequency response of a series R-L-C circuit and determine resonant frequency and Q-factor for various values of R, L and C				CO3		
7	To perform direct load test of a transformer and plot efficiency versus load characteristics.				CO4		
8	To perform	To perform open circuit on transformer					CO4
9	To perform	n short circuit tes	t on transformer	•			CO4
10	Measuren method, t	nent of power in a wo-wattmeter me	three-phase syst withod and three	em by: o wattmet	one watt ter meth	meter od	CO5

In	hou		
L	Т	Ρ	Credit
0	0	6	3

Course Code	MED101								
Course Title	Engineering Graphics and Design								
Course	On the completion of the course the student will be able to:								
Outcomes	CO1: To provide the basic knowledge about Engineering Drawing, technical lettering, an						ng, and		
	dimensioning. Theory of projections for point, line and plane.								
	CO2: [	Detailed concep	ots of ortho	graphic ai	nd isome	tric proj	jections f	or point, li	ne and
	pl	ane.							
	CO3: D	Detailed concep	ts of orthog	raphic and	d isometi	ric proje	ctions fo	r regular so	lids. To
	ev	valuate the sect	ional view o	f solids an	d develo	ping the	ir lateral	surface	
	CO4: -	Fo impart know	vledge of la	ayers com	imand ai	nd build	ing 3D c	bjects. To	impart
	kr	nowledge of the	e CAD softwa	are and to	use edit,	modify	and draw	commands	5.
Examination	Practic	al(72hr)							
Mode		_	()				1	1	
Assessment	Contin	uous Assessme	nt (CA)		MSE	MSP	ESE	ESP	Total
Tools	Quiz	Assignment/	Attendan	Lab					
		Project	се	Pertor					
		Work		mance		20			100
Weightage	-	-	-	20	-	30	-	50	100
Syllabus									
									iviap
	linture d	ustice and The				Na	of Chaot	. 2	ping 10km
	Introduction and I neory of Projection No. of Sheets: 3						1011		
	Engineering Graphics/Technical Drawing, Introduction to drawing equipment's						01		
	uses BIS codes for lines Technical lettering as per BIS codes. Introduction to								
	dimensioning Types Concents of scale drawing Types of scales								
	Theory of projections Perspective Orthographic System of orthographic								
	projec	tion: in reference	e to quadra	nts. Proiec	tion of P	oints. Pr	oiection i	n different	
	quadra	ants, Projection	of point on	auxiliary p	lanes. Di	stance b	etween t	wo points,	
	Illustra	ition through si	mple proble	ms.					
Unit 2	Projec	tions of Lines a	nd Planes			No.	of Sheets	: 4	18hr
	Line Pa	arallel to both I	H.P. and V.P	., Parallel	to one a	nd inclir	ned to ot	her, Other	CO2
	typical	cases: three	view project	tion of st	raight lir	nes, true	e length	and angle	
	orienta	ation of straight	t line: rotati	on metho	d, Trapez	zoidal m	ethod an	d auxiliary	
	plane i	method, traces	of line.						
	Projection of Planes Parallel to one and perpendicular to other, Perpendicular to								
	one and inclined to other, Inclined to both reference planes, Plane oblique to								
	refere	nce planes, trac	es of planes	•					
Unit 3	Projection of Solids, Section of Solids No. of Sheets: 4					18hr			
	Projec	tion of solids	in first or	third qu	iadrant,	Axis pa	rallel to	one and	CO3
	perper	ndicular to othe	r, Axis parall	el to one i	nclined to	o other, A	Axis inclir	ed to both	
	the pri	inciple plane, A	kis perpendi	cular to p	rofile pla	ne and p	barallel to	both H.P.	
	and V	.P., Visible and	invisible de	etails in t	ne proje	ction, U	se of ro	tation and	
	auxilia	ry plane metho	d.						

	Definition of Sectioning and its purpose, Procedure of Sectioning, Illustration through examples, Types of sectional planes-application to few examples.	
Unit 4	Development of Surface, Isometric and Orthographic Projection	18 hr
	No. of Sheets: 3	
	Purpose of development, Parallel line, radial line and triangulation method, Development of prism, cylinder, cone and pyramid surface for both right angled and oblique solids, Development of surface.	CO4
	between isometric projection and drawing, Isometric projection of solids such as cube, prism, pyramid and cylinder.	
	Review of principle of Orthographic Projection, Examples of simple machine parts, Drawing of Block and machine parts.	
	Introduction to CAD: Interfacing and Introduction to CAD Software, Coordinate	
	System, 2D drafting: lines, circles, arc, polygon, etc., Dimensioning, 2-D	
	Modelling, Use of CAD Software for engineering drawing practices.	
	Total No. of Sheets: 14	
Text Books	<ol> <li>P.S. Gill, "Engineering Graphics &amp; Drafting", S.K. Kataria &amp; Sons</li> <li>Bhatt N.D., Panchal V.M. &amp; Ingle P.R., (2014), Engineering Drawing, Charotar Publishing.</li> </ol>	
	3. Jain, Maheshwari, Gautam (2021), Engineering Graphics & Design, Khanna Book Publishing.	
	4. S. Vishal "AutoCAD" Dhanpat rai publishing company.	
Reference Books	1. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson.	
	<ol> <li>Agrawal B. &amp; Agrawal C. M. (2012), Engineering Graphics, TMH Publication.</li> <li>M.B. Shah, B.C. Rana, "Engineering Drawing", 3rd Ed., Pearson Education, New Delhi, 2009</li> </ol>	
	<ol> <li>Frederick E. Giesecke, Shawna Lockhart, Marla Goodman, Cindy M. Johnson, "Technical Drawing with Engineering Graphics", 15th Ed., Prentice Hall, USA, 2016</li> </ol>	
	5. (Corresponding set of) CAD Software Theory and User Manuals.	

In	hou		
L	Т	Ρ	Credit
0	0	2	1

Course Code	MED103								
Course Title	Design Thinking and Idea Lab								
Course	On the completion of the course the student will be able to:								
Outcomes	CO1: To learn all the skills associated with the tools and inventory associated with the IDEA								
	La	Lab.							
	CO2: L	earn useful	mechanica	I and electi	onic fab	prication	orocesse	es.	
	CO3: L	earn necess	sary skills to	o build usef	ul and st	tandalon	e system	n/ projec	t with enclosures.
	<b>CO4</b> : P	erceive ind	ividual diffe	erences and	l its imp	act on ev	eryday c	lecisions	and further Create
	а	better cust	omer exper	rience.					
Examination	Practic	al (24hr)							
Mode					Γ	1	1	r	
Assessment	C	ontinuous /	Assessment	: (CA)	MSE	MSP	ESE	ESP	Total
Tools	Quiz	Assignm	Attenda	Lab					
		ent/	nce	Perform					
		Project		ance					
		Work							
Weightage	-	-	-	20	-	30	-	50	100
S. No.	LIST OF EXPERIEMENTS								CO Mapping
1.	To stud	To study the working principles and operation of normal lathe machine. CO1							
2.	To stud	dy the, wor	king and op	peration of	different	t welding	equipm	ent's.	CO1
3.	To stud	dy the work	ing princip	les and ope	ration o	f wood la	the mad	chine.	CO1
4.	To Stu	dy the macl	nining of 3D	) geometry	on soft	material	such as	soft	CO2
	wood	or modellin	g wax.						
5.	To Stu	dy the 2D p	rofile cuttir	ng on plywo	od /MD	F (6-12 n	חm) for ן	oress	CO2
	fit desi	gns.							
6.	To Stu	dy the 3D 2	D profile cu	utting of pre	ess fit bo	x/casing	in acryli	c (3 or	CO2
	6 mm 1	thickness)/o	cardboard,	MDF (2 mm	i) board	using las	er cutte	r &	
	engrav	er.			<b>f</b>	20			
1.	Scanning of computer mouse geometry surface. 3D printing of scanned CO2								
0	geome	atic and DC		sign of a cu	itable e	rouit fab	rication	and	603
ð.	testing	and and PC	b layout de uit	sign of a su	itable Cl	icuit, Idb	rication	anu	03
0	Embed	Lesting of the circuit.							<u> </u>
<u> </u>	Design	and implor	mentation (	of a canstor		ct involvi	ng embe	haha	CO4
10.	hardwa	are softwa	re and mac	hined or 20	) nrinter	enclosu	re	Jueu	04
	naruwa	arc, sortwa			, printet	a criciosu			

	Reference content for theory Syllabus	CO Mapping
Unit 1	An Insight to Learning, Remembering Memory and Emotions:	
	Experience & Expression	
	Understanding the Learning Process, Kolb's Learning Styles, Assessing	CO1
	and Interpreting. Understanding the Memory process, Problems in	
	retention, Memory enhancement techniques. Understanding Emotions:	
	Experience & Expression, Assessing Empathy, Application with Peers	
Unit 2	Basics of Design Thinking	

	Definition of Design Thinking, Need for Design Thinking, Objective of	CO2
	Design Thinking, Concepts & Brainstorming, Stages of Design Thinking	
	Process (explain with examples) – Empathize, Define, Ideate, Prototype,	
	Test. Understanding Creative thinking process, Understanding Problem	
	Solving, Testing Creative	
	Problem Solving. Process of Engineering Product Design, Design Thinking	
	Approach, Stages of Product Design,	
	Examples of best product designs and functions, Assignment –	
	Engineering Product Design	
Unit 3	Prototyping & Testing	
	What is Prototype? Why Prototype? Rapid Prototype Development	CO3
	process, Testing, Sample Example, Test Group Marketing. Understanding	
	Individual differences & Uniqueness, Group Discussion and Activities to	
	encourage the understanding, acceptance and appreciation of Individual	
	differences	
Unit 4	Design Thinking & Customer Centricity	
	Practical Examples of Customer Challenges, Use of Design Thinking to	CO4
	Enhance Customer Experience, Parameters of Product experience,	
	Alignment of Customer Expectations with Product	
	Design. Feedback loop, Focus on User Experience, Address "ergonomic	
	challenges, User focused design,	
	rapid prototyping & testing, final product, Final Presentation – "Solving	
	Practical Engineering	
	Problem through Innovative Product Design & Creative Solution".	
Text Books	1. E Balaguruswamy (2022), Developing Thinking Skills (The way to	
	Success), Khanna Book Publishing Company.	
	2. AICTE's Prescribed Textbook: Workshop / Manufacturing Practices	
	(with Lab Manual), ISBN: 978-9391505332	
	3 Amrinder Singh, Manufacturing Practice. Mahalakshmi Publication,	
	New Delhi.	
Reference	1. All-in-One Electronics Simplified, A.K. Maini; 2021. ISBN-13: 978-	
Books	9386173393, Khanna Book Publishing Company, New Delhi.	
	2. 3D Printing & Design, Dr. Sabrie Soloman, ISBN: 978-9386173768,	
	Khanna Book Publishing Company, New Delhi	
	3. The Big Book of Maker Skills: Tools & Techniques for Building Great	
	Tech Projects. Chris Hackett. Weldon Owen; 2018. ISBN-13: 978-	
	1681884325.	

In	hou		
L	Т	Ρ	Credit
2	1	0	3

Course Code	HVE101						
Course Title	Human Values and Ethics						
Course Outcomes	On the completion of the course, the student will gain the following knowledge and skills: CO1: Development of a holistic perspective based on self – exploration about themselves (human being), family, society and nature/existence. CO2: Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence CO3: Strengthening of self-reflection. CO4: Development of commitment and courage to act.						
Examination Type	Theory + I	Practical					
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	Attendance
Weightage	10	10	25		50		5
Examination Mode	Theory + I	Practical					
Syllabus	Unit 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education and Understanding Harmony in the Human Being – Harmony in Myself, Purpose and motivation for the course, recapitulation from Universal Human 1, Values -1, Self – Exploration – what is it? – its content and process; 'Natural Acceptance' and Experiential Validation – as the process for self – exploration. Continuous Happiness and Prosperity – A look at basic Human Aspirations. Right understanding, Relationship and Physical Facility – the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding the needs of Self ('I') and 'Body' – happiness and physical facility. Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail						CO1
	Unit 2: (14hours) Understanding Harmony in the Family and Society – Harmony in Human – Human Relationship: Understanding values in human- human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the detailed meaning of Trust and Respect: Difference between intention and competence, Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of						CO2

	family): Resolution, Prosperity, fearlessness (trust) and co – existence as comprehensive Human Goals.		
	Unit 3: (14hours) Understanding Harmony in the Nature and Existence – Whole existence as Coexistence Understanding the harmony in the Nature. Understanding Existence as Co – existence of mutually interacting unitsin all- pervasive space. Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	CO3	
	Unit 4: (12hours) Implications of the above Holistic Understanding of Harmony on Professional Ethics Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: a. Ability to utilize the professional for competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco- friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems.	CO4	
Reference Books:	<ol> <li>A Nagaraj, Jeeban Vidya: Ek Parichaya. Jeevan Vidya Prakashan, Amarkantak, 1999.</li> <li>A.N. Tripathi, Human Values. New Age Intl. Publishers, New Delhi, 2004.</li> <li>Annie Leonard, The Story of Stuff. Free Press, Mumbai, latest edition.</li> <li>Mohandas Karamchand Gandhi, The Story of My Experiments with Truth. Fingerprint publisher, New Delhi, latest edition.</li> <li>E. F Schumacher, Small is Beautiful. Blond &amp; amp; Briggs and HarperCollins, latest edition.</li> <li>Cecile Andrews, Slow is Beautiful. New Society publishers, Canada, latest edition.</li> <li>J C Kumarappa, Economy of Permanence. Sarva Seva Sangh Prakashan, Varanasi, latest edition.</li> <li>Pandit Sunder Lal, Bharat Mein Angreji Raj. Prabhat Prakashan, New Delhi, latest edition.</li> <li>Mohandas K. Gandhi, Hind, Swaraj or Indian Home Rule.</li> <li>The International Printing Press Phoenix, Natal, latest edition.</li> <li>Mohandas K. Gandhi, Life of Vivekananda. Advaita Ashrama, Kolkata, Latest Edition.</li> <li>Romain Rolland, Life of Vivekananda. Advaita Ashrama, Kolkata, Latest Edition.</li> <li>Romain Rolland, Mahatma Gandhi. Srishti Publishers &amp; Distributors, New Delhi, Latest Edition.</li> </ol>		
In hours			
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L	Т	Ρ	Credit
1	0	2	2

Course Code	ENH111	ENH111					
Course Title	Cambridg	Cambridge English I					
Course	On the completion of the course the student will be able to						
Outcomes	CO1: Dev	elop effective listening	skills to c	omprehe	nd spok	en Englisł	n in various contexts
	and accer	and accents, employing strategies such as skimming, scanning, and understanding implicit					
	meaning.	meaning.					
	CO2: Imp	rove spoken communi	cation sk	kills by ex	pressin	g ideas f	uently, engaging in
	discussior	ns, role-plays, and colla	aborative	tasks, ar	nd apply	ving effec	tive communication
	strategies						
	CO3: Enh	ance reading compret	nension a	abilities t	o unde	rstand ar	interpret diverse
	written m	aterials using technique	es like ski	mming, so	canning,	and critic	al reading to extract
	essential	information.					
	CO4: Dev	elop writing proficienc	y to proc	luce well	-structu	red, cohe	rent written pieces,
	demonstr	ating accurate gramma	r usage, v	ocabulary	y selectio	on, and ef	fective organization.
Examination	Theory +	Practical					
Mode				_			-
Assessment	Written	Assignment/Project	MSE	MSP	ESE	ESP	Attendance
Tools	Quiz	Work					
Weightage	10			20	35	30	5
Examination	Theory +	Practical					
Mode							
Syllabus							CO Mapping
Unit 1	Chapters	1-4					
	Listening	Introduction to Listeni	ng I				
	Listening	to people talk about the	eir past, li	stening to	o a descr	iption of	CO1
	a transpo	ortation system, listeni	ng to pe	eople tall	k about	capsule	
	hotels, et	с.					
	Speaking	Basic Conversation Ski	ills I				CO2
	Introducir	ng yourself; Talking ab	out your	self; Exch	anging	personal	
	informatio	information; Talking about transportation and transportation					
	problems	problems; Evaluating city services; Asking for and giving					
	informatio	on; describing positive	e and ne	egative fe	eatures;	Making	
	compariso	ons; Expressing wishes;	talking al	bout food	l; Giving	step-by-	
	step instr	uctions, etc.			-		CO3
	Reading:	Introduction to Rea	ding Ski	lls and	Compre	hension	
	Strategies	SI		inton vo	adina ak		
	Reading a	about the life of a lyre	exican pa	unter, rea	ading at	bout the	
	happiest cities in the world, reading about living without money, CO4						
	Mriting a	ntroduction to Pasics a	a, ell <b>f \//=i+i</b> =~	. 1			
	Writing a	naroduction to basics of	hildbood	, I writing :	on online	nost on	
		paragraph about your c nity message board ab		, writing a	writing	an omail	
	comparin	a two living spaces atc		ai issue,	winnig		CO4
	Grammar	· An Introduction to	the Fi	Indamen	tals of	Fnglich	
	Grammar			andamen		LIIBIIIII	
	Jiannidi	•					

	Past tense; <i>used to</i> for habitual actions, Expressions of quantity with count and noncount nouns: <i>too many, too much, fewer, less, more, not enough</i> ; indirect questions from Wh-questions, Evaluations and comparisons with adjectives: <i>not enough, too, (not) as as</i> ; evaluations and comparisons with nouns: <i>not enough , too much/many , (not) as much/many as</i> ; wish.	
	Self-paced practice with Online Workbook (Units 1-4)	
Unit 2	Chapters 5-8	
	Listening: Listening For Basic Information	CO1
	Listening to travel advice, Listening to the results of a survey about family life, Listening to a radio program, listening to people give suggestions for using technology, Listening to a description of Carnival in Brazil, etc.	
	<b>Speaking: Vocabulary Development for Effective Conversation</b> Speaking about vacation plans; giving travel advice; planning a vacation, Making requests; agreeing to and refusing requests; complaining; apologizing; giving excuses, giving instructions; giving suggestions, Talking about holidays, festivals, customs, and special	CO2
	events, etc. <b>Reading: Introduction to Reading Skills and Comprehension</b> <b>Strategies II</b> Reading about unusual vacations, Reading about unusual hotel requests Reading about sharing accommy Reading about	CO3
	interesting New Year's customs, etc. Writing: Introduction to Basics of Writing II Writing a message making a request, Writing a message asking for	CO4
	specific favors, and Writing an entry on a travel website about a cultural custom, etc.	CO4
	Grammar: An introduction to the Fundamentals of English	
	Future with <i>be going to</i> and <i>will</i> , modals for necessity and	
	suggestion: must, need to, (don't) have to, ought to'd better.	
	should (not), Two-part verbs; will for responding to requests;	
	requests with modals and Would you mind ?, Infinitives and	
	gerunds for uses and purposes; imperatives and infinitives for giving suggestions,	
	Self-paced practice with Online Workbook (Units 5-8)	
Unit 3	Chapters 9-12	

	Listening: Listening for Specific Information	CO1
	Listening to people talk about changes, Listening to people talk	
	about their job preferences, Listening to descriptions of	
	monuments, listening for information about a country, Listening to	
	stories about unexpected experiences, etc.	
	Speaking: Descriptive Speaking I	CO2
	Talking about change; comparing time periods; describing possible	
	consequences; describing abilities and skills; describing personality	
	traits; talking about landmarks and monuments; describing	
	countries; discussing facts, Describing recent past events and	CO3
	experiences, etc	
	Reading: Introduction to Reading Skills and Comprehension	
	Strategies III	
	Reading about a town's attempt to attract new residents, Reading	
	about understanding cultural differences in an international	CO4
	company, Reading about unusual museums, Reading about an	
	unusual rock band, etc	
	Writing: Introduction to Basics of Writing III	
	Writing a paragraph describing a person's past, present, and	CO4
	possible future, Writing an online cover letter for a job application,	
	Writing an introduction to an online city guide, Writing a description	
	of a recent experience	
	Grammar: An Introduction to the Fundamentals of English	
	Grammar III	
	Time contrasts; conditional sentences with <i>if</i> clauses. Gerunds: short	
	responses; clauses with <i>because</i> , Passive with <i>bv</i> (simple past):	
	passive without by (simple present); past continuous vs. simple past:	
	present perfect continuous.	
	Self-paced practice with Online Workbook (Units 9-12)	
Unit 4	Chapters 13-16	

	Listening: Listening for Sequencing	
	Listening for opinions; listening to a movie review; listening to	
	people talk about the meaning of signs, Listening to people talk	CO1
	about predicaments; listening to a call-in radio show, etc.	
	Speaking: Descriptive Speaking II	CO2
	Describing movies and books; talking about actors and actresses;	
	asking for and giving reactions and opinions, Interpreting body	
	language; explaining gestures and meanings; Speculating about past	
	and future events; describing a predicament; giving advice and	
	suggestions, Reporting what people said; making polite requests;	
	making invitations and excuses, etc.	CO3
	Reading: Introduction to Reading Skills and Comprehension	
	Strategies IV	
	Reading about unpleasant experiences actors put themselves	
	through, Reading about idioms and their meaning, Reading an	CO4
	online advice forum, Reading about taking a sick day, etc	
	Writing: Introduction to Basics of Writing IV	
	Writing a movie review, Writing a report about people's responses	CO4
	to a survey, etc	
	Grammar: An Introduction to the Fundamentals of English	
	Grammar IV	
	Participles as adjectives; relative pronouns for people and things,	
	Modals and adverbs: might, may, could, must, maybe, perhaps,	
	probably, definitely; permission, obligation, and prohibition, Unreal	
	conditional sentences with <i>if</i> clauses; past modals, Reported speech:	
	requests and statements	
	Self-paced practice with Online Workbook (Units 13-16)	
Text Books	Interchange Level 2 - 5 <sup>th</sup> edition published by Cambridge University	
	Press	

In	hou	In hours		
L	Т	Ρ	Credit	
3	1	0	4	

Course Code	MAT152						
Course Title	Engineeri	ng Mathematics-II					
Course Outcomes	On the con CO1: Unde trigonome CO2: Unde curves. CO3: Unde integrals. CO4: Unde converger	On the completion of the course the student will be able to CO1: Understand complex numbers and its applications, summation of trigonometric series. CO2: Understand double, triple integration to use in finding areas and volumes of curves. CO3: Understand vector calculus, del, gradient, divergence, and line and surface integrals. CO4: Understand Convergence, divergence, absolute convergence, uniform					
Examination Type	Theory						
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	Attendance
Weightage	10	10	25	0	50	0	5
Examination Mode	Theory						
Syllabus	Unit 1: (1) Functions Complex N De-Moivre of expone inverse hy trigonome	Unit 1: (11 hours)CO1Functions of Complex VariablesComplex Numbers and elementary functions of complex variables.De-Moivre's theorem and its applications. Real and imaginary parts of exponential, logarithmic, circular, inverse circular, hyperbolic, inverse hyperbolic functions of complex variables. Summation of trigonometric series (C+iS method).					CO1
	Unit 2: (13 hours)CO2Integral CalculusRectification of standard curves, Areas bounded by standard curves, Volumes and surfaces of revolution of curves. Double and triple integral and their evaluation, change of order of integration, change of variables. Application of double and triple integration to find areas and volumes. Centre of gravity and Moment of inertia.				CO2		
	Unit 3: (13 Vector Ca Scalar and acceleration interpreta Flux, Solo theorem, proofs) and	<b>B hours)</b> Iculus and its application d vector fields, different on. Del, Gradient, Diver tions, Line, surface and v enoidal and Irrotationa Green's theorem in pla id their applications.	is iation of gence al olume in olume in il vector ane, Stol	f vectors nd Curl, tegrals. rs. Gaus ke's theo	s, veloc their p ss Dive orem (v	ity and hysical ergence without	СОЗ

	Unit 4: (11 hours) Infinite Series Convergence and divergence of series, tests of convergence (without proofs): comparison test, Integral test, ratio test. Raabe's test, logarithmic test, Cauchy's root test and Gauss test. Convergence and absolute convergence of alternating series. Uniform Convergence and power Series.	CO4
Reference Books:	<ol> <li>Grewal, B.S. Higher Engineering Mathematics. New Delhi: Khanna Publication, 2009.</li> <li>Jain, R K, and K Iyengar S R. Advanced Engineering Mathematics, New Delhi: Narosa Publishing House, 2003.Artificial Intelligence by Rich and Knight, The McGraw Hill, 2017.</li> <li>Kreyszig, Erwin. Advanced Engineering Mathematics. New Delhi: Wiley Eastern Ltd., 2003.</li> <li>Thomas, George B. and Finney Ross L. Calculus and Analytic Geometry. New Delhi Addison Wesley, 1995.</li> </ol>	

In	hou	rs	
L	Т	Ρ	Credit
3	0	2	4

Course Code	CHM151						
Course Title	Chemistry	Y					
Course Outcomes	On the con CO1: Stud UV, and N CO2: Fami domestic classificati corrosion CO3: To Familiarize polymeriz understan concept o CO4: Appl the basic o	On the completion of the course the student will be able to: CO1: Students will be able to understand the basic concept of spectroscopy (IR, UV, and NMR). CO2: Familiarize with the basic properties of water and its uses in industrial and domestic purposes and understand the basic knowledge about corrosion, their classification, different mechanism and understand the various factors influencing corrosion and various methods of corrosion control. CO3: To provide the basic knowledge about the classification of polymer. Familiarize students with a complete packet of information of mechanism of polymerization, the effect of molecular weight on the properties of polymers, and understand the basic concept of polymer reinforced composites. Understand the concept of chemistry in Nano science and nanotechnology. CO4: Apply the concept of physical properties of liquids, pH and to understand					
Examination Type	Theory + F	Practical					
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	Attendance
Weightage	10		25	0	35	25	5
Examination Mode	Theory + F	Practical					
Syllabus	Unit 1: (12 Spectrosco General I absorption spectrosco technique UV/Visible Chromoph lines, effec IR Spectro and types energy le characteri affecting v NMR Spo magnetic shift.	<b>2 hours)</b> opy and its Applications ntroduction: Introduction and emission spectro opy, types of molec s, selection rules, width, a e Spectroscopy: types nores, Auxochromes, nores, Factors affecting λ ct of solvent on λmax, isos scopy: Infrared region, fu , theory of infrared spectro vels, modes of vibration stic signals of IR spectru vibrational frequency; app ectroscopy: Principle a resonance spectroscopy,	n, elect rum, at cular s and inter of e Effect max an sbestic p ndamen tra, vibr ndamen itra, vibr ins of p um, fing lications nd inst	romagne omic a pectra, nsities of lectronic of con d intens oint, app tal mode rational colyatom erprint n s. trumenta r of sign	etic spe nd mc experi spectra spectra Tran njugatic ity of s plicatior es of vib frequen nic mol region, ation, nals, Ch	ectrum, olecular mental al lines. sitions, on on pectral ns. rations icy and ecules, factors proton nemical	CO1
	Unit 2: (1 Water and	<b>2 hours)</b> I its treatment & Corrosio	n and its	Prevent	tion		CO2

<ul> <li>Introduction, hardness of water, degree of hardness, units of hardness, boiler feed water: specification, scales, and sludge formation; priming&amp; foaming, boiler corrosion.</li> <li>Treatment of boiler feed water, internal treatment of water; softening of water by lime-soda, zeolite, and ion exchange methods.</li> <li>Introduction; different types of corrosion - wet and dry corrosion; mechanism of wet corrosion; comparison of dry and wet corrosion, Types of electrochemical corrosion.</li> <li>Galvanic corrosion, concentration cell corrosion or differential aeration corrosion, waterline corrosion, pitting corrosion, crevice corrosion, stress corrosion, intergranular corrosion.</li> <li>Passivity, galvanic series, factors influencing corrosion, various methods of corrosion control.</li> </ul>	
<ul> <li>Unit 3: (14 hours)</li> <li>Polymers and Reinforce composites</li> <li>Introduction, monomer and repeating unit, degree of polymerization, functionality, and classification of polymers: based on origin, monomers, structure, method of synthesis, tacticity or configuration, action of heat, chemical composition, and ultimate form.</li> <li>Types of polymerization, specific features of polymers, regularity and irregularity, tacticity of polymers.</li> <li>Average molecular weights and size, determination of molecular weight by number average methods, effect of molecular weight on the properties of polymer.</li> <li>Introduction to polymer reinforced composites.</li> <li>Introduction to Nano composites, Materials self-assembly, self-assembling materials, two dimensional assemblies, Nano scale materials, future perspectives applications, nano composites, and its applications.</li> </ul>	CO3
Unit 4: (14 hours) Practical Preparation of a polymer phenol/urea formaldehyde resin. Determination of surface tension of given liquid by using Stalagmometer. Determination of the viscosity of given lubricating oil by using Redwood Viscometer. Determination of the strength of HCl solution by titrating against NaOH using pH meter. Determine the strength of HCl solution by titrating against NaOH solution conductometerically. Determination of total hardness of water (tap) using standard EDTA solution and Eriochrome black T indicator. Determination of dissolved oxygen present in given sample of water. Determination of alkalinity of water.	CO4

Reference Books:	1. William Kemp, Organic Spectroscopy, Palgrave Foundations, 199
	<ol> <li>D. A. Skoog, F. J. Holler and A. N. Timothy, Principle of Instrumental Analysis, 5th Edition., Saunders College Publishing, Philadelphia, 1998.</li> </ol>
	<ol> <li>C. P. Poole, Jr., F. J. Owens, Introduction to Nanotechnology, Wiley Interscience, 2003.</li> </ol>
	<ol> <li>L.E. Foster, Nanotechnology, Science Innovation &amp; Opportunity, Pearson Education, 2007.</li> </ol>
	<ol> <li>P. Ghosh, Polymer Science, and technology (2nd Edition), Tata McGraw Hill, 2008.</li> </ol>
	6. Wiley Engineering Chemistry, Second Edition, 2013.

In	hou	rs	
L	Т	Ρ	Credit
0	0	4	2

Course Code	MED102								
Course Title	Manuf	acturing Pr	actice						
Course	On the	completio	n of the cou	urse the stu	ident wi	ll be able	to:		
Outcomes	CO1: T	o Know bas	sic worksho	p processe	s, Read,	and inte	rpret jol	o drawing.	
	CO2: lo	dentify, sele	ect, and use	e various m	arking, n	neasurin	g, holdir	ng, striking, and	d cutting tools
	&	equipment	c's						
	CO3: O	CO3: Operate and control different machines and equipment's.							
	CO4: 1	Fo provide	exposure	to the stu	dents w	vith hand	ds on e	xperience on	various basic
	engine	ering pract	ices in Civil,	, Mechanic	al, Electr	ical and	Electror	nics Engineerin	g.
Examination	Practic	al (48hr)							
Mode									
Assessment	C	ontinuous /	Assessment	: (CA)	MSE	MSP	ESE	ESP	Total
Tools	Quiz	Assignm	Attenda	Lab					
		ent/	nce	Perform					
		Project		ance					
		Work							
Weightage	-	-	-	20	-	30	-	50	100
Syllabus					1		1	-	CO Mapping
Unit 1	Carper	ntry Shop a	nd Welding	g shop					12hr
	Introdu	uction, Clas	ssification	of wood, S	Seasonin	g of wo	od, Cla	ssification of	CO1
	carpentry tools. Joints and joining processes. Wood working machines and					nachines and			
	proces	ses, safety	precaution	n, Preparat	ion of ł	nalf lap	ioint, Pr	eparation of	
	Mortis	e and Tend	, on Joint, Pr	reparation	of a Do	ve & Tai	, I joint, <sup>-</sup>	, To prepare a	
	White	board dust	er.	•					
	Introdu	uction, Vari	ous weldin	g processe	s with b	rief intro	ductior	, Electric Arc	
	weldin	g, Arc weld	ing procedu	ure, List of e	quipme	nt for ele	ctric arc	welding, Gas	
	weldin	g process	and equir	oment. Pre	eparation	n of Joi	nt bv A	Arc Welding.	
	Prepar	ation of Joi	int by using	g Gas Weld	ing. Prei	paration	of Joint	by MIG/ TIG	
	Weldin	ng, Preparat	tion of Joint	, t by Spot/ S	Seam We	elding.		, ,	
Unit 2	Fitting	shop and I	Foundry sho	op		<u>U</u>			12hr
	Introdu	uction, Too	ls used in fi	itting, mea	suring a	nd marki	ng tools	, the process	CO2
	of mal	king sawing	g, Filling, T	apping an	d die, Ir	ntroducti	on to d	Irills, Filing a	
	dimens	sioned recta	angular or s	quare piec	e and pre	epare a s	q. fitting	, Preparation	
	of T fit	tting male	part, Prepa	ration of l	J fitting	Female	part, Int	ernal thread	
	Cutting in Square piece and external thread cutting on a rod and assembling								
	as a paper weight.								
	Introduction, Basic terminology, Pattern, Types of patterns, Patterns								
	allowances, Tools for hand Moulding, Moulding sand and Moulding process,								
	Crucible furnace, Operation of cupola, Foundry containers, Casting defects,								
	Safety precautions, To make a Mould of solid pattern, To prepare a mould of								
	sleeve	fitting using	g gating sys <sup>.</sup>	tem, To ma	ke a Mo	uld of Sp	lit Patte	rn using Cope	
	& Drag	g, To check	the Hardne	ss of the M	lould.				
Unit 3	Sheet-	Metal Sho	p and Macl	hine Shop					12hr

	Introduction, Types of sheets (ferrous/non-ferrous), Standard sheet sizes and	CO3
	their measurement, Tools used in sheet metal. Preparation of a funnel from	
	G.I. sheet, Preparation of a book rack stand from G.I. Sheet, Preparation of a	
	leak proof tray with inclined edges from G.I. Sheet, Preparation of a square	
	pen stand from G.I. Sheet with riveting at corners.	
	Introduction, Classification of machine tools and cutting tolls, Basic operations	
	on lathe, Drilling, Shaper, Milling, Cutting tool material, Work-holding devices,	
	To make a job using step turning and grooving, To make a job using knurling	
	and threading, To make a multi operation job on a Lathe machine, To make V	
	<ul> <li>slot by using shaper machine</li> </ul>	
Unit 4	Smithy Shop and Electrical Shop	12hr
	Introduction, Types of forging, Equipment used in the smithy shop, Smithy	CO4
	tools, Black smith's hearth, Hand forging operations. To Forge the L – Hook,	
	To Forge a Chisel, To Forge a Cube from a M.S Round, To forge a screw driver.	
	Layout of electrical tube light wiring, Layout of stair case wiring using two-way	
	switch, Testing and rectification of simulated faults in electrical appliances	
	such as 'Electric Iron' Ceiling Fan. Electric kettle, To fabricate a circuit for the	
	electrical wiring of Fan with regulator and Bulb through a main switch and its	
	testing using a series lamp	
Text Books	1. Johl, K. C. Mechanical Workshop Practice. Prentice Hall India, 1st Edition,	
	2010. Print.	
	2. Bawa, H.S. Workshop Technology. New Delhi: Tata McGraw Hill, 7th	
	Edition, 2004. Print.	
	3 Amrinder Singh, Manufacturing Practice. Mahalakshmi Publication, New	
	Delhi.	
Reference	1. Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and	
Books	Technology", 4th edition, Pearson Education India Edition, 2002.	
	2. Gowri P. Hariharan and A. Suresh Babu," Manufacturing Technology – I"	
	Pearson Education, 2008.	
	3. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition,	
	Prentice Hall India, 1998.	

In	hou	rs	
L	Т	Ρ	Credit
3	0	0	3

Course Code	CST100						
Course Title	Program	nming for Proble	m Solving				
Course	On the	completion of the	e course the student	will be able to			
Outcomes	CO1: De	evelop and transla	ate the algorithms to	programs & executi	ion		
	CO2: Im	plement condition	onal branching and it	eration.			
	CO3: Us	se arrays, strings a	and decompose a pro	oblem into functions	i		
	CO4: Us	e pointers and st	ructures to formulat	e algorithms and pro	ograms and t	to use files to	
	perform	n read and write o	operations.				
Examination	Theory	Theory					
Mode							
Assessment	Quiz	Assignment	Attendance	MSE	ESE	Total	
Tools							
Weightage	10	10	5	25	50	100	
Syllabus						СО	
						Mapping	
Unit 1	Introdu	ction to Program	ming(11hours)				
•	Introdu	ction to Program	ning: Computer syste	em, components of a	computer	CO1	
	system,	computing en	vironments, compu	ter languages, cre	ating and		
	running	programs, Algori	thms, flowcharts.				
	Introdu	ction to C langu	age: History of C, b	asic structure of C	programs,		
	process	of compiling a	nd running a C p	rogram, C tokens,	keywords,		
	identifie	ers, constants, st	rings, special symb	ols, variables, data	types, I/O		
	statements.						
Unit 2	Operate	ors, Expressions a	and Control Structur	es(12hours)			
•	Operato	ors and expression	ons: Operators, arit	hmetic, relational a	nd logical,	CO2	
	assignm	nent operators, i	ncrement and decre	ement operators, b	itwise and		
	conditio	onal operators,	special operators,	operator preced	ence and		
	associat	tivity, evaluation	of expressions, type	conversions in expre	essions.		
	Control	structures: Dec	ision statements; if	and switch statem	nent; Loop		
	control	statements: whil	e, for and do while l	oops, jump stateme	nts, break,		
	continu	e, goto statemen	ts.				
Unit 3	Arrays,	strings and funct	ions(12hours)				
•	Arrays:	Concepts, One c	limensional array, d	eclaration and initia	lization of	CO3	
	one dim	nensional arrays, t	two dimensional arra	ays, initialization and	accessing,		
	multi-di	imensional arrays					
	Functio	ns: User defined	and built-in Functio	ns, storage classes,	Parameter		
	passing	in functions, call	by value, Passing arr	ays to functions: ide	a of call by		
	referen	ce, Recursion					
	Strings:	Arrays of chara	cters, variable leng	h character strings	, inputting		
	charact	er strings, charac	ter library functions,	string handling func	tions.		
Unit 4	Pointer	s, Structures and	File Handling(11hou	ırs)			
•	Pointer	s: Pointer basics,	pointer arithmetic,	pointers to pointe	rs, generic	CO4	
	pointer	s, array of pointe	rs, functions returni	ng pointers, Dynam	ic memory		
	allocatio	on.					

	Structures and unions: Structure definition, initialization, accessing structures, nested structures, arrays of structures, structures and functions, unions, typedef, enumerations. File handling: command line arguments, File modes, basic file operations read, write and append,	
Text Books	<ol> <li>Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill</li> <li>Programming for Problem Solving, R.S. Salaria, Khanna Book Publishing Co., Delhi.</li> </ol>	
Reference Book/s	<ol> <li>Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, Pearson</li> <li>The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.</li> <li>Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition, Cengage Learning - 2007.</li> <li>Let US C By Yashwant P. Kanetkar.</li> </ol>	

In	hou	Irs	
L	Т	Ρ	Credit
0	0	4	2

Course Code	CST102							
Course Title	Program	Programming for Problem Solving Laboratory						
Course	On the	On the completion of the course the student will be able to						
Outcomes	CO1: De	CO1: Develop and translate the algorithms to programs & execution						
	CO2: Im	plement condition	onal branching and it	eration.				
	CO3: Us	se arrays, strings a	and decompose a pro	oblem into functions	5			
	CO4: Us	se pointers and st	ructures to formulat	e algorithms and pro	ograms and t	to use files to		
	perform	n read and write o	operations.					
Examination	Theory	Theory						
Mode								
Assessment	Quiz	Quiz Lab ATTENDANCE MSP ESP						
Tools		Performance						
Weightage	-	20	-	30	50	100		
Syllabus						СО		
						Mapping		
Unit 1	Introdu	ction to Program	ming(10hours)					
•	WAP th	at accepts the ma	arks of 5 subjects and	d finds the sum and p	percentage	CO1		
	marks o	btained by the st	udent.					
	WAP th	nat calculates th	e Simple Interest	and Compound Int	erest. The			
	Principa	al, Amount, Rate	of Interest and Ti	ime are entered th	rough the			
	keyboai	rd.						
	WAP to	calculate the are	a and circumference	of a circle.				
	WAP t	hat accepts the	temperature in C	Centigrade and con	verts into			
	Fahrenh	neit using the form	mula C/5=(F32)/9.					
	WAP th	at swaps values c	of two variables using	g a third variable.				
Unit 2	Operate	ors, Expressions a	and Control Structur	es(11hours)				
•	WAP th	at checks whethe	r the two numbers e	ntered by the user a	re equal or	CO2		
	not.							
	WAP to	find the greatest	of three numbers.					
	WAP th	at finds whether	a given number is ev	en or odd.				
	WAP th	at tells whether a	given year is a leap	year or not.				
	WAP th	at accepts mark	s of five subjects an	nd finds percentage	and prints			
	grades a	according to the f	ollowing					
	criteria:							
	Betwee	n 90-100	Print 'A'					
	80-90		Print 'B'					
	60-80		Print 'C'					
	Below 6	»O	Print 'D'					
	WAP th	at takes two ope	rands and one opera	itor from the user ar	nd perform			
	tne ope	ration and prints	the result by using S	witch statement.				
	WAP to	print the sum of	all numbers up to a	given number.				
	WAP to	ting the factorial	of a given number.					
	WAP to	print sum of eve	n and odd numbers l	from 1 to N numbers	5.			
	WAP to	print the Fibonad	cci series.					
	WAP to	check whether t	ne entered number i	s prime or not.				
	WAP to	find the reverse	of a number.					

	WAP to print Armstrong numbers from 1 to 100.	
Unit 3	Arrays, strings and functions(12hours)	
•	WAP that simply takes elements of the array from the user and finds the sum	CO3
	WAP to find the minimum and maximum element of the array	
	WAP to search an element in a array using Linear Search	
	WAP to add and multiply two matrices of order nxn	
	WAP to implement strien () streat () streat () using the concept of Functions	
Unit 4	Pointers, Structures and File Handling(12hours)	
•	WAP to implement the concept of Structures and Union	CO4
	WAP to swap two elements using the concept of pointers.	001
	WAP to compare the contents of two files and determine whether they are	
	same or not.	
	WAP to check whether a given word exists in a file or not. If yes then find the	
	number of times it occurs.	
Text Books	1. Computer Concepts and Programming in C, E Balaguruswami,	
	McGraw Hill	
	2. Programming for Problem Solving, R.S. Salaria, Khanna Book	
	Publishing Co., Delhi.	
Reference	1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B.	
Book/s	Koffman, Pearson	
	2. The C programming by Kernighan Brain W. and Ritchie Dennis M.,	
	Pearson Education .	
	3. Computer Science- A Structured Programming Approach Using C, by	
	Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition,	
	Cengage Learning - 2007.	
	4. Let Us C By Yashwant P. Kanetkar.	

Note: This is only the suggested list of practical. Instructor may frame additional practicals relevant to the course contents.

In	hou		
L	Т	Ρ	Credit
2	0	2	3

Course Code	EVS104						
Course Title	Environm	ent Studies					
Course Outcomes	On the co and skills: CO1: To environme of natural CO2: To av Interpret and disast CO3: Expa perspectiv environme on humar governme of society. CO4: Field skills for th	On the completion of the course, the student will gain the following knowledge and skills: CO1: To Understand the interconnected and interdisciplinary nature of environmental studies and develops critical thinking skills in relation to environmental affairs. Acquire knowledge about the depletion of the root cause of natural resources and their effective management. CO2: To aware about the ecosystems, biodiversity and its importance to mankind. Interpret and propose solutions to various environmental pollution, solid waste and disaster management. CO3: Expand awareness of self in a global society and effectively engage diverse perspectives, values, and cultures, ranging from local to global in dealing with environmental and social issues. Awareness about effect of population increase on humans itself. Causes of spread of different diseases in society. How Indian government is supporting women and children that considered weakest section of society. CO4: Field visits and practical applications will help the students to enhance their					
Examination Type	Theory + F	Practical					
Assessment Tools	Written Quiz	Assignment/Project Work	MSE	MSP	ESE	ESP	Attendance
Weightage	10	0	25	0	35	25	5
Examination Mode	Theory + F	Practical					
Syllabus	Unit 1: (11hours)       CO1         Introduction to Environmental Studies, Natural Resources and Ecosystem       CO1         • The multidisciplinary nature of environmental studies       Natural Resources: Renewable and non-renewable resources.         • Forest resources: Use and over-exploitation       Water resources: Over-utilization of surface and ground water         • Mineral resources: Use and exploitation, environmental effects of mining       Food resources: Effects of modern agriculture on environment         • Energy resources: Uses and land degradation, soil erosion       Ecosystem: Structure and function of an ecosystem. Producers, consumers and decomposers						

<ul> <li>Energy flow in the ecosystem, Ecological succession</li> <li>Food chains, food webs, ecological pyramids</li> </ul>	
Unit 2: (11hours) Biodiversity and Environmental Pollution	CO2
<ul> <li>Biodiversity definition. Genetic, species and ecosystem diversity. Bio-geographical classification of India.</li> <li>Value of biodiversity. India as mega-diversity nation. Hot-spots of biodiversity.</li> <li>Threats to biodiversity. Man wildlife conflicts. In-situ and Ex-situ conservation of biodiversity.</li> <li>Environmental Pollution: Definition, causes, effects and control measures of: Air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution, nuclear pollution</li> <li>Solid waste management and techniques.</li> <li>Disaster management: floods, earthquake, cyclone and landslides.</li> </ul>	
<ul> <li>Unit 3: (11hours)</li> <li>Social Issues, Human Population and Environment <ul> <li>Sustainable Development: From unsustainable to sustainable development. Urban problems related to energy.</li> <li>Water conservation: Rain water harvesting and watershed management. Resettlement and rehabilitation of people</li> <li>Environmental Issues: Climate change, global warming, acid rain, ozone depletion, nuclear accidents and holocaust.</li> <li>Wasteland reclamation. Consumerism and waste products.</li> <li>Environmental Laws: The Environment Protection Act, 1986; The Air Act, 1981; The Water Act, 1974; The Wildlife Protection Act, 1972; Forest Conservation Act, 1980.</li> <li>Human Population and Environment: Population growth and population explosion, causes and effects</li> <li>HIV/ AIDS</li> <li>Women and child welfare programmes in India</li> <li>Role of IT in environment and human health.</li> </ul> </li> </ul>	CO3
<ul> <li>Unit 4: (12hours)</li> <li>Practical's and field study <ul> <li>Visit to sewage treatment plant and rain water harvesting system</li> <li>Solid waste management by vermi-composting and biogas plant</li> <li>Visit to incineration plant of your area.</li> <li>A visit to pond, river and lake ecosystem</li> <li>Visit to different industries with respect to pollution</li> <li>Testing of water parameters: Hardness, pH, Conductivity, Total dissolved solids, Total suspended solids, BOD and DO</li> </ul> </li> </ul>	CO4

	Study of plants in their natural habitat
Reference Books:	<ol> <li>Garg, S. K. Sewage Disposal and Air Pollution Engineering. Khanna Publishers, Delhi, 2003.</li> </ol>
	<ol> <li>Botkin, D.B. and Kodler, E.A. Environmental Studies: The Earth as a living planet. New York: John Wiley and Sons Inc., 2000.</li> </ol>
	3. Odum, E.P. Basic Ecology. Japan: Halt Saundurs, 1983.
	<ol> <li>Oliver, S. O. and Daniel, D. C. Natural Resource Conservation: Management for a Sustainable future. Prentice Hall International, New Jersey, 1990.</li> </ol>
	<ol> <li>Rai, G. D. Non-Conventional Energy Sources, Khanna Publishers, Delhi, 1993.</li> </ol>
	<ol> <li>Sharma, P. D. Ecology and Environment. Meerut Rastogi Publications, 2004.</li> </ol>
	<ol> <li>Singh, J.S., Singh, S.P. and Gupta, S. R. Ecology, Environment and Resource Conservation. New Delhi: Anamaya Publishers, 2006.</li> </ol>
	<ol> <li>Smith, R.L.Ecology and Field Biology, Harper Collins, New York, 1996.</li> </ol>
	9. Alloway, B. J. and Ayres, D.C. Chemical Principles of Environmental Pollution. Blackie Academic and Professional, London, 1997.
	<ol> <li>Chapman, J. L. and Reiss, M. J. Ecology: Principles and Applications. Cambridge University Press, UK, 1998.</li> </ol>
	11. De, A.K. Environmental Chemistry. New Delhi: Wiley Eastern Ltd., 1990.
	12. Muller-Dombols, D. and Ellenberg, H. Aims and Methods of Vegetation Ecology, Wiley, New York, 1974.
	<ol> <li>Singh, J. S. Restoration of Degraded Land: Concepts and Strategies. Rastogi Publications, Meerut, 1993.</li> </ol>
	14. Wright, R. T. and Nebel, B. J. Environmental Science, 8th Ed. Prentice Hall India Ltd., 2004.

In	hou		
L	Т	Ρ	Credit
1	0	2	2

Course Code	ENH112							
Course Title	Cambridge English-II							
Course	On the completion of the course the student will be able to							
Outcomes	CO1: Proficiently handle diverse communication situations, including listening to							
	complain	complaints, news stories, and podcasts; discussing careers and experiences; expressing						
	emotions	and cultural expectatio	ns; and	writing c	ritical onlir	ne reviews.		
	CO2: Cor	nsolidate advanced gra	ammar	and voc	abulary ki	nowledge for	асо	curate and
	appropria	ate language usage.						
	CO3: Util	ize comprehensive aud	lio and	video res	sources to	develop effe	ctiv	e language
	compreh	ension and production.						
	CO4: Effe	ctive Communication in	Diverse	Contexts	: Demonst	trate fluency, c	ohe	erence, and
	confidenc	ce in expressing compl	ex ideas	s, drawin	g conclusi	ons, discussin	g h	ypothetical
	situations	s, and describing qualities	es for su	ccess.				
Examination	Theory +	Practical						
Mode					[	L		
	Written	Assignment/Project	MSE	MSP	ESE	ESP	At	tendance
	Quiz	Work						_
Weightage	10	0	0	20	35	30		5
Syllabus								CO
11.11.4								Mapping
Unit 1	Unit 1: (1	0 hours)						CO1
	Listening	: Advanced Listening I	I. Bata					
	Listening	for descriptions of peop	ne; listei	ning for o	pinions; ils	stening to peop	bie	
	making,	accepting, and declinin	ng requ	ests; list	ening to i	messages and	а	
	podcast.							CO1
	Speaking	– Advanced Speaking I						01
	Describin	g personalities; expre	essing	likes and	d dislikes	; agreeing a	nd	
	disagreei	ng; complaining; talking	g about	possible	careers; d	eciding betwe	en	
	two jobs	, Making direct and i	ndirect	requests	; acceptin	g and declini	ng	CO1
	requests,	Narrating a story						01
	Writing	/ Reading –	Adva	nced	Reading/	Writing	I	
	Writing a	a description of a go	od friei	nd, Read	ing about	t unusual soc	ial	
	networki	ng sites, Writing about t	two care	eer choice	es, Reading	g about differe	ent	
	types of	workplaces, Writing a	message	e with re	quests, W	riting a persor	nal	<u> </u>
	account,	Reading about the relial	bility of	online co	ntent topi	cs		002
	Gramma	r – Advanced English Gr	ammar	I				
	Relative g	pronouns as subjects an	d obiect	s; it claus	es + adver	bial clauses wi	ith	
	when: Ge	erund phrases as subject	ts and o	, biects: co	mparisons	s with adjective	es.	
	nouns, ve	erbs, and past particip	les. Reg	iuests wi	th modals	if clauses a	nd	
	gerunds	indirect requests. Past of	continuc	us vs. sin	nple past.	past perfect.		
Unit 2	Unit 2. /1	0 hours)				p		
		d Communication II						
	Listening		GII					
	Listening	for information about	living a	hroad li	stening to	oninions abo	<u></u>	CO1
	custome	Listening to complaint	s. licton	ing to ne	onle evch	ange things in	,ui 1 2	001
	customs,		s, iistell	ing to pe	opie excli	ange tilligs li	īđ	<u> </u>

	store; listening to a conversation about a "throwaway culture," Listening to environmental problems; listening for solutions, Listening to a conversation with a guidance counselor; listening for additional information	604
	<b>Speaking – ADVANCED SPEAKING II</b> Talking about moving abroad; expressing emotions; describing cultural expectations; giving advice; describing problems; making complaints; explaining something that needs to be done; identifying and describing problems; coming up with solutions; asking about preferences; discussing	01
	different skills to be learned <b>Writing/ Reading – ADVANCED READING/ WRITING II</b> Writing a pamphlet for tourists, Reading about moving to another country, Writing a critical online review. Reading about a problem with a ride-sharing	CO4
	service, Writing a post on a community website, Reading about a creative solution to lionfish on St. Lucia, Writing about a skill, Reading about different studying styles	CO2
	<b>Grammar - ADVANCED GRAMMAR II</b> Noun phrases containing relative clauses; expectations: <i>the custom to</i> , ( <i>not</i> ) <i>supposed to</i> , <i>expected to</i> , ( <i>not</i> ) <i>acceptable to</i> ; <i>d</i> escribing problems with past participles as adjectives and with nouns; describing problems with <i>need</i> + gerund, <i>need</i> + passive infinitive, and <i>keep</i> + gerund, Passive in the present continuous and present perfect; prepositions of cause; infinitive clauses and phrases, <i>Would rather</i> and <i>would prefer; by</i> + gerund to describe how to do things	
Unit 3	Unit 3: (10 hours)	
	Listening – ADVANCED LISTENING III Listening to New Year's resolutions, Listening for dates and time periods; listening to predictions, Listening to descriptions of important events; listening to regrets and explanations. Listening for features and slogans	CO1
	<b>Speaking – ADVANCED SPEAKING II</b> Talking about moving abroad; expressing emotions; describing cultural expectations; giving advice; describing problems; making complaints;	CO2
	explaining something that needs to be done; identifying and describing problems; coming up with solutions; asking about preferences; discussing different skills to be learned.	CO3
	<ul> <li>Writing / Reading – ADVANCED READING/ WRITING III</li> <li>Writing a message of advice, Reading about young scientist Jack Andraka,</li> <li>Writing a biography, Reading about futurists and their predictions for the year</li> <li>2050, Writing a message of apology, Reading about a conflict with a friend and advice on how to fix it, Writing a TV or web commercial, Reading about what makes some advertisements memorable,</li> <li>Grammar – ADVANCED GRAMMAR III</li> <li>Get or have something done; making suggestions with modals + verbs,</li> </ul>	CO2
	gerunds, negative questions, and infinitives; referring to time in the past with adverbs and prepositions: <i>during</i> , <i>in</i> , <i>ago</i> , <i>fromto</i> , <i>for</i> , <i>since</i> ; predicting the future with will, future continuous, and future perfect, Time clauses: <i>before</i> , <i>after</i> , <i>once</i> , <i>the moment</i> , <i>as soon as</i> , <i>until</i> , <i>by the time</i> ; expressing regret with <i>should</i> ( <i>not</i> ) <i>have</i> + past participle; describing hypothetical situations with <i>if</i> clauses + past perfect and <i>would/could have</i> + past participle	
Unit 4	Unit 4: (10 hours) Listening – ADVANCED LISTENING IV	

	Listening to explanations; listening for the best solution, Listening for parts of	CO3
	a movie, Listening for solutions to everyday annoyances; listening to issues	
	and Opinions, Listening to past obstacles and how they were overcome,	
	listening for people's goals for the future	CO4
	Speaking – ADVANCED SPEAKING IV	
	Drawing conclusions, offering explanations; describing hypothetical events;	
	giving advice for complicated situations, Describing how something is done	
	or made; describing careers in film, TV, publishing, gaming, and music, Giving	
	opinions for and against controversial topics; offering a different opinion;	CO3
	agreeing and disagreeing, Giving opinions about inspirational sayings; talking	
	about the past and the future.	
	Writing/ Reading – ADVANCED READING/ WRITING II	
	Writing a pamphlet for tourists, Reading about moving to another country,	
	Writing a critical online review, Reading about a problem with a ride-sharing	CO2
	service, Writing a post on a community website, Reading about a creative	
	solution to Lion fish on St. Lucia, Writing about a skill, Reading about different	
	studying styles	
	Grammar - ADVANCED GRAMMAR IV	
	Past modals for degrees of certainty: must (not) have, may (not) have, might	
	(not) have, could (not) have; past modals for judgments and suggestions:	
	should (not) have, could (not) have, would (not) have, The passive to describe	
	process with <i>is/are</i> + past participle and modal + <i>be</i> + past participle; defining	
	and non-defining relative clauses, Giving recommendations and opinions with	
	passive modals: should be, ought to be, must be, has to be, has got to be; tag	
	questions for opinions, Accomplishments with the simple past and present	
	perfect; goals with the future perfect and would like to have + past participle	
Text Books	Interchange Level 3 - 5th edition published by Cambridge University	
	Press	

In	hou		
L	Т	Ρ	Credit
3	1	0	4

Course Code	MED201							
Course Title	Applied T	hermodynamics						
Course	On the co	On the completion of the course the student will be able to:						
Outcomes	CO1: To i	dentify and formulat	e power	producti	on based	d on the fu	ndamental's laws	
	of Th	ermal engineering.						
	CO2: Anal	lyze the performance o	f vapour p	ower cyc	les cycle a	and steam n	ozzles	
	CO3: Des	cribe the various coolir	ng, lubrica	tion, igni	tion & fue	el supply sys	stems and evaluate	
	the perfor	mance parameters of i	nternal co	mbustior	engines			
	CO4: Anal	lyze the performance of	f air comp	ressors ar	nd steam t	turbine solv	e numerical related	
	to the per	formance of single stag	e and mu	lti stage.				
Examination	Theory							
Mode		ſ	1					
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introduct	tion to basic of therm	nodynam	ics				
	Introducti	on to solid, liquid and	gaseous	fuels–Sto	ichiometr	ry, exhaust	CO1	
	gas analys	is- First law analysis of c	combustio	n reactio	ns- Heat c	alculations		
	using en	thalpy tables- Adiat	oatic flar	me tem	perature	Chemical		
	equilibriur	m and equilibrium com	position c	alculatior	ns using fr	ee energy.		
	Compress	ible flow in diffusers, ef	ficiency o	f nozzle a	nd diffuse	er.		
Unit 2	Vapor po	wer cycles						
	Vapor po	ower cycles Rankine	cycle w	ith supe	rheat, re	eheat and	CO2	
	regenerat	ion, energy analysis.	Supercrit	tical and	ultra-su	per-critical		
	Rankine c	ycle- Gas power cycle	s, Air sta	ndard Ot	to, Diese	and Dual		
	Cycles-Air	standard Brayton cyc	le, effect	of rehea	t, regene	ration and		
	intercoolir	ng- Combined gas and v	apor pow	er cycles-	Vapor co	mpression		
	refrigerati	on cycles, refrigerants	and their	propertie	es. Proper	rties of dry		
	and wet	air, use of psych	ometric	chart, p	rocesses	involving		
	heating/co	poling and humidificatio	on/dehum	idificatio	n, dew po	oint.		
Unit 3	Compres	sible flow						
	Basics of o	compressible flow. Stag	gnation pr	operties,	Isentropi	c flow of a	CO3	
	perfect ga	as through a nozzle, c	hoked flo	w, subsc	onic and	supersonic		
	flows- noi	rmal shocks- use of id	eal gas ta	bles for	isentropi	c flow and		
	normal sh	ock flow- Flow of stean	n and refr	igerant th	rough no	zzle, super		
	saturation							
Unit 4	Compressor and Steam turbine							
	Reciproca	ting compressors, sta	aging of	reciproc	ating co	mpressors,	CO4	
	optimal st	age pressure ratio, eff	ect of inte	ercooling,	minimur	n work for		
	multistage	e reciprocating compi	ressors. A	Analysis	of steam	turbines,		
	velocity ar	nd pressure compoundi	ing of stea	im turbin	es.			

Text Books	1. Y. A. Cengel, M. A. Boles; Thermodynamics – An Engineering Approach: Tata McGraw Hill Education Pvt. Ltd. New Delhi.4th Ed:	
	2012.	
	2. P. K Nag; Engineering Thermodynamics; Tata McGraw Hill	
	Education Pvt. Ltd.; New Delhi.4th Ed.; 2008.	
	3. P. W Gill, J. H. Smith., E. J. Ziurys; Fundamentals of Combustion	
	Engines; Oxford & IBH Publishing Co. Pvt. Ltd.; 4th revised Ed.;1967.	
	4. G. V. Wylen; R. Sonntag, C. Borgnakke; Fundamentals of Classical	
	Thermodynamics; John Wiley & Sons, 4th Ed.; 1996.	
	5. G. Rogers, Y. Mayhew; Engineering Thermodynamics-Work and	
	Heat Transfer; Pearson Education Ltd., 7th Ed.; 2012.	
	6. J. B. Jones, R. E. Dungan; Engineering Thermodynamics; Prentice	
	Hall of India Pvt. Ltd., New Delhi, Eastern Economy Ed.; 1996.	
Reference	1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition,	
Books	Fundamentals of Thermodynamics, John Wiley and Sons.	
	2. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics,	
	Prentice-Hall of India	
	3. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering	
	Thermodynamics, John Wiley and Sons.	
	https://archive.nptel.ac.in/courses/112/106/112106314/	

In	hou	rs	
L	Т	Ρ	Credit
3	0	2	4

Course Code	MED202	MED202						
Course Title	Kinematic	Kinematics & Dynamics of Machines						
Course	On the co	On the completion of the course the student will be able to:						
Outcomes	CO1: To p	rovide the basic concep	ots of force	es in mec	hanisms.			
	CO2: To le	arn about the various t	types of ca	ım & follo	owers.			
	CO3: To pi	CO3: To provide the information of balancing of machines.						
	CO4: To le	CO4: To learn the concept of flywheels.						
Examination	Theory							
Mode			1			I		
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	-	25%	-	35%	25%	5%	
Syllabus							CO Mapping	
Unit 1	Mechanis	ms						
	Definition	and types of joints;	Lower an	d higher	pairs; Cl	assification of	CO1	
	mechanisr	ns based on function a	nd constra	aints; Con	nmon me	chanisms such		
	as slider o	crank and 4-bar mecha	anisms an	d their i	nversions;	Quick return		
	mechanisr	n, Straight line genera	tors, rock	er mecha	anisms, ur	niversal joints,		
	steering r	nechanisms, etc. Deg	ree of fr	eedom a	and Grüb	ler's formula;		
	Grashof's	rule and rotatability lin	mits; Mec	hanical a	dvantage;	Transmission		
	angle; Lim	it positions.						
Unit 2	Cams and	Followers						
	Classificat	ion of cams and followe	ers, disc ca	m nomer	nclature, c	onstruction of	CO2	
	displacem	ent, velocity and acce	eleration	diagrams	for diffe	rent types of		
	follower m	notions, determination	of basic di	mension,	synthesis	of cam profile		
	by graphic	cal methods with vario	us motion	is, cams v	with speci	fied contours,		
	problems.							
Unit 3	Balancing	of Rotating Componer	nts and Re	ciprocati	ng Parts			
	Static bala	ance, dynamic balance	, balancin	g of rota	ting mass	es, two plane	CO3	
	balancing,	graphical and analytic	al method	ls, balanc	ing of rot	ors, balancing		
	machines,	field balancing.						
	Balancing	of single cylinder engin	ie, balanci	ng of mu	lti cylinde	r; inline, radial		
	and V type	e engines, firing order.						
Unit 4	Flywheels							
	Turning m	noment and crank eff	ort diagra	ms for r	eciprocat	ing machines'	CO4	
	Fluctuatio	ns of speed, coefficie	ent of flu	ctuation	of speed	and energy,		
	Determina	ation of mass and dim	ensions o	t flywhee	el used to	r engines and		
	punching	machines.						
Text Books	Rattan, S.	S. Theory of Machines	. New De	lhi: Tata	McGraw-	Hill Publishing		
	Company	Ltd. Print.			D : 0 O	<b>.</b>		
	Singh, V.P.	. Theory of Machines.	vew Delhi:	Unanpat		Print.		
	Ballaney,	P.L. I neory of Machin	nes and	wechanis	sm, New	Deini:Khanna		
	Publishers	5, 2015.Print.						
Reference	Shigley, J	.E. and Uicker, J.J. The	ory of M	achines	and ech	anısms. New		
Books	Delhi:Oxfo	ora University Press, 20	15. Print.					
	Ghosh, A.	and Mallick, A.K.Theory	y of Mecha	anisms an	id Machin	es. New Delhi:		
	Attiliated I	ffiliated East-West Pvt. Ltd., 2009. Print.						

In	hou	Irs	
L	Т	Ρ	Credit
3	1	0	4

Course Code	MED203							
Course Title	Engineeri	ng Mechanics						
Course	On the co	On the completion of the course the student will be able to:						
Outcomes	CO1: To understand the concepts of force and free body diagram.							
	CO2: To ga	ain knowledge of force	system in	trusses, o	cables and	d beams.		
	CO3: To a	apply Methods of virt	ual work	and stat	ionary Po	otential Energy	in engineering	
	appli	applications.						
	CO4: To u	CO4: To understand the Kinematics of a Particle-simple Relative Motion						
Examination	Theory	Theory						
Mode		ſ				1		
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introduct	tion to Mechanics						
	Forces in I	Nature; Newton's laws	and its co	mpletene	ss in desc	ribing particle	CO1	
	motion; F	orm invariance of N	ewton's S	Second L	aw; Solv	ing Newton's		
	equations	of motion in polar co	ordinates;	Problem	ns includir	ng constraints		
	and frictio	n; Extension to cylindri	ical and sp	herical co	pordinate	S.		
	Position V	ector, Moment of a For	ce about a	Point, M	oment of	a Force about		
	an Axis, 1	The Couple and Coupl	e Momer	nt, Additi	on and S	ubtraction of		
	Couple M	oment of a Couple Ab	out a Lin	e, The Fr	ee-body [	Diagram, Free		
	Bodies Inv	olving Interior Sections	s, Looking	Ahead-Co	ontrol Vol	umes		
	General E	quations of Equilibrium	l.					
Unit 2	Introduct	tion to structural Me	chanics a	nd Fricti	on Force	S		
	Potential e	energy function; F = - G	rad V, equ	ipotentia	I surfaces	and meaning	CO2	
	of gradien	it; Conservative and no	n-conserv	ative forc	es, curl o	t a force field;		
	Part A: Iru	usses: The Structural N	lodel, The	Simple I	russ Solu	tion of Simple		
	Trusses, Method of Joints, Method of Sections, Looking Ahead-Deflection of							
	a Simple, I	Linearly Elastic Truss,			<b>F</b> aura <b>A</b> .	del Conce and		
	Part B: Sec	ction Forces in Beams:		on, Snear	Force, AX	dal Force, and		
	Bending N	homent, Differential Re	ations for	Conlona	um r Cableer	Looding is a		
	Function	Part C: Chains and Cables: Introduction, Coplanar Cables; Loading is a						
	Function,	troduction Laws of Cou	ilomh Eric	tion A Co	une Cable	oncorning the		
	Lise of Co	ulomh' · Law Simple C	nomo FIIC	tion Drob	Jome Rol	t Friction The		
		row Thread Rolling Res	sistanco		nems, dei	t Friction, me		
Linit 2	Methods	of virtual work and	stationar	v Potont	ial Enorg	N/		
Sincs	Dart A. M	ethod of Virtual Work		of Virt	ial Work	for a Particle	<u> </u>	
	Principle	of Virtual Work for Riv	aid Rodie		s of Free	dom and the		
	Solution	f Problems Looking Ah	ead-Defoi	rmahle				
	Solids			music				
	Part B: M	ethod of Total Potentia	al Energy	Conserva	tive Syste	ms. Condition		
	of Fauilibr	ium for a Conservative	System S	tability I	ooking Ał	head-More on		
	Total Pote	ntial Energy.	System, S	Labinty, L				
Unit 4	Kinemati	cs of a Particle-simpl	e Relativ	e Motio	n			
J T	mentati				•			

	<b>Part A: General Notions:</b> Introduction, Differentiation of a Vector with Respect to Time, <b>Part B: Velocity and Acceleration Calculations:</b> Introductory Remark, Rectangular Components, Velocity and Acceleration in Terms of Path Variables, Cylindrical Coordinates. <b>Part C: Simple</b> <b>Kinematical Relations and Applications</b> : Simple Relative Motion, Motion of	CO4				
	a Particle Relative to a Pair of Translating Axes.					
Text Books	1. Irving H. Shames, "Engineering Mechanics Statics and Dynamics",					
	Prentice Hall Publications					
	2. An Introduction to Mechanics — D Kleppner & R Kolenkow					
	3. Engineering Mechanics - Dynamics, 7th ed JL Meriam					
Reference	1. Boresi. P, "Engineering Mechanics Statics and Dynamics", Cengage					
Books	Publishers.					
	2.Hibbler. H. C., "Engineering Mechanics", Pearson publishers.					

In	hou		
L	Т	Ρ	Credit
0	0	8	4

Course Code	MED204										
Course Title	Machine Drawing										
Course	On the	completio	n of the cou	urse the stu	ident wi	ll be able	e to:				
Outcomes	CO1To	make the	e students	understan	d the p	principles	and re	equireme	ents	of production	
	drawin	gs.									
	CO2To	CO2To provide the students a clear understanding of assembly and disassembly of important									
	mecha	mechanical parts used in major engineering applications.									
	CO3To	learn vario	us boiler m	ountings, I	C Engine	es Parts.					
	CO4 To	Learn diffe	erent types	of bearing	s.						
Examination Mode	Practic	al (48hr)									
Assessment	C	ontinuous A	Assessment	: (CA)	MSE	MSP	ESE	ESP	Тс	otal	
Tools	Ouiz	Assignm	Attenda	Lab							
	~~~	ent/	nce	Perform							
		Proiect		ance							
		Work									
Weightage	_	_	_	20	-	30	_	50	10	00	
Syllabus									C	O Mapping	
Unit 1	Reauir	ements of	Production	Drawing							
	Types	of Machi	ne Drawir	ng. Requir	ements	of Pro	duction	Drawir	ıg.	CO1	
	Conver	ntional rep	resentation	n of mater	rials. Di	mension	ing. Lim	its. Fits	&		
	Tolera	nces. Symbo	ols of stand	lard tolerar	nces. Ma	chining 8	& Weldir	ng Symbo	ol.		
	Fasten	ers : Introd	uction, Ten	nporary & P	, Permane	nt Faster	ners; Typ	bes of Riv	et		
	Head,	Riveting Pr	ocess, Typ	es of Rive	ted join	ts, Vario	us type	s of scre	w		
	thread	s, Types of	nuts and bo	olts, Assem	bly of N	ut, Bolt a	ind Wasl	her.			
Unit 2					-						
	Keys, C	Cotter & Kn	uckle Joint	: Types of k	eys, Sad	dle Key,	Sunk Key	, Gib He	ad	CO2	
	Key; So	ocket & Spi	igot cotter	joint, Sleev	ve and c	otter joi	nt, Gib	and Cott	er		
	Joint, k	Knuckle Joir	nt, Pipe join	ts and Pipe	fittings.						
	Coupli	<b>ngs</b> : Solid o	r Rigid Cou	pling, Prote	ected an	d Unpro	tected T	ype Flan	ge		
	couplir	ng, Pin type	e flexible co	oupling, m	uff coup	ling, Old	lham's 8	univers	sal		
	couplir	ıg.									
Unit 3											
	Boiler	Mountings	: Steam sto	p valve, fee	d check	valve, sa	fety valv	e, blow o	off	CO3	
	cock va	alve. IC Eng	ine Parts: P	Piston, conr	necting r	od, Cran	kshaft.				
Unit 4											
	Bearin	gs: Bushed	bearing, Plu	ummer bloo	ck, foots	tep bear	ing, Swiv	el bearir	ng.	CO4	
	Miscel	laneous: Sc	rew Jack, T	ool Post, T	ail Stock	، Drillin	g jig, Ma	chine vio	ce,		
	Bench	Vice, cross	head, Ecce	ntric Soluti	on of fev	v proble	ms using	g comput	er		
	design	software.									
Text Books	1. Gill,	P.S. Machir	ne Drawing	. New Delh	i: S. K. Ka	ataria& S	Sons, 201	L3. Print.			
	2. Dha	wan, R.K. N	lachine Dra	wing. New	Delhi: S	. Chand a	& Sons, 2	2014.			
	Print.										

	3. Narayana, K. L., Kannaiah, P. and Reddy, K. V. Machine Drawing. New Delhi: New AgeInternational Publishers, 2009. Print	
Reference	1. Sidheshwar, N., Kannaieh, P., Sastry V.V.S. Machine Drawing. New Delhi:	
Books	Tata McGraw Hill,	
	2010. Print.	

In	hou		
L	Т	Ρ	Credit
0	0	2	1

Course Code	MED205									
Course Title	Swach	Swachh Bharat								
Course	On the	On the completion of the course the student will be able to:								
Outcomes	CO1: Understanding the significance of the Swachh Bharat Abhiyan									
	CO2: A	CO2: Ability to analyse and predict the sanitation challenges of India								
	CO3: D	CO3: Determine the link between sanitation and development.								
	CO4: C	CO4: Contribute to the Swachh Bharat Abhiyan through real time projects/fieldwork.								
Examination	Practic	Practical (30hr)								
Mode						1			1	
Assessment	C	ontinuous A	Assessment	: (CA)	MSE	MSP	ESE	ESP	Total	
Tools	Quiz	Assignm	Attenda	Lab						
		ent/	nce	Perform						
		Project		ance						
		Work								
Weightage	-	-	-	20	-	30	-	50	100	
Syllabus									CO M	lapping
Unit 1	Introd	uction to Sv	wachh Bhai	rat Abhiya	n					
	Gandh	ian philoso	ohy of Clea	nlinesst						CO1
	Swach	Swachh Bharat Abhiyan {SBA}								
	Hygien	e, Sanitatio	n & Sustair	hable Wast	e Manag	gement				
	Agenci	es and nod	al Ministrie	s for SBA						
	Differe	ent phases o	of the SBA a	nd its evalu	uation					
	Citizen	s' Responsi	bilities: Rol	e of Swaccl	nagrahi					
Unit 2	Swach	h Bharat: F	Rural and U	J <b>rban Face</b>	ts					
	•	Indicators	for Swachl	h Bharat						CO2
	•	Rural								
		i. Sa	anitation co	overage acr	oss hou	seholds (	2014 vs.	2022)		
		ii. O	pen Defeca	ition Free (	ODF} Vil	lages: Pa	rameter	S		
		iii. O	DF plus mo	del: Key ind	dicators					
	•	Urban								
		1. SU	ustainable s	anitation	Nacto		ont			
		II. W	asle/ Waler	n and solid v	wastem	lanagem	ent			
Linit 2	Drococ	octs and Ch	allonges							
JIII J	Attitud	les and Dor	contions							603
	Onerat	tional and F	inancial ice	ues						
	Monite	nring & Sun	ervision	403						
	Comm	unity Mohil	ization							
Unit 4	List of	activities to	be undert	taken						
	Identif	v plastic and	de-waste ir	and aroun	d the in	stitution	and sug	gest inno	vative	CO4
	techno	logies to m	inimize wa	stage.						
	Identif	v events/fe	sts that ger	nerate max	imum w	aste and	ways to	minimiz	e it.	
	Visit ca	nteen/sho	os and trac	k the lifecv	cle of w	et/drv w	aste in a	ind arou	nd the	
	institut	tion and do	cument the	e findings ir	the for	m of a Pi	roject Re	eport.		
	Condu	ct interview	s of stakeh	olders to u	ndersta	nd the le	vel of av	vareness	5.	

	Conduct a Clean Audit of the Institution and identify areas for action.						
	Conduct cleanliness drives.						
	Organise Swachhata Pakhwada meetings, rallies, and mobilization camps within						
	the identified communities.						
	Students may participate in the Swachh Bharat Internship programme.						
	If required students can share their experiences in the form of a Project Report.						
	Any other Practical/Practice as decided from time to time						
Text Books	"Swachh Bharat Mission - Gramin, Department of Drinking Water and						
	Sanitation, Ministry of Jal Shakti"						
	India 2021, Ministry of Information & Broadcasting						
	http://swachhbharatmission.gov.in/SBMCMS/swachhta-pakhwada.htm						
	https://swachhbharatm ission.gov.in/SBMCMS/a bout-us.html						
	https://www.communityledtotalsanitation.org/sites/communityledtotalsanita						
	tion.org/files/ODF _verification_checklist.pdf						
	https://sbm.gov.in/phase2dashboard/PhaseII/NationDashboard.aspx						
	https://www.niti.gov.in/sites/default/files/2019-						
	08/Report%20of%20SubGroup%20of%20Chief%20Min						
	isters%20on%20Swachh%20%20Bharat%20Anhiyaan.pdf						
Reference	https://swachh bha ratm ission.gov. in/SBM						
Books	CMS/writereaddata/Porta1/1mages/pd/brochure/Greywatermanagement.pdf						
	https://swachhbharatmission.gov.in/SBMCMS/writereaddata/Portal/Images/p						
	df/brochure/PWMBS 28th June.pdf						
	Gol (2020). Swachh Bharat Mission (Grameen) Phase 2: Operational guidelines.						
	Department of Drinking Water and Sanitation, Ministry of Jalshakti.						
	MoHUA (2017). Guidelines for Swachh Bharat Mission - Urban (PDF). Ministry						
	of Housing and Urban Affairs, Government of India.						

In	hou		
L	Т	Ρ	Credit
1	0	2	2

Course Code	CEC103							
Course Title	Commun	ity Engagement Cours	se					
Course	On the co	mpletion of the course	the stude	ent will be	able to:			
Outcomes	CO1: Gain	and understanding of	rural life,	culture ar	nd social r	ealities.		
	CO2: Deve	CO2: Develop a sense of empathy and bonds of mutuality with local community						
	CO3: Appr	CO3: Appreciate significant contribution of local communities to Indian society and economy						
	CO4: Lear	n to value the local kno	owledge a	nd wisdon	n of the c	ommunity		
	CO5: Iden	tify opportunities for c	ontributir	ng to comr	nunity's s	ocio-economic	improvements	
Examination	Theory+P	Practical						
Mode			1		Т			
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work						
Weightage	10%	-	-	20%	35%	30%	5%	
Syllabus							CO Mapping	
Unit 1	Appreciat	ion of Rural Society	1.110		<u> </u>			
	Appreciat	ion of Rural Society: Ru	ural life sty	/le, rural s	ociety, ca	ste and	CO1	
	gender re	lations, rural values wi	th respect	to comm	unity, nat	ure and		
	resources	, elaboration of "soul c	of India lie	s in village	es' (Gandh	i),rural		
	Infrastruct	infrastructure.						
		wethodology: Classroo	husical vi	sions sual ar dia	ital) af th			
	<ul> <li>Assignment</li> <li>visited and</li> </ul>	ient: Prepare a map (pi d write an essay a bout	nysical, vis	ily relation	ntal) of the			
	Mode of A	u write an essay a bour	Writton		nt III liidi	village.		
llnit 2	Understar	nding Rural Economy&	livelihoor		iit.			
	Understar	nding rural economy	& livelih	ood· Δgri	culture	farming land	<u> </u>	
	ownershir	n water management	animal	husbandry	/non-far	m livelihoods	002	
	and artisa	ans, rural entrepreneu	irs. rural	markets T	eaching	Methodology:		
	Group Dis	scussions in Class Ass	signment:	Describe	your and	alysis of rural		
	household economy, its challenges and possible pathways to address them							
	Mode of A							
Unit 3	Rural Ins	titutions		-				
	Rural Insti	tutions: Traditional rui	ral organis	ations, Se	lf-help Gr	oups,	CO3	
	Panchayat	tiraj institutions (Gram	Sabha, G	ram Panch	ayat, Sta	nding		
	Committe	es), local civilsociety, lo	ocal admin	istration.				
	Teaching I	Methodology: Classroc	om Discuss	sions				
	<ul> <li>Assignm</li> </ul>	ent: How effectively a	re Pancha	yati raj ins	titutions			
	functionin	ng in thevillage? What w	would you	suggest t	o improve	e their		
	effectiven	ess? Present a casestu	dy(writte	n oraudio-	visual).			
	Mode of A	Assignment Submission	n: Group p	resentatio	ons of Ass	ignment		
Unit 4	Rural Dev	velopmental Program	nmes					
	Rural Dev	elopmental Programm	es:History	of rural d	evelopme	ent in	CO4	
	India, curr	ent national program	nes: Sarva	Shiksha A	Abhiyan, E	Beti		
	Bachao, B	eti Padhao, Ayushman	Bharat, S	watchh Bh	narat, PM	Awaas		
	Yojana, Sk	ill India, Grampanchay	at Decent	ralised Pla	anning, NI	RLM,		
	MNREGA,	etc.						

	Teaching Methodology: Classroom Discussions	
	• Assignment: Describe the benefits received and challenges faced in the	
	• Assignment. Describe the benefits received and chanenges faced in the	
	denveryor one of these programmes in the rural community, give	
	suggestions about improving implementation of the programme for the	
	rural poor.	
	ModeofAssignmentSubmission: WrittenAssignment	
Text Books	1. Singh, Katar, Rural Development: Principles, Policies and Management,	
	New Delhi; Sage Publications, , 2015. 2. A Hand book on Village Panchayat	
	Administration, Rajiv Gandhi Chair for Panchayati Raj Studies, 2002. 3.	
	United Nations, Sustainable Development Goals,2015un.org/sdgs/ 4.	
	M.P.Boraian, Best Practices in Rural Development, Shanlax Publishers, 2016.	
Reference	1. Journals of Rural development, (published by NIRD&PR Hyderabad) 2.	
	Indian Journal of Social Work, (by TISS, Bombay) 3. Indian Journal of	
	Extension Education(by Indian Society of Extension Education) 4. Journal of	
	Extension Education (by Extension Education Society) 5. Fostering Social	
	Responsibility & Community Engagement in Higher Education Institutions in	
	India 6. Kurukshetra (Ministry of Rural Development, Gol) 7. Yojana (Ministry	
	of Information and Broadcasting, Gol)	
	The students are required to spend a total of 30 hours in field and select any	
	5 activities from	
	among the following:	
	• Interaction with SHG women members, and study of their functions and	
	challenges; planning for	
	their skill building and livelihood activities	
	• Visit MGNREGS project sites, interact with beneficiaries and interview	
	functionaries at the	
	worksite	
	• Field visit to Swachh Bharat project sites, conduct analysis and initiate	
	problem solving	
	measures	
	• Conduct Mission An tyoday a surveys to support under Gram Panchavat	
	Development Plan (GPDP)	
	• Interactive community exercise with local leaders, panchayat	
	functionaries, grass-root officials and	
	local institutions regarding village development plan preparation and	
	resource mobilization	
	• Visit Rural Schools /mid- day meal centres, study Academic and	
	infrastructural resources and gaps	
	• Participate in Gram Sabha meetings, and study community participation	
	• Associate with Social audit exercises at the Gram Panchavat level, and	
	interact with programme	
	beneficiaries	
	• Attend Parent Teacher Association meetings, and interview school	
	dropouts Fostering Social	
	Responsibility & Community Engagement in Higher Education Institutions in	
	India	
	• Visit local Anganwadi Centre and observe the services being provided	
	• Visit local NGOs, civil society organizations and interact with the staff and	
	beneficiaries,	
	• Organize awareness programmes, health camps. Disability camps and	
	cleanliness camps	

• Conducts oil health test, drinking water analysis, energy use and fuel efficiency surveys	
• Raise understanding of people's impacts of climate change, building up community's disaster	
<ul> <li>preparedness</li> <li>Organise orientation programmes for farmers regarding organic</li> </ul>	
cultivation, rational use of	
plants	
• Formation of committees for common property resource management, village pond maintenance and fishing.	

In	hou		
L	Т	Ρ	Credit
3	0	2	4

Course Code	MED251							
Course Title	Heat and Mass Transfer							
Course Outcomes	<ul> <li>On the completion of the course the student will be able to:</li> <li>CO1: To understand the fundamental principles and mathematical basis underlying the balance equations for heat transfer.</li> <li>CO2: To analyses problems involving steady and unsteady heat conduction, convection and radiation heat transfer in different geometries.</li> <li>CO3: To solve real life engineering problems such as heat transfer enhancement through extended surfaces, lumped heat capacity systems, heat exchangers, boiling and condensation, and calculating radiation view factor in different geometries.</li> <li>CO4: Design heat and mass transfer equipment like Heat Exchanger, condenser, steam turbine etc.</li> </ul>							
Mode	meory							
Assessment Tools	Written Quiz	Assignment/ Project Work	MSE	MTP	ESE	EPR	ABL/PBL	
Weightage	10%	10%	25%	-	35%	25	5%	
Syllabus							CO Mapping	
	1.1							
Unit 1	Introduct	<u> </u>						
	air conditi balance e conductio Concept o Lumped sy pin fins; 21							
Unit 2	Convection							
	Convection Heat Transfer Basic equations; Boundary layers; Forced convection; External and internal flows; Natural convective heat transfer; Dimensionless parameters for forced and free convection heat transfer; Correlations for forced and free convection; Approximate solutions to laminar boundary layer equations for internal and external flow; Estimating heat transfer rates in laminar and turbulent flow situations using appropriate correlations for free and forced convection.						CO2	
Unit 3	Radiation	n Heat Transfer and H	Heat Excl	hanger D	esign			
	Radiation Definition grey body surfaces method; Exchanger exchanger effectiven	CO3						
Unit 4	Boiling a							

	Boiling and Condensation heat transfer Pool boiling; Flow boiling; Film and drop wise condensation, Introduction to mass transfer, Analogy between heat and mass transfer; Mass diffusion; Fick's Law; Steady and transient mass diffusion; Simultaneous heat and mass transfer.	CO4
Text Books	<ol> <li>Holman, J.P., "Heat and Mass Transfer", Tata McGraw Hill, 2000</li> <li>Yunus A. Cengel, "Heat Transfer A Practical Approach", Tata McGraw</li> </ol>	
	Hill, 5th Edition 2015.	
Reference	1. A. Bejan, "Heat Transfer," John Wiley, 1993.	
Books	2 J.P. Holman and S. Bhattacharyya, "Heat Transfer," McGraw Hill, 2017.	
	3 F.P. Incropera, and D.P. Dewitt, "Fundamentals of Heat and Mass	
	Transfer," John Wiley, 2019.	
	4 Massoud Kaviany, "Principles of Heat Transfer," John Wiley, 2002.	
	5 Yunus A Cengel, "Heat Transfer: A Practical Approach," McGraw Hill,	
	2002	
Online	1 https://onlinecourses.nptel.ac.in/noc22_ch65/preview	
Resources:		

# In Hours L T P Credit 3 0 2 4

Course Code	MED252									
Course Title	FLUID ME	FLUID MECHANICS AND HYDRAULIC MACHINES								
Course	On the completion of the course the student will be able to:									
Outcomes	CO1: To understand the fundamental principles of fluid mechanics.									
	CO2: To give basic understanding of boundary layer concept and analyze different types of									
	losses and measurement of flow.									
	CO3: To analyze a variety of practical fluid flow and measuring devices and utilize Fluid									
	Mechanic	Mechanics principles in design.								
	СО4: То	CO4: To become familiar about different types of turbines & able to analyze their								
	performance characteristics of various turbines.									
Examination	Theory									
Mode		1	I		-	1				
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL			
Tools	Quiz	Project Work								
Weightage	10%	10%	25%	-	50%	-	5%			
Syllabus							CO Mapping			
Unit 1	Introduct									
	Properties	CO1								
	and dime									
	Statics:									
	Mechanic	al gauges, Force on	plane and	d curved	surfaces,	Centre of				
	pressure,									
Unit 2	Fluid Kine									
	Different	approaches; Reynolds	transport	theorem	; Flow vi	sualization;	CO2			
	Types of f	low; Strain rate, stream	n line, stre	eak line, p	, ath lines	and stream				
	tubes; Cor	ntinuity equation in Ca	rtesian coo	ordinates	in 3D forr	ns; Velocity				
	and accele	eration of fluid particle	s; Velocity	potential	function	and stream				
	function. I	Dimensional Analysis:	Dimensior	ally home	ogeneous	equations:				
	Buckingha									
	Similitude									
	theory and	theory and analysis.								
Unit 3	Fluid Dynamics and Flow Measuring Device									
	Momentu	CO3								
	Development of Euler's equation; Bernoulli's equation and application:									
	Steady and unsteady flow through orifice; Orifice placed in pipe;									
	Venturimeter; Flow over triangular and rectangular notches; Pitot tube.									
	Laminar and Turbulent Flow: Viscous/Laminar flow – Plane Poiseuille									
	flow and 0									
	and powe									
	experimer									
	Major and									
	siphon pip									
Unit 4	Hydraulio									
	Rotodynamic Machines: Euler's equation; Theory of Rotodynamic machines; Various efficiencies; Velocity components at entry and exit of the rotor; Velocity triangles; Centrifugal pumps – working principle, work done by the impeller and performance curves; Cavitation in pumps; Reciprocating pump – working principle. Hydraulic Turbines: Classification of water turbines; Heads and efficiencies; Velocity triangles; Axial, radial and mixed flow turbines; Pelton wheel, Francis turbine and Kaplan turbines – working and design principles.	CO4								
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Text Books	<ol> <li>S.S. Rattan, Fluid Mechanics &amp; Hydraulic Machines, Khanna Book Publishing, 2019.</li> <li>R. K. Rajput, "A Textbook of Fluid Mechanics and Hydraulic Machines," S Chand Publication, 2014.</li> <li>P.J. Pritchard, A.T. McDonald and R.W. Fox, "Introduction to Fluid Mechanics," Wiley India, 2012.</li> </ol>									
Reference Books	<ol> <li>S. K. Som, G. Biswas and S. Chakraborty, "Introduction to Fluid Mechanics and Fluid Machines, Tata McGraw Hill, 2017.</li> <li>F.M. White, "Fluid Mechanics," Tata McGraw Hill, 2011</li> <li>Mechanics of Fluids, Shames, McGraw Hill Book Co., New Delhi, 1988</li> </ol>									
Online Resources:	https://onlinecourses.nptel.ac.in/noc22_ce85/preview									

In	hou		
L	Т	Ρ	Credit
3	0	2	4

Course Code	MED253							
Course Title	Mechanics of Deformable Solids							
Course	On the completion of the course the student will be able to:							
Outcomes	CO1: To understand the concepts of Stresses produced in rigid body because of different							
	loadi	loading conditions.						
	CO2: To calculate slope and deflection in beams.							
	CO3: To ca	alculate load for failure	e of colum	ns and sha	afts.			
	CO4: To ca	alculate hoop and radi	al stresses	in pressu	re vessels			
Examination	Theory							
Mode			1	1	1			
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work	0.70(					
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus	-						CO Mapping	
Unit 1	Concept	of Stress and Strain						
	Deformat	ion of bars: Hooke's la	aw, stress	, strain, a	nd elong	ation; Tensile,	CO1	
	compress	ive and shear stresses	s in 2D sc	lids; Elast	tic consta	ints and their		
	relations;	Volumetric, linear and	shear stra	ins; Temp	perature S	stresses		
	Principal s	tresses and strain; Prin	ncipal plar	es; Mohr	s circle			
Unit 2	iviechani	cs of Beams and the	Ir deflect				602	
	Transvers	e loading on beams, p	oint and d	istributed	loads; Sh	hear force and	CO2	
	bend mon	nent diagrams; Types d	of beam su	pports – s	simply sup	oported, over-		
	nanging,	cantilevers, fixed and	i guided	beams; S	tatic dete	erminacy and		
	distributio	nacy; Theory of be	naing of	beams,	pure be	ending stress		
	contions	f hooms: Shoor stross i	Second II distributio	n n	i alea, Di	merent cross-		
	Deflection	of a beam using the d	ouble inte	n. aration m	ethod: C	omputation of		
	slones and	deflection in heams.	Muosotis n	athod for	r computi	ng deflections		
	and slone	s	viyosotis i		rcomputi	ing deficetions		
Unit 3	Column H	 Buckling and torsion	of Shafts					
	Critical loa	ads using Fuler's theor	v <sup>.</sup> Differer	t hounda	rv conditi	ons: Eccentric	CO3	
	columns		,, Differen	it boundu	ry contaite			
	Torsion s	tresses and deformat	ion of ci	rcular and	d hollow	shafts: Polar		
	moment of	of area, stepped shaft	s; Deflecti	on of sha	fts fixed	at both ends;		
	Stresses a	nd deflection of helica	l springs.					
Unit 4	Resilienc	e and pressure vesse	els					
	Principle of	of virtual work; Minimu	um potent	ial energy	theorem	; Castigliano's	CO4	
	theorems	; Maxwell reciprocity t	heorem.	0,				
	Axial and	hoop stresses in c	ylinders s	ubjected	to inter	nal pressure;		
	Deformat	ion of thin and thick	cylinders;	Deforma	tion in sp	pherical shells		
	subjected to internal pressure; Combined thermo mechanical stress;							
	Examples	and case studies (boile	ers).					
Text Books	1. Lehri. R	1. Lehri. R. S, "Strength of Materials", Kataria and son's publications						
	2. Bansal.	R.K "Strength of Mate	rials" Laxn	ni Publicat	ions			
	3. Hibbler	3. Hibbler. H. C "Mechanics of Materials" - Pearson publishers						

Reference	1. Boresi. P, "Engineering Mechanics Statics and Dynamics", Cengage	
Books	Publishers.	
	2.Gere, "Mechanics of Materials", Cengage publishers.	

In	hou		
L	Т	Ρ	Credit
3	1	0	4

Course Code	MED254							
Course Title	Engineering Materials and Applications							
Course	On the co	On the completion of the course the student will be able to:						
Outcomes	CO1: Know the range of engineering materials, their mechanical properties and applications							
	CO2: Knov	w various methods to m	neasure th	e mechai	nical prop	erties of ma	terials.	
	CO3: Lear	n how to improve the p	oroperties	of ferrou	s alloys th	rough vario	us heat treatments	
	CO4: To le	earn about the polymer	Electrical	and Mag	netic Mat	erials		
Examination	Theory							
Mode				_				
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Engineeri	ng Materials and Class	ification					
	Metals, pl	astics, ceramics and cor	nposites;	Relevant	propertie	s (physical,	CO1	
	mechanic	al, thermal, electrical,	chemical),	, cost; Ra	inge of ap	plications;		
	Material of	designation and standa	rds; Ashb	y diagran	ns; Selecti	on criteria		
	and proce	SS.						
	Mechanic	al Properties and Te	esting: Te	nsile, co	mpressio	n, torsion,		
	fatigue, fr	acture and wear tests	; Young's	modulus	; Relation	s between		
	true and	engineering stress-str	ain curve	s; Gener	alized Ho	oke's law;		
	Yielding a	nd yield strength; duc	tility, resi	lience, to	ughness a	and elastic		
	recovery;	Hardness measuremen	nt their re	lation to	strength;	SN curve,		
	endurance	e and fatigue limits; Ir	ntroductio	n to nor	n-destruct	ive testing		
	(NDT).							
Unit 2	Metal and	d Alloys						
	Iron and	steel; Stainless steel a	and tool s	steels; Co	opper & i	ts alloys –	CO2	
	brass, bro	onze & cupro-nickel; A	Aluminiu	n & Al-C	u-Mg allo	ys; Nickel		
	based s	uperalloys & Titani	um allo	ys; Pha	se diagr	ams and		
	interpreta	ation of microstructu	re; Iron I	ron-carb	ide phas	e diagram		
	and coolin	ng (TTT) diagrams.						
	Heat Tre	atment: Heat treatm	ent of St	teel; Anr	nealing, t	empering,		
	normalizi	ing, spheroidising, a	austempe	ring, m	artemper	ing, case		
	hardening	g, carburizing, nitridin	g, cyanidi	ing, carbo	o-nitridin	g,		
	flame and	l induction hardening,	vacuum a	and plasr	na hardei	ning		
Unit 3	Polymers	s, Ceramics and Comp	osites					
	Polymers	<ul> <li>Classification and ap</li> </ul>	plication	s; Polyme	erization		CO3	
	technique	es; Ceramics – Oxide	ceramic	s, ceram	nic insula	tors, bio-		
	ceramics	and Glasses; Compo	sitesRe	inforcem	ient, mat	rix, metal		
	matrix co	mposites, ceramic con	nposites,	polymer	composit	es; Other		
	Advanced	i materials – bior	naterials,	optical	I materi	als, high		
<b>.</b>	temperat	ure materials, energy	materials	, and nan	omateria	IS.		
Unit 4	Electrica							

	Conducting and resisting materials – types, properties and applications; Semiconducting materials – properties and applications; Magnetic materials – Soft and hard magnetic materials and applications; Superconductors and dielectric materials – properties and applications; Smart materials; Sensors and actuators; Piezoelectric, magneto strictive and electro strictive materials.	CO4
Text Books	<ol> <li>V. Raghavan, "Material Science and Engineering', PHI India, 2015.</li> <li>K. G. Budinski and M.K. Budinski, "Engineering Materials", PHI India, 2002.</li> </ol>	
Reference Books	<ol> <li>W. D. Callister, "Materials Science &amp; Engineering," Wiley India, 2014.</li> <li>U. C. Jindal, "Engineering Materials and Metallurgy", Pearson, 2011.</li> <li>M.F. Ashby and D.R.H. Jones, Engineering Materials 1 - An Introduction to Properties, Applications and Design, Butterworth-Heinemann, USA, 2011</li> </ol>	
Online Resources	https://onlinecourses.nptel.ac.in/noc22_me90/preview	

In	hou		
L T P		Credit	
0	0	4	2

Course Code	MED255						
Course Title	Mechanical Engineering Laboratory-I (Fluid Mechanics & Hydraulic Machines)						
Course	On the completion of the course the student will be able to:						
Outcomes	<b>CO1:</b> To provide the knowledge of different pressure measuring devices.						
	<b>СО2:</b> То р	rovide the knowledge of	of differer	nt types of	f head los	sses in flow	
	CO3: To s	tudy the pumps opera	ting and r	nain char	acteristic	curves and familia	r with pump
	statio	on					
	CO4: To s	tudy the fluid machines	and fluid	power			
Examination	Practical						
Mode		T	1		1	- 1	
Assessment	Written	Project Work/Lab	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Performance					
Weightage	-	20%	-	30%		50%	-
Syllabus							со
							Mapping
Content	List of exp	periments					
	1) To Find	Coefficient of Discharge	ge of Vent	urimeter	and Orifi	ce Meter.	
	2) To Find	Coefficient of Discharg	ge of Pitot	Tube			
	3) To Find	Cd, Cv& Cc of an Orific	e				
	4) To Find	Friction Factor of Pipe	s of Differ	ent mater	rial & Dia	meter.	
	5) To Find	Minor Losses with Sud	lden Enlar	gement 8	Contrac	tion.	
	6) To Find	Metacentric Height of	Floating \	/essel.			
	7) To Find	Reynolds Number.					
	8) To Find	Coefficient of Discharg	ge of Diffe	rent Notc	hes.		
	9) To Prov	e Bernoulli's Theorem.					
	10) To stu	dy Free & Forced Verte	ex.				
	11) Exper	iment on Laminar & Tu	rbulent Fl	ow			
	pipes.	termine critical Reynold	as numbe	ers for flow	v througr	n commercial	
	13) To stu	dy development of bou	undary lay	ver over a	flat plate		
	1. To stud	y the performance char	acteristics	s of Peltor	turbine	and draw constant	
	head,						
	constant s	speed and constant effi	ciency cu	rves.			
	2. To dr	aw the constant hea	d, consta	ant speed	d and co	onstant efficiency	
	performa	nce					
	character	istics of Francis turbine					
	3. To drav	v the constant head, sp	eed and e	efficiency	curves fo	r a Kaplan turbine.	
	4. To stu	dy the constructional	details o	f a Centr	ifugal Pu	imp and draw its	
	character	istic					
	curves.						
	5. To study the constructional details of a Reciprocating Pump and draw its						
	character	istics					
	curves.						
	6. To stud	dy the construction de	tails of a	Gear oil	oump an	d its performance	
	curves.						

7. To study the constructional details of a Hydraulic Ram and determine its	
various	
efficiencies.	
8. To study the model of Hydro power plant and draw its layout.	
9. Study and perform test on a Torque Convertor	

In	hou		
L	Т	Ρ	Credit
3	1	0	4

Course Code	MED301							
Course Title	Machine I	Machine Element and system design						
Course	On the completion of the course the student will be able to:							
Outcomes	CO1: Principles of machine elements and how they can be combined to function as a system							
	CO2: Failure analysis of machine elements							
	CO3: An o	verview of codes, stand	dards and	design gu	idelines fo	or different	elements	
	CO4: Abili	ty to analyse mechanic	al systems					
Examination	Theory							
Mode		ſ	1	1		1		
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introducti	ion						
	Anatomy	of machines; Function	nal dissect	tion of m	notorcycle	, washing	CO1	
	machine,	sewing machine, etc. in	nto machi	ne eleme	nts incluc	ling gears,		
	rack and p	pinions, cams, chains, be	elts, pulley	rs, flywhe	els, bearir	igs, shafts,		
	keys, bra	akes, etc.; Design	considera	tions –	Limits,	fits and		
	standardiz	zation; Friction and lubr	rication.					
	Free-body	/ Diagrams						
	Force ana	lysis of machine elemer	nts and ma	chine sys	tems; App	lication to		
-	power scr	ews and couplings, clut	ches, and	brakes.				
Unit 2	Failure Th	eories						
	Static failu	ire theories including no	ormal stre	ss theory,	shear stre	ess theory,	CO2	
	distortion	energy theory; von I	Mises stre	ess; Facto	or of safe	ety; Stress		
	concentra	tion factors; Fatigue fai	lure theor	ies: mear	n and			
	alternatin	g stresses, yield, ultima al Cadarbara linaa	ite, and en	durance	strength;	Goodman,		
11	Gerber, an	Agentical Florente						
Unit 3	Design of		tancian	torciona	l and las	f coringci	<u> </u>	
	Springs –	Helical compression,	lension,		i and lea	ii springs;	03	
	Fasteriers	– threaded tasteners, b	lor static c	us, preioa	aeu boits,	rivets and		
	loadings:	Kover Sliding and re		niu iatigu	e ringe: Tra	nemission		
	alements	- transmission ratio ar	ning CON	cy of sou	r holical	haval and		
	worm gea	rs: bolt and chain drive		cy or spu de	i, nencai,	Devel allu		
Unit 4	Vibration	s of Machine Flements	5, 119 WITE	:15.				
Omt 4	Single de	groa of froadom syst	ame: Nati	ural from		nd critical	CO4	
	damning:	Earced vibration: Base	nance: Ba		of reciprov	sating and	04	
	rotating m	asses. Torsional vibrati	ion and cri	tical snee	n recipiou	ts		
	Mechanic	al Systems		acu spec				
	Case stur	dies on automobile s	uspension	s. autom	natic tran	smissions		
	material c	onvevor systems.		<i>c, autor</i>				
	constructi	on machinery. etc.						
Text Books	1. Shiglev	J.E. and Mischke. C.	.R., "Mech	nanical F	ngineering	g Design."		
	McGraw-	Hill, 1989.	,		J			
	Withdraw-mill, 1969.							

	2. Deutschman, D., & Wilson, C.E., "Machine Design Theory & Practice," Macmillan, 1992	
	3. Juvinal, R.C., "Fundamentals of Machine Component Design," John Wiley, 1994.	
Reference Books	<ol> <li>Spottes, M.F., "Design of Machine elements," Prentice-Hall India, 1994.</li> <li>R. L. Norton, "Mechanical Design – An Integrated Approach," Prentice Hall, 2009.</li> <li>Sadhu Singh, "Machine Design", Khanna Book Publishing, 2021.</li> <li>Sadhu Singh, "Machine Design Data Book", Khanna Book Publishing, 2022.</li> </ol>	
Online Resources	https://archive.nptel.ac.in/courses/112/105/112105124/	

In	hou		
L	Т	Ρ	Credit
3	0	2	4

Course Code	MED302	MED302					
Course Title	Mechatro	Mechatronics, Robotics & Control					
Course	On the co	On the completion of the course the student will be able to:					
Outcomes	CO1: To u	CO1: To understand the concept of Robot, Sensors and End effectors.					
	CO2: To k	CO2: To know the concepts of the fluid power and various control valves.					
	CO3: To g	CO3: To give understanding about the robotics and its programming.					
	CO4: To a	pply the concept of rob	otics in in	dustrial a	pplication	s.	
Examination	Theory						
Mode							
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Work					
Weightage	10%	-	25%	-	35%	25%	5%
Syllabus		•					CO Mapping
Unit 1	Introduct	ion to Robot, Sensors a	nd End Ef	fectors			
	Introducti	on, terminology, laws	of robo	tics, clas	sification	based on	CO1
	geometry	, machine vision, rob	ot compo	onents, d	legree of	freedom,	
	coordinat	coordinators, reference frames.					
	Types of	Types of Sensors in robots, exteroceptors, proprioceptors, tactile,					
	proximity	proximity, range, velocity and machine vision sensors, robot end-					
	effectors,	classification, gripper, §	gripper me	echanism	, type of g	ripper.	
Unit 2	Fluid Pow	Fluid Power and Fluidics					
	Fluid pow	Fluid power control elements, Construction and performance of fluid CO2					
	power ge	power generators; Hydraulic and pneumatic cylinders - construction,					
	design and	d mounting; Hydraulic a	and pneun	natic valv	es for pres	ssure, flow	
	and direct	and direction control.					
	Boolean algebra; Truth tables; Conda effect.						
Unit 3	Robot Pro	Robot Programming and Control					
	Robot pr	ogramming, technique	s of pro	gramming	g, robot	languages,	CO3
	requireme	ent for a standard robot	t language	e, types of	f language	s.	
Unit 4	Industrial	and Mechatronic appl	ications				
	Applicatio	ns of robots in weldin	ıg, machir	ne loading	g, fabricat	ion, spray	CO4
	painting, assembly and unusual applications.						
Text Books	1. Deb, S.R. Robotics and Flexible Automation. New Delhi: Tata						
	McGraw-Hill Publishing Company Ltd. 2010. Print.						
	2. Majumdar, S.R. Pneumatic Systems. New Delhi: Tata McGraw-Hill						
	Publishing	g Company Ltd. Sixteent	th reprint	2006. Prii	nt.		
Reference	1. Asfahl,	C.R. Robotics and Manı	ufacturing	Automat	<i>tion.</i> Wiley	' India.	
Books	1992. Prin	ıt.					
	2. Niku, S.	B. Introduction to Robo	tic Analys	is system:	s and appl	lications.	
	Wiley India. 2001. Print.						

In	hou		
L	Т	Ρ	Credit
3	1	0	4

Course Code	MED303						
Course Title	Manufact	Manufacturing Processes					
Course	On the co	mpletion of the course	the stude	nt will be	able to:		
Outcomes	CO1: To u	CO1: To understand the fundamental principles of materials, processes and manufacturing.					
	CO2: To g	CO2: To gain knowledge of various material shaping and removal manufacturing processes					
	CO3: Appl	CO3: Application of various advanced manufacturing processes in engineering applications.					
	CO4: selec	ction of material joining	g or fabrica	ation pro	cesses.		
Examination	Theory	Theory					
Mode				-			
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Work					
Weightage	10%	-	25%	-	35%	25%	5%
Syllabus							со
							Mapping
Unit 1	Manufact	uring Processes and Cl	assificatio	n			
	Additive,	subtractive and sha	ping pro	cesses; l	Relative	advantages and	CO1
	limitation	s; Inter-dependency of	f geometr	y, mater	ial and pr	ocess; Effect on	
	product q	uality and cost; Part de	esign for r	nanufacti	urability; I	Process selection	
	criteria.						
11	Material Chapter & Demourl Processes						
Unit 2	Indential Stapping & Removal Processes						
	ivietal casting (sand, die and investment casting), Bulk forming (forging, rolling, CO2						02
	extrusion, drawing) and sheet forming (shearing, deep drawing, bending);						
	i nermopi	astic and thermoset	plastic p	rocesses	(ex. Inje	ction and blow	
	Motoling);	Powder metallurgy;				~)	
		ction moloing; Glass ar	id compos	hor finick	isses (layu	p).	
	multi noir	or autting toola. Cutti	ng tool y	matoriale	ing proce	fluide: Matorial	
	romoval r	nt culling loois; culli	ing tool i	naterials;	, Cutting	hility	
Linit 2	removarrates, surrace linish, accuracy, integrity and machinability						
	Unconventional & Additive Manufacturing Processes						<u> </u>
	Discharge	Machining Water Je	A Electro	Chomics		ing lacor Boom	
	Machining	Machining, Wire EDN	n, Electro		an ividuliili am Mach	ing, Laser Bedill	
		5, Flashid Alt Midtilli	ig allu Ele	споп ве		ining, which and	
	Extrucion	wat polymorization -	nowdor b	ad fusion	· matoria	l jotting binder	
	Extrusion; vat polymerization, powder bed tusion; material jetting, binder						
Linit /	jetting; direct energy deposition and lamination processes						
	Archuoldin	a as wolding chields	d motal as	c wolding		(MIC) and CTANA	<u> </u>
		ig, gas weiullig, sillelue	u metal al	C WEIGINE		(IVIIG) and GTAW	04
	(IIG); Brazing and soldering; Solid state joining; Adhesive						
	Cacting	metal flow, colidificatio	n and cos	ling: and	lication to	design of goting	
		Casting – metal flow, solidification and cooling; application to design of gating					
		ing systems for quality	anu yieid		UUII; UK I D Machimi	orthogonal	
		on anu yielu criteria; l	uau estim			ng – Orthogonal	
	formation	Tool woor and to all if	is; unip				
	Tormation	, roor wear and tool life	e.				

Text Books	1. Amitabha Ghosh and A.K. Mallick, Manufacturing Science. Affiliated East- West Press Pyt. Ltd. 2010.	
	2. Kalpakjian and Schmid, Manufacturing Processes for Engineering	
	Materials, Pearson India, 2014	
	3. M. P. Groover, Fundamentals of Modern Manufacturing: Materials,	
	Processes, and Systems.	
Reference	1. Lindberg R.A, "Processes and Materials of Manufacture", Prentice Hall of	
Books	India (P) Ltd.,1996	
	2. Degarmo, Black & Kohser, Materials and Processes in Manufacturing	
	3.William F. Hosford and Robert M. Caddel, "Metal forming", PrenticeHall	
	Publishing Co., 1990.Shaw, "Principles of Metal cutting", Oxford I.B.H.	

In	hou		
L	Т	Ρ	Credit
3	0	2	4

Course Code	MED304						
Course Title	Measureme	Measurement & Metrology					
Course	1. To provi	ide basic knowledge	e about er	rors in me	easuremei	nt systems.	
Outcomes	To learn abo	To learn about measuring mechanical quantities like surface roughness, and speed.					
	To learn abo	To learn about various sensors and transducers used for the measurement of mechanical					
	quantities.						
	To learn abo	To learn about the measurement of pressure and temperature measuring devices.					
Examination	Theory						
Mode							
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Project Work					
Weightage	10%		25%		35%	25%	5%
		Syllabus					CO Mapping
Unit 1							
	Introductio	n: Measurement, S	Significanc	e, metho	d of mea	surement	CO1
	definitions	and concept of a	ccuracy, p	precision,	range, r	esolution,	
	calibration,	threshold, sensitiv	ity, hystei	resis, rep	eatability,	linearity,	
	loading effe	ct, system response	e times de	lay, Facto	r in the se	election of	
	measuring i	measuring instruments.					
	Errors in measuring instruments: Classifications of error, sources of						
	error, temperature problem, static & dynamic characteristics of						
	measuring instruments, calibration, error.						
Unit 2							
	<b>Metrology:</b> Standards of measurements- Line, end and wavelength; CO2						CO2
	linear meas	near measurements - Vernier calipers, Vernier height gauge, and					
	depth gaug	lepth gauge and micrometer; Angular measurements - sine bar,					
	clinometer,	diameter, angle gauge; measurement of major diameter, minor diameter, diameter nitch angle and form of threads for					
	internal and external threads: comparators - their types, relative						
	merits and limitations: surface roughness - specifications and						
	measurement, concept, and measurement of straightness and flatness						
	by interferometry. <b>Speed:</b> , Force, Torque and Shaft Power						
	Measurement Mechanical tachometers, vibration reed tachometer						
	and stroboscope: proving ring, hydraulic and pneumatic load cells						
	and subboscope, proving ring, nyuradiic and priediriatic road cells,						
	dynamo meters.						
	,						
Unit 3							
	Sensors and	Sensors and transducers: Introduction to sensors and transducers,					
	types of sen	sors, review of elect	tro-mecha	nical sens	ors and tra	ansducers	
	- variable re	esistance, inductan	ce and ca	pacitive p	лскирs, р those ale	monte for	
		et of position /dicels	anu appilo			nems IOr	
	force and liv	nuid level Resistan	ce strain a		uge facto	r honded	
	and unhour	ided gauges surfa	re prenara	auges, ga ation and	honding	technique	
	signal cond	itioning and hridge		temperat	ure com	pensation	
	Jightar Conta	gnal conditioning and bridge circuits, temperature compensat					

	application of strain gauges for direct, bending and torsional loads. Introduction to amplifying, transmitting and recording devices.	
Unit 4		
	Pressure and Flow Measurement: Bourdon tube, diaphragm and bellows, vacuum measurement - Mcleod gauge, thermal conductivity gauge and ionization gauge; Dead weight gauge tester. Electromagnetic flux meters, ultra-sonic flow meters and hot wire anemometer: flow visualization techniques. <b>Temperature Measurement</b> : Thermal expansion methods - bimetallic thermometers, liquid-in-glass thermeter and filled-insystem thermometers; thermo-electric sensors - common thermo couples, reference junction considerations, special materials and configurations; metal resistance thermometers and thermistors; optical and total radiation pyrometers; calibration standards.	CO4
Text Books	1. Thomas G. Beckwith, Roy D. Marangoni, John H. Lienhard V, Mechanical Measurements (6th Edition) 6th Edition, Pearson Education India, 2007.	
Reference Books	<ol> <li>Instrumentation and control systems by W. Bolton, 2nd edition, Newnes, 200</li> <li>Gregory K. McMillan, Process/Industrial Instruments and Controls Handbook, Fifth Edition, McGraw-Hill: New York, 1999.</li> <li>A Textbook of Measurements &amp; Metrology by Er. R.K. Rajput, 1st Edition 2012, S.K. Kataria &amp; Sons</li> </ol>	

# **Program Elective 1- As per basket.**

In	hou		
L	Т	Ρ	Credit
0	0	4	2

Course Code	MED305						
Course Title	Mechanic	al Engineering Laborat	ory-II (De	sign)			
Course	On the co	On the completion of the course the student will be able to:					
Outcomes	CO1: To u	nderstand the measure	ement of r	mechanica	al propert	ies of mate	erials.
	CO2: To u	nderstand the deforma	ntion beha	vior of m	aterials.		
	CO3: To u	nderstand the kinemat	ic charact	eristics of	mechani	cal devices	
	CO4: To u	nderstand the dynamic	characte	ristics of r	nechanica	al devices.	
Examination	Practical						
Mode		•	-				
Assessment	Written	Project Work/Lab	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Performance					
Weightage	-	20%	-	30%		50%	-
Syllabus	CO Mapping						
Content	List of experiments						
	1. Uniaxial tension test on mild steel rod						
	2. Torsion test on mild steel rod						
	3. Impact test on a metallic specimen						
	4. Brinnell and Rockwell hardness tests on metallic specimen						
	5. Bending	g deflection test on bea	ams				
	6. Strain measurement using Rosette strain gauge						
	7. Microscopic examination of heat-treated and untreated metallic						
	8. Velocity	v ratios of simple, com	pound, ep	icvclic and	d different	tial gear	
	trains						
	9. Kinematics of four bar, slider crank, crank rocker, double crank,						
	double rocker, and oscillating cylinder mechanisms						
	10. Cam & follower and motion studies						
	11. Single degree of freedom Spring-mass-damper system,						
	determination of natural frequency and damping coefficient						
	12. Deterr	mination of torsional na	atural frec	quency of	single and	d double	
	rotor syst	ems- undamped and da	amped na	tural freq	uencies		

# Industrial Training (MED306)- As per guidelines

In	hou		
L	Т	Ρ	Credit
3	0	2	4

Course Code	MED351					· · · · · · · ·	
Course Title	CAD & Analysis						
Course	On the completion of the course the student will be able to:						
Outcomes	CO1: To u	CO1: To understand the fundamental of CAD.					
	CO2: To g	ain knowledge of variou	us concept	s of geor	netric mo	delling.	
	СО3: То р	rovide basic knowled	ge of NC/0	CNC/DN	C systems	5.	
	CO4: To a	pply the concept in CAP	PP.				
Examination	Theory						
Mode		ſ	1			T	
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Work					
Weightage	10%	-	25%	-	35%	25	5%
Syllabus							CO Mapping
Unit 1	Fundame	ntals of CAD and Geom	etric Tran	sformati	ons		
Unit 2	Introduction, Design Process, Application of computers in design, Creating manufacturing database, benefits of CAD, Software configuration of a graphics system, functions of a graphics package, geometric modeling, Fundamentals of Computer Graphics, Visual realism- hidden line surface- solid removal algorithms, Product cycle, sequential and concurrent engineering. Mathematics preliminaries, matrix representation of 2 and 3 dimensional transformation, Concatenation of transformation matrices, Application of geometric transformations.						CO1
Unit 2	Geometri	eometric modeling					
	Need of G represent represent surfaces, Represent standards	Need of Geometric Modeling, types of geometric modeling, geometric modeling representation, and geometric modeling techniques and uses, parametric representation of analytical and synthetic curves, parametric representation of surfaces, Coons and bicubic. Patches, Solid modeling, CSG and Boundary Representation, CAD standards- Graphical Kernel System (GKS), Data exchange standards- IGES, STEP					
Unit 3	Numerical Control						
	Types of NC systems, MCU and other components, NC manual part programming, coordinate systems, G & M codes, Part program for simple parts, computer assisted part programming. Direct numerical control, Adaptive control in machining system, DNC/CNC systems						CO3
Unit 4	Computer	Aided Process Plannin	Ig				
	Introducti planning,	on and benefits of C/ planning for CAPP, mac	APP, type: hinability	s of CAP data sele	P, Steps ction syst	in variant process ems in CAPP.	CO4
Text Books	1. Groove 2. Zeid, I.	r and Zimmer. CAD/ CA CAD/ CAM Theory and	M. Prentic Practice. N	ce Hall. Pi //cGraw H	rint. 2010. Iill. 2009.		
Reference Books	<ol> <li>Zeid, I. CAD/ CAM Theory and Practice. McGraw Hill. 2009.</li> <li>Bedworth, D.D., Henderson, M.R. &amp; Wolfe, P.M. Computer Integrated Design and Manufacturing. New Delhi: Tata McGraw Hill. 1991</li> <li>W. M. Neumann and R.F. Sproul, Principles of Computer Graphics, McGraw Hill, 1989.</li> <li>Mikell P. Groover, Automation, Production Systems, and Computer-integrated Manufacturing, preprice Hall, 2007</li> </ol>						
	•						

In	hou		
L	Т	Ρ	Credit
3	0	2	4

Course Code	MED352							
Course Title	Manufact	Manufacturing Automation						
Course	On the completion of the course the student will be able to:							
Outcomes	CO1: To u	nderstand the fundame	ental princ	iples of a	utomatior	۱.		
	CO2: To ga	ain knowledge of desig	n of auton	nated ass	embly syst	tems.		
	CO3: To u	nderstand the concept	of group t	echnolog	gy.			
	CO4: To u	nderstand the applicati	on of auto	mation i	n flexible r	nanufacturing syst	tems.	
Examination	Theory							
Mode								
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	-	25%	-	35%	25%	5%	
Svllabus						L	со	
							Mapping	
Unit 1	Automat	ion						
	Types of	automation, reason	s for au	tomating	z. automa	tion strategies	CO1	
	Detroit-ty	be automation: Auto	mated fl	ow lines	s. method	s of work part	001	
	transport	, Transfer mechanism	s, buffer s	storage, a	automatio	n for machining		
	operation	s. Mechanization.	,	0,		0		
	Factory A	utomation: Lean mai	nufacturii	ng, Autor	nation sc	alability, Design		
	and analy	sis of automated flow	lines; Av	erage pro	oduction t	ime, production		
	rate, line	efficiency; Analysis of	f transfer	lines wit	thout stor	age; Partial and		
	full auton	ull automation.						
Unit 2	Automat	utomated assembly systems						
	Design for	Design for automated assembly, types of automated assembly systems, part CO2						
	feeding d	evices, quantitative an	alysis of	the delive	ery systen	n operation, and		
	analysis o	f a single-station						
	assembly	machine, numerical.						
Unit 3	Group Te	chnology						
	Part fami	Part families, parts classification and coding, types of classification and CO3						
	coding sy	stems, Machine cell d	esign: Th	e compos	site part c	oncept, types of		
	cell desig	ns, determining the be	est machi	ne arran	gement, b	enefits of group		
	technolog	y.						
Unit 4	Flexible Manufacturing Systems							
	Compone	nts of an FMS. types of	of system	s, where	to apply	FMS technology.	CO4	
	FMS worl	stations, Material ha	ndling an	d storage	e system:	Functions of the		
	handling	system, FMS layout	U	Ũ	5			
	configura	tions. Material handl	ing equip	oment, C	omputer	control system:		
	Computer	Computer function, FMS data file, system reports. Planning the FMS, analysis						
	methods	for FMS, applications a	and benef	its				
Text Books	1. Groove	r, M.P. Automation, Pr	oduction	Systems	and com	outer Integrated		
	Manufact	uring. Prentice Hall of	India, 20	07. Print.				
	2. S. Kal	pakjian and S. R. Se	chmid, M	lanufactu	ıring – E	ngineering and		
	Technolog	gy, Pearson.						
Reference	1. Yoram	Koren, Computer Con	trol of Ma	nufactur	ing Syster	ns, McGraw Hill,		
Books	2005				-			
	2. CAD/CA	AM Principles and App	olications	P.N. Rao	, Tata Mc	Graw Hill, 2010.		

In	hou		
L	Т	Ρ	Credit
3	1	0	4

Course Code	MED353							
Course Title	Production	& Operation Mana	gement					
Course	<ul> <li>Το ι</li> </ul>	understand the role	of Produc	tion and o	operation	s managem	ent and	
Outcomes	pro	ductivity in the ove	rall busine	ss strateg	y of the o	rganization		
	<ul> <li>Το ι</li> </ul>	understand the fund	ctions of P	PC.				
	• Toi	dentify the key fact	ors affecti	ng the loo	cation and	l layout.		
	<ul> <li>Το ι</li> </ul>	understand the sele	ction and	function o	of Materia	al Handling	Equipment and the	
	con	cept of repair and r	naintenan	ce.				
Examination	Theory							
Mode			-			-		
Assessment	Written	Assignment/	MSE	ΜΤΡ	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work						
Weightage	10%	10%	25%		50%		5%	
	T	Syllabus					CO Mapping	
Unit 1	Introduction	n						
	Production	Management, Serv	vice verses	Goods, C	Objectives	s, Scope &	CO1	
	Functions/A	ctivities of Produ	uction an	d Operat	tion Mar	nagement,		
	Decisions in	n Production and	Operatio	n Manag	ement, F	Production		
	Managemei	nt verses Industrial	Engineerir	ıg.				
	Production	Production and Productivity						
	Introduction	n, Fabrication, Man	ufacturing	and Proc	duction, P	roduction		
	Systems: In	termittent System,	Project Sy	stem, Job	o Order P	roduction,		
	Batch Prod	uction, Continuous	Productio	on and th	heir chara	acteristics,		
	Process Life	Cycle or Production	n Life Cycle	e, Product	ivity, Mea	asurement		
	of Product	ivity, Ways to im	prove Pro	oductivity	, Produc	tivity and		
	Fatigue, Rei	Fatigue, Relationship between Productivity and Standard of living.						
Unit 2	Production Planning and Control							
	Production.	Planning, Contro	l. Definitio	on and (	Obiective	s of PPC.	CO2	
	Functions o	f PPC. (Pre-Plannin	g. Active	Planning	and Post	Planning).		
	Definition a	nd Concept of fore	casting. Im	portance	and appl	ication for		
	purpose of s	sales forecasts. Met	hods of Sa	les foreca	st. Routin	g (Routing		
	Procedures,	Route Sheet and	d Route (	Cards, Ac	dvantages	of good		
	Routing), So	cheduling Loading	(Objective	s of Load	ling, Adju	stment to		
	Machine	Overloading an	d unde	r loadi	ing), D	ispatching		
	(Duties/Acti	vities of a dispat	tcher, Cer	ntralized	and Dec	entralized		
	dispatching	dispatching). Control(Need and Significance, Objectives). Follow up						
	Phase(Prog	Phase(Progress Reporting, Corrective Action, Common reasons for						
	Production	delay, Method of t	taking corr	ective ac	tion), Adv	vantage of		
	better PPC	, Principles of So	und PPC,	Assem	bly line	balancing;		
	Aggregate p	production planning	g; Master	productio	on schedu	ling; MRP		
	and MRP-II							
Unit 3	Factory Org	anization						

	Concept and structure of an organization, Significance and Requirement of an organization structure, Types of Organization- Military or Line Organization, Functional Organization, Line and Staff Organization, Committees Organization. <b>Facility Location and Layout</b> Need for a suitable location, Factor Affecting Plant Location, Selection of actual site, Selection of Urban, Suburban or Rural area, Comparison between Urban and Rural area in connection with selection of site, Recent Trends in Location of Industries. Ideal Plant Layout, Objectives of plant layout, Factors affecting the plant layout decision, Principles of plant layout, Material Flow System, Different types of layouts viz. Product, Process, Combination, Static or Project and Group layouts and their suitability. Computer aided layout design techniques.	CO3
Unit 4	Material Handling	
Text Books	<ul> <li>Introduction, Definition and Concept, Material Handling and Plant Layout, Benefits, Negative aspects of Material Handling, Objectives of Material Handling, Functions of Material Handling, Principles of economic Material Handling, Selection of Material Handling Equipment, Types of Material Handling Equipment's.</li> <li><b>Repair and Maintenance</b></li> <li>Objective and importance of Maintenance, Different type of maintenance, Predictive and Preventive Maintenance, Procedure of Preventive Maintenance, Schedules of Preventive Maintenance, Nature of maintenance problem</li> <li>1. Bansal, V.B. Industrial Engineering and Production Management. New Delhi: Kapson Publishers. 2015. Print</li> <li>2. Raju, N.V.S. Industrial Engineering and Management. New</li> </ul>	CO4
	Delhi: Cengage Learning. 2013. Print.	
Reference Books	<ol> <li>Chunawala. Production and Operation Management. New Delhi: Himalaya Publication. 2013. Print.</li> <li>Dalela, and Ali, Mansoor. Industrial Engineering and Management Systems. New Delhi: Standard Publishing Distributors. 2010. Print.</li> <li>Hicks. Industrial Engineering &amp; Management-A new perspective. New Delhi: Tata McGraw Hill. 2014. Print.</li> <li>Shankar, Ravi. Industrial Engineering and Management. New Delhi: Galgotia Publishers. 2010. Print.</li> <li>Jain and Agarwal. Production Planning &amp; Control. New Delhi: Khanna Publishers. 2013. Print.</li> <li>Verma, A.P. Industrial Engineering and Management. New Delhi: Katson Books. 2010. Print.</li> </ol>	

In	hou		
L	Т	Ρ	Credit
3	1	0	4

Course Code	MED354							
Course Title	Product Inn	Product Innovation & Entrepreneurship						
Course	• To l	know about entrep	reneurship	and enti	repreneur	ship Suppo	ort System.	
Outcomes	• To l	know the different	types of b	usiness, n	narket opp	portunities	and product	
	inne	ovation.						
	• Toi	dentify the various	compone	nts of ma	nagemen	t and the ir	nportance of the	
	mai	nagement process	in busines	5.				
	• To i	mpart knowledge o	of venture	creation.				
Examination	Theory							
Mode		<b>A</b>			565	500		
Assessment	Written	Assignment/	IVISE	MIP	ESE	EPK	ABL/PBL	
100IS			259/		E 09/		E 0/	
weightage	10%	10%	25%		50%		5%	
		Syllabus					CO Mapping	
Unit 1								
	Entreprene	ur and Entreprene	urship				CO1	
	Introduction	n, Definition, Conce	ept, Charac	teristics,	Classificat	ion, Types,		
	Functions a	nd Competencies						
	Entreprene	urship						
	Definition, 0	Loncept, Need, Ent	repreneur	snip as a	career op	tion		
	Concontion	Entrepreneurship Support System						
		Concept and Need of entrepreneursnip support system						
Unit 2	Sole proprie	Sole proprietorship, Partnership, Joint Stock Companies, Cooperative						
011112	Private Limi	ted. Public Limited	and PPP n	node	punnes, ee	operative,		
	Market Sur	vey, Opportunity a	nd Produc	t Innovat	tion			
	Introduction	n, Industry and its C	lassificatio	on, Small S	Scale Indu	stries (SSI):		
	Definition, 0	, Dbjectives, Feature	s and impo	ortance, St	teps for st	arting SSIs,		
	Procedure	for registration	of SSIs	s, Unde	rstanding	business		
	opportunity	, Consideration in	product	selection,	Data col	lection for		
	setting up	small venture C	Creative d	esign th	inking fo	r concept		
	generation;	Detailed desig	n & pr	ototyping	; Functi	onality &		
	manufactur	ability; Bill of ma	aterials &	compor	ients sup	ply chain;		
	Manufactur	ing & assembly pla	n; Product	testing 8	k quality a	issurance		
Unit 3	Managerial	Aspects of Small E	Susiness IV	lanageme	ent		03	
	Fayors prin	cipies, Functions o	r manager	nent, Lev f marko	els or ivia	nagement,		
	Marketing	Stratogies Pers	incipies o connel M		nt Trai	ning and		
	Developme	nt		lanageme	,			
	Labour Wel	fare						
	Definition	and Concept, Sig	gnificance.	Feature	es, Labou	ır welfare		
	schemes		_ ,		*			
Unit 4	Venture Cre	eation					CO4	
	Sustainable	business options &	& pathway	s; Busine	ss model	& business		
	canvas; Sta	rtup team & busi	ness parti	ners; Star	tup ecos	ystem and		
	stakeholder	s; Technology bu	isiness in	cubators	& parks;	; Proposal		

	pitching & agreements; Startup company incorporation; Social impact	
	& responsibility	
Text Books	1. Singh, A.K. Entrepreneurship Development and	
	Management, New Delhi: Laxmi Publication Second	
	Edition. 2009. Print.	
	2. Bansal. Entrepreneurship Development and Management,	
	New Delhi: Kapson. Print.	
Reference	1. Negendra. Entrepreneurship and Management, New Delhi:	
Books	Pearson.1995. Print.	
	2. Saravate, Dilip. Entrepreneurship Development and	
	Project Managemen, Pune: Everest Publication. Print.	
	3. Sharma Pritosh. <i>Entrepreneurship Development and</i>	
	Management, New Delhi: Dhanpat Rai & Co Print.	
	4. Lal, A. K. Entrepreneurship Development and	
	Management, Vayu Education. Print.	
	5. Bill Aulet, "Technology Entrepreneurship", 4th ed., Tata	
	McGraw Hill, 2014.	
	6. Peter F. Drucker, "Innovation and Entrepreneurship", 1st	
	ed., Harper Business, 2006.	
	7. Chelat Bhuvanachandran, Innovision, Khanna Book	
	Publishing, 2022.	
	8. Byers, Dorf, and Nelson, Technology Ventures: From	
	Ideas to Enterprise, McGraw Hill, 2010	
	9. Steve Blank, "The Startup Owner's Manual"	
	10. T.V. Rao, "Entrepreneurship - A South Asian Perspective"	

# **Program Elective II: As per elective basket**

In	hou		
L	Т	Ρ	Credit
0	0	4	2

Course Code	MED355	MED355					
Course Title	Mechanie	cal Engineering Labo	oratory-II	I (Manu	facturing	g)	
Course	On the co	ompletion of the cour	se the stu	udent wil	ll be able	to:	
Outcomes	CO1: To p	provide an understan	ding of ac	dvanced i	manufact	turing me	thods.
	CO2: To g	get an idea of the dim	ensional	& form a	ccuracy o	of produc	ts.
	CO3: To p	berform some advanc	ed manu	facturing	operatio	ons	
	CO4: To e	evaluate the accuracy	& tolera	nce of co	mponen	ts produc	ed.
Examination	Practical						
Mode							
Assessment	Written	Project Work/Lab	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Performance					
Weightage	-	20%	-	30%		50%	-
Syllabus	CO Mapping						
Content	List of ex	List of experiments					
	1. Taper t	urning and external the	read cuttir	ng using l	athe		
	2. Contou	r milling using vertica	l milling ı	machine			
	3. Spur ge	ear cutting in milling n	nachine				
	4. Measur	rement of cutting force	s in Milli	ng/ Turni	ng proces	S	
	5. CNC p	art programming					
	6. Drilling	g of a small hole using	wire EDN	M			
	7. Microp	7. Microprocessor controlled pick & place robot					
	8. Use of Tool Maker's Microscope						
	9. Comparator and sine bar						
	10. Surface finish measurement equipment						
	11. Bore (	diameter measurement	using mid	crometer	and teleso	copic	
	gauge	C A					
	12. Use of	t Autocollimator.					

In	hou		
L	Т	Ρ	Credit
0	0	4	2

Course Code	MED356						
Course Title	Engineer	Engineering Project-1 (Literature Review)					
Course	On the co	ompletion of the cour	se the stu	udent wil	ll be able	to:	
Outcomes	CO1: Το ι	understand and gain k	knowledg	e in diffe	erent area	IS.	
	CO2: Το ι	understand the desigr	n process				
	CO3: Το ι	understand the select	ion of ma	terials.			
	CO4: Το ι	understand the fabric	ation or p	orototypi	ng.		
Examination	Practical						
Mode							
Assessment	Written	Project Work/Lab	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Performance					
Weightage	-	20%	-	30%		50%	-
Syllabus							CO Mapping
Content							
	This course is aimed to provide more weightage for project work. The						
	project work could be done in the form of a summer project or						
	internship in the industry or even a minor practical project in the						
	college. P	college. Participation in any technical event/ competition to fabricate					
	and dem	ionstrate an innovat	ive mach	nine or	product	could be	
	encourag	ed under this course.					

# **Program Elective 3, 4 and open electives as per baskets**

In	hou		
L	Т	Ρ	Credit
0	0	10	5

Course Code	MED403						
Course Title	Engineer	ing Project-II (Design	and Ana	lysis)			
Course	On the co	mpletion of the course	the stude	nt will be	able to:		
Outcomes	CO1: To u	nderstand and gain kno	owledge ir	n different	areas.		
	CO2: To u	nderstand the design p	rocess.				
	CO3: To u	nderstand the selectior	n of mater	ials.			
	CO4: To u	nderstand the fabricati	on or prot	totyping.			
Examination	Practical						
Mode							
Assessment	Written	Project Work/Lab	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Performance					
Weightage	-	20%	-	30%		50%	-
Syllabus							CO Mapping
Content							
	This course is aimed to provide more weightage for project work. The						
	project work could be done in the form of a summer project or internship						
	in the industry or even a minor practical project in the college.						
	Participation in any technical event/ competition to fabricate and						
	demonstr	ate an innovative mac	hine or p	roduct co	ould be ei	ncouraged	
	under this	s course.					

In	hou		
L	Т	Ρ	Credit
0	0	14	7

Course Code	MED451						
Course Title	Engineer	ing Project-III (Protot	typing an	d Testing	)		
Course	On the co	mpletion of the course	the stude	nt will be	able to:		
Outcomes	CO1: To u	nderstand and gain kno	owledge ir	n different	areas.		
	CO2: To u	nderstand the design p	rocess.				
	CO3: To u	nderstand the selectior	n of mater	ials.			
	CO4: To u	nderstand the fabricati	on or pro	totyping.			
Examination	Practical						
Mode							
Assessment	Written	Project Work/Lab	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Performance					
Weightage	-	20%	-	30%		50%	-
Syllabus							CO Mapping
Content							
	This course is aimed to provide more weightage for project work. The						
	project work could be done in the form of a summer project or internship						
	in the industry or even a minor practical project in the college.						
	Participation in any technical event/ competition to fabricate and						
	demonstr	ate an innovative mac	chine or p	roduct co	ould be ei	ncouraged	
	under this	s course.				-	

# PROGRAM ELECTIVE

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED 311	( PROGRAM ELECTIVE I	)					
Course Title	Finite Ele	ment Method						
Course	On the co	ompletion of the cour	se the stu	udent wil	ll be able	to:		
Outcomes	CO1: Stud	CO1: Students will learn about the basic concepts of FEM.						
	СО2: То р	rovide the knowledge of	of one, two	o dimensi	onal and a	ixisymmetri	ic Problems in FEM.	
	СО3: То р	provide the information	of static,	scalar fiel	d and dyn	amic proble	ems.	
	CO4: To k	now about the dyna	mic consi	derations	s and con	nputer imp	elementations.	
Examination	Theory							
Mode								
Assessment	Written	Assignment/Projec	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	t Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introduct	tion						
	Introducti	on: Historical Backgro	und, Mat	hematica	l modelin	g of field	CO1	
	problems	in engineering, govern	ing equati	ons, disci	rete and c	ontinuous		
	, models, l	boundary and initial	value pr	oblems,	Weighted	Residual		
	Methods,	Variational formulation	on of bou	undary va	alue prob	lems, Ritz		
	technique, Basic concept of Finite Element Method.							
Unit 2	Dimensional Problems							
	One Dimensional Problems: One dimensional second order equation CO2							
	discretization, linear and higher order elements, derivation of shape							
	functions. Stiffness matrix and force vectors assembly of elemental							
	matrices solution of problems from solid mechanics							
	Two Dime	Two Dimensional Problem: Finite Element Modeling Constant Strain						
	Triangle (	Triangle (CST), problem modelling and boundary conditions. The Four						
	Node Qua	Node Quadrilateral, Numerical Integration, Higher Order Flements, Nine						
	Node Quadrilateral, Eight Node Quadrilaterals. Six Node Triangle.							
Unit 3	Beams							
	Introduction. Finite element modelling formulation. load vector. CO3							
	boundary	considerations. shear	force and	bending	moment.	beams on		
	elastic sur	ports.						
	Scalar Field Problems: Introduction. Steady-state heat transfer. Torsion							
Unit 4	Dynamic	Dynamic Considerations						
	Dynamic (	Considerations: Eleme	nt Mass N	Aatrices.	Evaluatio	n of Eigen	CO4	
	Values and	d Eigen Vectors.					-	
	Computer Implementation: Introduction: Computer Program							
	Organization for Calculation of System Matrices, Introduction to FE							
	software.							
Text Books	1. Chandri	upatla, T.R and Belegur	ndu A.D, T.	S. Introdu	uction to F	inite		
	Elements	in Engineering, New De	Ihi: Pearso	on Educat	ion: 2015	. Print.		
	2. Alavala,	C. R.Finite Element Me	ethods, Ne	ew Delhi:	PHI Learn	ing Pvt.		
	Ltd.2015.F	Print.				-		
	3. Moave	ni, S. Finite Element An	alysis, Nev	w Delhi: P	HI Learnir	ng Pvt.		
	Ltd. 2015.	Print.	-					

Reference	1. Seshu, P. Textbook of Finite Element Analysis, New Delhi: PHI	
Books	Learning Pvt. Ltd. 2015.Print.	
	2. Reddy, J. N.An Introduction to the Finite Element Method, New Delhi:	
	McGraw Hill Education.2015. Print	
Online		
Resources	http://nptel.ac.in/courses/112104116/	

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED312 (PROGRAM ELECTIVE I)							
Course Title	Tool Desig	gn						
Course	On the co	On the completion of the course the student will be able to:						
Outcomes	CO1: To ki	now about material geo	ometry of	cutting to	ols and th	nermal aspe	cts in machining	
	CO2: To a	nalyze the mechanics o	f cutting a	nd jigs, fi	xture desi	gn.		
	CO3: To fa	amiliar with die design a	and tool fa	ilure.				
	CO4: To ki	now about tooling cost.						
Examination	Theory							
Mode					- <b>-</b>			
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introducti	ion						
	Materials	and Geometry of cutti	ng tools:				CO1	
	Introducti	on, Desirable Propertie	es of Tool	Material	s, Charac	teristics of		
	Cutting To	ol Materials, cutting to	ool geome	try, Chip	flow dire	ction, Tool		
	angles sp	ecification systems, Cu	itting para	ameters	and Tool	geometry,		
	Index able	e inserts, chip breakers,	Tools of u	inusual ge	eometrv.	0 //		
	Thermal a	spects in machining an	nd cutting	fluid:	,			
	Regions of	f heat generation: Heat	in the Pri	mary She	ar Zone. H	leat at the		
	Tool/work	Interface. Heat Flow	at the To	ool Clear	ance Face	- Average		
	shear plai	ne temperature: Avera	age chip -	tool inte	erface ter	nperature:		
	method of	f tool temperature mea	asurement	t temper	ature dist	ribution in		
	tool. Cutti	tool Cutting Fluid: Types and composition of cutting fluids, selection of						
	cutting fluid.							
Unit 2								
	Mechanic	CO2						
	Merchant							
	Coefficien	t of friction: shear plan	e angle. Ve	elocitv an	d force re	lationship.		
	shear stre	ess and strain and str	ain rate i	n orthog	onal cutt	ing. stress		
	distributio	on along rake face, the	ories of Le	e and Sh	affer's O	xlev's etc.		
	Cutting fo	rce measuring techniqu	ies i.e. dvr	namomet	er			
	Jigs and Fi	ixture:						
	Principles	of jig and fixture desi	ign. Princi	ple of de	egrees of	freedoms		
	methods	of locations and clam	oing. Vari	ous devic	es for lo	cation and		
	clamping	indexing devices. Hy	draulic a	nd nneu	matic ac	tuation of		
	clamping devices, iig bushes, use of standard parts of iig design type of							
	drilling jigs, milling fixtures, lathe fixture, grinding fixtures and their							
	classification.							
Unit 3	Design							
	Die Design	n:					CO3	
	Compone	nts of die design desig	n of die h	locks nu	nches and	strinners		
	methods	of holding nunches ske	tches of s	tock ston	is Design	nrocedure		
	for progre	ssive dies compound d	lies and co	mhinatic	n dies for	nress tool		
	oneration	forging die design for o	fron and n	nachino f	orging ner	7001		
	operation forging die design for drop and machine forging parts.							

	Tool Wear, Tool Life and Machinability:				
	Tool wear mechanisms, Types of tool damage during cutting, Wear and				
	chipping characteristics of different tool materials, Tool wear equations,				
	tool failure criteria, Tool life equations, Effect of process				
	Parameters on Tool life, Tool life testing, Machinability, Surface finish				
	and surface integrity.				
Unit 4	Surface Finish				
	Tooling Costs:	CO4			
	Estimating cost of a product, estimating costs of tools, Economics of				
	tooling, Breakeven point analysis, minimum cost analysis.				
	Surface Finish:				
	Elements of surface finish, Factors affecting surface finish, Effect of				
	surface quality on Functional properties of machine parts, Evaluation of				
	surface finish, Indian Standards on surface finish. Measurement of				
	surface finish, Relationship of surface finish to the production methods,				
	finishing operations like honing, lapping, buffing super finishing etc.				
Text Books	1. Sharma P.C. A Textbook of Production Engineering, New Delhi: S.				
	Chand Publication. Print.				
	2. N. K. Mehta: Machine Tool Design McGraw Hill Publishing				
	3. S.K, Basu Machine Tool Design Oxford and IBH Publishing.				
Reference	1. Acherkan Machine Tool Design Mir publishing.				
Books	2. F. Koenigsberger: Design Principles of Metal-Cutting Machine				
	Tools.				
	3. ASTM, Fundamentals of Tool Design.				
	4. Donaldson C. Tool Design, McGraw Hill.				

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED313 (	MED313 ( PROGRAM ELECTIVE I)					
Course Title	Total Quality Management						
Course Outcomes	<ul> <li>To equip the students with knowledge about statistical tools.</li> <li>To provide knowledge about quality levels and different quality mana tools.</li> <li>To provide knowledge about six sigma and quality assurance and syst</li> <li>To provide information about different types of audits and the econo product inspection.</li> </ul>				egement ems. mics of		
Examination	Theory	•					
Mode							
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Project Work					
Weightage	10%	10%	25%		50%		5%
	I	Syllal	bus				CO Mapping
Unit 1							
	Introduction to quality Introduction, need for quality, evolution for quality, the definition of quality, product quality and service quality, Basic concepts of TQM, review of statistical concepts, test of normality for a given data, causes of variation, chance and assignable causes, statistical basis for control charts, basic control charting principles. TPM- concepts, improvement needs, performance measures. TQM implementation in manufacturing and service sectors. Introduction to control charts for variables and attributes, Process capability analysis: Introduction, specification limits and control limits, process capability indices, the Cp index, upper and lower capability indices, the Cpk index.					601	
Unit 2	Principles, leadership, strategic quality planning, Philosophies and frameworks, pillars of TQM: Leadership, Customer focus, Customer orientation and satisfaction, Customer complaints, Customer retention, Costs to quality, Quality Councils, Human Aspects in Management of Quality, Employee Involvement, motivation, Empowerment, team and teamwork, zero defects, quality circles, recognition and reward, Contribution of Deming, Continuous Process Improvement, PDCE cycle, 5S, Kaizen, Supplier partnership, Partnering, supplier rating and selection. TQM Tools: Benchmarking, Quality Function Deployment (QFD) – House of Quality, Taguchi Quality Loss Function, Juran and Crosby, Barriers to TQM, Seven traditional tool of quality, New management tools, PDCA methodology.					CO2	
Unit 3	Six Sigma         Statistical basis for six sigma, concepts of six sigma, DMAIC methodology, project selection for six sigma, tools and techniques, FMEA- stages and types.         Quality assurance and systems:					CO3	

	Definition, Activities associated with quality assurance, Quality statement, characteristics of quality assurance system Quality systems, need for ISO 9000, ISO 9001-2015, documentation requirement, guidelines for preparation of quality manual. Steps for certification, benefits of ISO –9000 implementation.	
Unit 4	Audit	CO4
	Quality audit: definition, internal audit, second party, third party audit, pre-	
	assessment and compliance audit, procedure of auditing, audit planning,	
	audit execution.	
Text Books	1Bansal, V.B. Industrial Engineering and Production Management. New	
	Delhi: Kapson Publishers. 2015. Print	
	2Raju, N.V.S. Industrial Engineering and Management. New Delhi: Cengage	
	Learning. 2013. Print.	
Reference Books	1Chunawala. <i>Production and Operation Management</i> . New Delhi: Himalaya Publication. 2013. Print.	
	2Dalela, and Ali, Mansoor. Industrial Engineering and Management Systems.	
	New Delhi: Standard Publishing Distributors. 2010. Print.	
	3Hicks. Industrial Engineering & Management-A new perspective. New Delhi:	
	Tata McGraw Hill. 2014. Print.	
	4Shankar, Ravi. Industrial Engineering and Management. New Delhi: Galgotia	
	Publishers. 2010. Print.	
	5Jain and Agarwal. Production Planning & Control. New Delhi: Khanna	
	Publishers. 2013. Print.	
	bverma, A.P. industrial Engineering and Management. New Delhi: Katson	
	BOOKS, 2010, Print.	
	7 Bill Aulet, Technology Entrepreneurship, 4th ed., Tata MCGraw Hill, 2014.	

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED314 (PROGRAM ELECTIVE I)							
Course Title	Refrigeration and Air-Conditioning							
Course	On the completion of the course the student will be able to:							
Outcomes	CO1: Analyze the reversed Carnot cycle and vapour compression refrigeration cycle (VCR).							
	CO2: Select the air-refrigeration systems for aircraft, and vapour absorption refrigeration							
	syste	system for rural and remote areas and select environmental friendly refrigerants						
	consi	considering the international standards.						
	CO3: Ider	ntify the Psychometri	c process	ses for d	ifferent	application	s and design the	
	paramete	rs of air-conditioning sy	stem as p	er standaı	rds.			
	CO4: Estin	nate cooling load and he	eating load	d consider	ing huma	in comfort a	nd optimize the air	
-	conditioni	ng system as per requir	rements.					
Examination	Theory							
Mode	14/		NACE	1470	505	500		
Assessment	written	Assignment/ Project	IVISE	MIP	ESE	EPK	ABL/PBL	
TOOIS			250/		F 00/		F.0/	
	10%	10%	25%	-	50%	-	5%	
Syllabus							CO wapping	
Unit 1	Introduction to Refrigeration and Air-Conditioning							
	Introduction: Basic Definitions of Refrigeration and Air-Conditioning:					nditioning;	CO1	
	History of Refrigeration; Natural and Artificial Refrigeration Methods:							
	Techniques to produce low temperatures; Applications of Refrigeration;							
	Refrigerants- Classification, Nomenclature, Desirable Properties,							
	Selection. Air Refrigeration: Air Refrigeration Cycles - reversed Carnot					ed Carnot		
	cycle; Bell-Coleman cycle analysis; various methods of Aircraft					f Aircraft		
	Refrigeration: Analysis, Merits and demerits. Vapor Compression							
	Refrigeration System:							
Unit 2	Vapor Compression Refrigeration System							
	Ideal VCR cycle (Working, Analysis and Limitations); Standard VCR						CO2	
	(Working and Analysis); Methods to improve performance of VCR; Multi-							
	Stage VCRS; Cascade Refrigeration. Components of Refrigeration							
	Systems: Compressors: Positive Displacement (Reciprocating and							
	Rotary); Dynamic (Centrifugal and Axial) Compressors; Condensers and							
	Evaporators (Both Natural and Forced Convection type); Expansion							
Linit 3	Vanor Absorntion Systems							
One S	Working and Analysis: Absorbent - Refrigerant combinations					hinations.	CO3	
	WaterAm	monia Systems: Wate	r-Lithium	Bromide	System.	Modified		
	Version of Agua-Ammonia System with Rectifier and Analyzer Assembly							
	Other Refrigeration systems: Brief Discussion on (i) Steam-let							
	refrigeration system: (ii) Vortex tube refrigeration: (iii) Thermoelectric							
	refrigerati	on system; and (iv) Ma	gnetic refr	igeration.	-			
Linit 4	Bsychrometry							
	i sychioni	,						

	Classification of Air-Conditioning Systems; ASHRAE Nomenclature;	CO4
	Applications of Air-Conditioning; Psychrometry - Air-water vapor	
	mixtures; Psychrometric Properties; Psychrometric or Air-Conditioning	
	processes; Psychrometric Chart. Air-Conditioning Systems: Classification	
	of Air-Conditioning Systems; Psychrometry of Air Conditioning Systems;	
	Thermal Comfort (Definition and Psychrometric Properties for Thermal	
	Comfort); Mathematical Analysis of Air-Conditioning Systems; Cooling	
	and Heating Load Estimation; a brief discussion on Ventilation.	
Text Books	1. A Text book of Refrigeration and Air conditioning" by Kurmi R S and	
	J K Gupta	
	2. ASHRAE Handbook (Fundamentals)	
Reference	1. Manohar Prasad, Refrigeration and Air Conditioning, New Age	
Books	International, 2004.	
	2. Dossat R.D., Principle of Refrigeration, 4th ed., Prentice-Hall, 1997.	
	3. Arora, C.P., Refrigeration and Air Conditioning, 2nd ed., Tata	
	McGraw-Hill, 2000.	
	Online Resources:	
	1 https://onlinecourses.nptel.ac.in/noc22_me135/preview	

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED361 ( PROGRAM ELECTIVE II)						
Course Title	Mechanic	Mechanical Vibrations					
Course	On the completion of the course the student will be able to:						
Outcomes	CO1: This course will enable students to fully understand and appreciate the importance of						
	vibra	tion in mechanical desi	gn of macl	hine part	s that ope	rate in vibra	atory conditions
	CO2: Stud	ents will able to write t	he differe	ntial equa	ation of m	otion of vib	ratory systems
	CO3: This	course will enable st	udents to	make f	ree and f	orced (Peri	odic, non-periodic,
	harmonic	etc.) vibration analysis	of single a	nd multi	-degree of	f freedom lir	near systems
	CO4: To ki	now about the continue	ous system	ns and M	ulti Degre	e Freedom S	Systems.
Examination	Theory						
Mode			1				
Assessment	Written	Assignment/Project	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Work					
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							CO Mapping
Unit 1	Introducti	on					
	Types of v	ibrations, Simple Harm	onic Moti	on (S.H.N	1), princip	le of super	CO1
	position a	pplied to Simple Harm	nonic Mot	ions. Bea	its, Fourie	er theorem	
	and simple	e problems					
	Undamped Free Vibrations: Single degree of freedom systems, Mass						
	Undamped free vibration-natural frequency of free vibration, stiffness of						
	spring elements, effect of mass of spring, Compound Pendulum					m	
Unit 2	Dampea Free Vibrations						
	single degree freedom systems, different types of damping, concept of						02
	systems for cases of under damning critical and over damning						
	systems for cases of under damping, critical and over damping,						
	Logarithmic decrement.						
	with viscous damping due to harmonic force. Solution by Complex						
	with viscous damping due to narmonic force, Solution by Complex						
	algebra, Reciprocating and rotating unbalance, vibration						
	isolation and support motion						
Unit 3	Vibration	Measurina Instrument	's				
	Whirling of shafts Vibrometer meter and accelerometer Whirling of					Whirling of	CO3
	shafts with and without air damning. Discussion of speeds above and					above and	
	below critical speeds. Combined with shear strain energy under					rgv under	
	combined	loading.					
	Systems with Two Degrees of Freedom: Introduction principle modes					ple modes	
	and Norm	al modes of vibration.	co-ordina	te coupl	ing, gener	alized and	
	principal	co-ordinates, free vib	ration in	terms o	of initial of	conditions.	
	Geared sy	stems, Forced Oscillatic	ons-Harmo	nic excita	ation Appl	ications: a)	
	Vehicle suspension b) Dynamic vibration absorber. c) Dynamics of					namics of	
	reciprocating Engines.						
Unit 4	Continuou	ıs systems					
	Introduction, vibration of string, longitudinal vibration of rods, Torsional					, Torsional	CO4
	vibration	of rods, Euler's equation	n for bean	ıs.			
	L						

	Numerical Methods for Multi Degree Freedom Systems: Introduction, Influence coefficients, Maxwell reciprocal theorem, Dunkerley's equation, Orthogonality of principal modes, Method of matrix iteration- Method of determination of all the natural frequencies using sweeping matrix and Orthogonality principle, Holzer's method, Stodola method.		
Text Books	<ol> <li>Leonard, Meirovitch. Elements of Vibrations Analysis. , Tata McGraw Hill,1986. Print.</li> <li>Rao, S.S. Mechanical Vibrations. Pearson Education, 2003. Print.</li> <li>Kelly, S. G. Mechanical Vibrations: Schaum's Outline Series. New Delhi: Tata McGraw Hill,2007. Print</li> </ol>		
Reference Books	<ol> <li>Bhave, Shrikant.Mechanical Vibrations: Theory and Practice. Pearson Education, New Delhi. 2010. Print.</li> <li>Venkatachalam R., Mechanical Vibrations.PHI Learning Pvt. Ltd. New Delhi. 2014. Print.</li> </ol>		
Online Resources	http://nptel.ac.in/courses/112103111/		
In hours			
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L	Т	Ρ	Credit
3	0	0	3

Course Code	MED362 ( PROGRAM ELECTIVE II)							
Course Title	Flexible Manufacturing System							
Course	On the co	mpletion of the course	the stude	nt will be	able to:			
Outcomes	CO1: To le	arn about manufacturi	ng system	•				
	CO2: To le	arn about the automat	ed asseml	oly line, a	bout the t	ypes of gro	up technology,	
	CO3: To a	bout the types of robot	ic technol	ogy				
	CO4: To about the types of robotic Programming.							
Examination	Theory							
Mode		Γ	1	1		1		
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introducti	on						
	Compone	nts of an FMS, type	s of syst	ems, wh	iere to a	pply FMS	CO1	
	technolog	y, FMS work stations,	Material h	nandling a	and storag	ge system:		
	Functions	of the handling syster	n, FMS lay	yout conf	figurations	s. Material		
	handling e	equipment, Computer c	ontrol syst	tem: Com	puter fun	ction, FMS		
	data file,	system reports. Plannir	ng the FM	S, analysi	is method	s for FMS,		
	applicatio	ns and Benefits Part fa	amilies, pa	rts classi	fication a	nd coding,		
	types of o	classification and codi	ng system	is, Machi	ne cell de	esign: The		
	composite	e part concept, types of	cell desig	ns, deteri	mining the	ebest		
11	machine a	irrangement, benefits c	of group te	echnology	/.			
Unit 2	Automatic	DN outomotion records f		ating and	hamatian		602	
	Dotroit ty	automation, reasons in	or automa	linos m	tomation	strategies,	02	
	transport	Transfor mochanism	ateu now	nnes, nn		work part		
	machining	operations	is, buile	i storag	e, auton			
	Design for	r automated assembly	types of a	automate	d assembl	v systems		
	nart feed	ing devices quantitat	tive analy	rsis of t	he delive	rv system		
	operation	and analysis of a single	e-station a	issembly	machine.	numerical.		
Unit 3	Robotic Te	echnology		,				
	Joints and	l links, common robot	configura	tions, wo	rk volume	e, types of	CO3	
	robot cor	ntrol, accuracy and re	epeatabilit	y, other	specificat	tions, end		
	effectors,	sensors in robotics.						
Unit 4	Robot pro	gramming						
	Types o	f programming, lea	d throu	gh proរ្	gramming	, motion	CO4	
	Programm	ning, interlocks, adv	antages	and dis	advantage	es. Robot		
	languages	: Motion programming	, simulatio	on and of	f-line pro	gramming,		
	work cell	control.						
Text Books	1. Groove	er, M.P. Automation,	Producti	on Syste	ems and	computer		
	Integrate	d Manufacturing. Pren	tice Hall o	of India, 2	2007. Prin	it.		
	2. Singh,	Nanua. Approach to	o Compu	ter Integ	grated De	esign and		
	Manufact	uring. John Wiley and						

Reference Books	1. Browne, J., Harhen, J. and Shivnan, J. Production Management Systems: A CIM Perspective. Addison Wesley,1989. Print.	
Online	http://nptel.ac.in/courses/110106044	
Resources		

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED363 ( P	MED363 ( PROGRAM ELECTIVE II)						
Course Title	Entreprene	urship Developme	nt and Ma	anagemer	nt			
Course	• To	know about entrep	reneurshi	p and ent	repreneu	rship Suppo	ort System.	
Outcomes	• To	<ul> <li>To know the different types of business and market opportunities.</li> </ul>						
	• To i	<ul> <li>To identify the various components of management and the importance of</li> </ul>						
	ma	management process in business.						
	• To i	impart the knowled	dge and av	vareness	about var	rious rules,	regulations and act	
	con	cerned with busine	ess.					
Examination	Theory							
Mode								
Assessment	Written	Assignment/	MSE	МТР	ESE	EPR	ABL/PBL	
100IS	Quiz	Project Work	25		50			
weightage	10	10 Cullebus	25		50		5	
11:4:4 1		Syllabus					CO iviapping	
	Entroproco	ur and Entroprote	urchin				CO1	
	Entreprene	n Dofinition Conce	ursnip nt Chara	etorictics	Classifica	tion Tunos	01	
	Eunctions a	nd Competencies	ept, Charac	Lienslics,	Classifica	tion, rypes,		
	Fntrenrene	urshin						
	Definition	Concept Need Ent	renreneu	rshin as a	career or	ntion		
	Entreprene	urship Support Svs	tem	sinp us u	cureer op			
	Concept an	d Need of entrepre	neurship	support sv	vstem			
	Business Ov	wnership and its Fe	eatures				CO2	
Unit 2	Sole proprie	etorship, Partnersh	ip, Joint S	tock Com	panies, C	ooperative,		
	Private Limi	ited, Public Limited	and PPP r	node	•			
	Market Sur	vey and Opportuni	ity					
	Introductio	n, Industry and its C	lassificati	on, Small S	Scale Indu	ustries (SSI):		
	Definition, 0	Objectives, Feature	s and impo	ortance, S	teps for s	tarting SSIs,	,	
	Procedure for registration of SSIs, Understanding business							
	opportunity, Consideration in product selection, Data collection for							
	setting up small venture.							
Unit 3	Project Report Preparation						CO3	
	Project: Int	roduction, Definition	on and Cor	ncept	d Concor	+ Mays for		
	selecting a	nroject Guidelines	for select	ing a proj	a concep	JL, WAYS IOI		
	Project Re	nort. Definition a	nd Conce	ing a proje ont Need	ect. Lof proi	ect renort		
	Contents of	a project report. S	alient fea	tures of a	project r	eport. Uses		
	of the pro	ject report, Prelin	ninary Pr	oject Reg	ort (PPF	R), Detailed		
	Project Rep	ort (DPR)	,	, ,	,	,,		
	Project Fo	mulation: Definiti	on and C	Concept, I	Elements	of project		
	formulation	ı						
	Project App	oraisal: Definition a	nd Conce	ot, Object	ives, Nee	d, Stages of		
	project app	raisal						
Unit 4	Wage Payn	nent					CO4	
	Introductio	n, Wage, Type of v	wages, Wa	age differ	entials, C	Dbjective of	•	
	good wage	–incentive plan, Ba	sis of goo	d wage in	centive p	lan, System		
	ot wage pay	yment.						

	Industrial Legislation and Laws Introduction, Need of industrial legislation, Types of taxes: Income tax, Sales tax, Excise duty, Provident fund, Legal aspects of small business, Factory Act, 1948, Payment of wages act, 1936, Workmen Compensation Act, 1947, Industrial dispute act, 1947, Employee state insurance act, 1948, Minimum wages act, 1948.
Text Books	<ul> <li>1Singh, A.K. <i>Entrepreneurship Development and Management,</i> New Delhi: Laxmi Publication Second Edition. 2009. Print.</li> <li>2Bansal. <i>Entrepreneurship Development and Management,</i> New Delhi: Kapson. Print.</li> </ul>
Reference Books	1Negendra.Entrepreneurship and Management, New Delhi:Pearson.1995. Print.2Saravate, Dilip.Entrepreneurship Development and ProjectManagemen, Pune:Everest Publication. Print.3Sharma Pritosh.Entrepreneurship Development and Management,New Delhi:Dhanpat Rai & Co Print.4Lal, A. K.Entrepreneurship Development and Management, VayuEducation.Print.

In	hou	Irs	
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED364 ( PROGRAM ELECTIVE II)							
Course Title	Gas Dyna	Gas Dynamics						
Course	On the co	On the completion of the course the student will be able to:						
Outcomes	CO1: Apply the thermodynamics concepts in relation to compressible flows and derive							
	relationships between various compressible flow parameters							
	CO2: Und	CO2: Understanding of isentropic compressible flows in variable area ducts and apply in						
	design of	static components like	nozzles an	nd diffuse	rs			
	CO3: Dev	elop relationship for s	hocks an	d detern	nine their	characteris	tics under various	
	conditions	5						
	CO4: Anal	yse the performance of	aircraft a	nd rocke	t propulsi	on engines.		
Examination	Theory							
Mode		Γ						
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introducti	on to basic concept of	gas dynar	nics				
	Energy a	nd momentum equat	ions of	compres	sible flui	d flows –	CO1	
	Stagnation	n states – Mach waves a	nd Mach	cone – Ef	fect of Ma	ach number		
	on compressibility. Isentropic flows: Isentropic flow through variable							
	area ducts.							
Unit 2	Isentropic Flow							
	Nozzle and Diffusers, compressors and turbines – Use of Gas tables. Flow						CO2	
	through c	lucts: Flow through co	onstant ar	rea ducts	s with he	at transfer		
	(Rayleigh	flow) and Friction (Fanr	no flow) –	Variation	of flow p	properties –		
	Use of tab	les and charts – Genera	alized gas	dynamics	5			
Unit 3	Normal and oblique shocks							
	Governing equations – Variation of flow parameters across the norma						CO3	
	and obliqu	ue shocks – Prandtl Me	yer relatio	ons – Exp	ansion of	supersonic		
	flow, Use	of table and charts – Ap	oplications	S.				
Unit 4	Jet propul	sion and Space propuls	sion					
	Theory of	jet propulsion – Thrust	equation -	- Thrust p	ower and	propulsive	CO4	
	efficiency	- Operation principle	<ul> <li>cycle ai</li> </ul>	nalysis ar	nd use of	stagnation		
	state perfe	ormance of ram jet, tur	bojet, turi	botan and	d turbo-pi	rop engines		
	– Aircraft	combustors.						
	Types of ro	ocket engines – Propella	ants – Igni	tion and o	combustio	on – Theory		
	of rocket	propulsion – Perform	ance stuc	iy — Stag	ging – Te	rminal and		
Taut Da alva	characteri	stic velocity – Applicati	ons – Spa	ce flights		increft and		
Text Books	1. Fallya S	$\sim$ M. Fundamentals of only $\sim$	Compres	tional nu	w with a			
	rocket propulsion", 5/e,New Age International publishers, 2016.							
	perspecti	ve". 2/e. McGraw Hil	Puhlish	ing com	nanv. Int	ernational		
	Edition. 1	.990.	4011011					
Reference	1. Balacha	andran P. "Fundament	als of Cor	npressib	le Fluid I	Dynamics",		
Books	PHI Learr	PHI Learning India Private Ltd., 2009.						

	<ol> <li>Shapiro A. H. "Dynamics and Thermodynamics of Compressible Fluid Flow – Volume I", John Wiley, New York, 1953.</li> <li>Cohen. H., G.E.C. Rogers and Saravanamutto, "Gas Turbine Theory", Longman Group Ltd.,1980</li> <li>Ganesan. V., "Gas Turbines", Tata McGraw Hill Publishing Co., New Delhi, 2010.</li> <li>Shapiro. A.H.," Dynamics and Thermodynamics of Compressible fluid Flow", John wiley, New York, 1953.</li> <li>Sutton. G.P., "Rocket Propulsion Elements", John wiley, New York,2010,.</li> <li>Zucrow. N.J., "Principles of Jet Propulsion and Gas Turbines", John Wiley, New York, 1970.</li> </ol>	
Online Sources	https://archive.nptel.ac.in/courses/112/106/112106166/	

In hours			
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED411 (	PROGRAM ELECTIVE III	l)						
Course Title	Advanced	Materials							
Course	On the co	mpletion of the course	the stude	nt will be	able to:				
Outcomes	CO1: Stud	ents will learn about th	e nano ma	aterials					
	CO2: Stud	ents will learn about th	e Compos	ite mater	ials				
	CO3: Stud	ents will learn about th	e Plastic n	naterials					
	CO4: Stud	ents will learn about th	e design a	nd develo	opment of	f composite	materials		
Examination	Theory								
Mode				I	1				
Assessment	Written	Assignment/Project	MSE	MTP	ESE	EPR	ABL/PBL		
Tools	Quiz	Work							
Weightage	10%	10%	25%	-	50%	-	5%		
Syllabus							CO Mapping		
Unit 1	Nano mat	terials			• .	<u> </u>			
	Carbon n	anotubes, structure a	and prope	erties, ch	emistry	of carbon	CO1		
	nanotube	s, graphite whiskers,	cones an	a polyne	drai crys	tais, nano			
	crystalline	e diamond, carbide	derived	a carbo	n nano	tubes in			
	field omis	cional polymer nano col	inpusites,	natio stru	ctureu ma				
	storage								
Linit 2	Storage:								
01111 2	Latraduction rainforcements matrix materials processing interface						<u> </u>		
	micromec	hanics monotonic he	haviour	cvclic fat	tique cre	en wear	002		
	applicatio	ns shape memory allow	(SMAs)	metallic f	nam rece	mat metal			
	foam etc.		o (on , o))	ine came i	00111)1000				
Unit 3	Plastics								
	Introducti	on to plastics,	polymer	ic mat	erials	(molecular	CO3		
	viewpoint), microstructures in polymers, mechanical properties (macro								
	view poir	nt) chemical and phy	sical prop	perties (r	macro vie	ew point),			
	designing	with plastics, thermore	olastic ma	terials (c	ommodity	/ plastics),			
	thermopla	astic materials(enginee	ering plast	tics), the	rmo set	materials,			
	elastomer	ic (rubber) materials,	extrusior	n, injectio	on mould	ling, blow			
	moulding,	thermoforming, rot	ational m	noulding,	casting,	foaming,			
	compress	ion moulding, transfe	er mouldi	ng, and	related	processes,			
	radiation,	finishing, adhesior	n and	assembly	operat	ions and			
	managem	ent, Environmental asp	ects of pla	astics.					
Unit 4	Developm	ent of Advanced Comp	osite Mat	cerials					
	Micromed	chanical behaviour of a	a lamina,	Mechani	cs of mat	erials and	CO4		
	elasticity a	approach to stiffness, Co	omparison	or appro	acnes, Me				
	of boloc in	approach to strength. I	-augue be	naviour ll		mes, Ellect			
		a shoar offects. Post cu	echanics V	s of up of	ence lo CO Immetric	Inposites,			
	Environm	ental effects	ing snape	s or ull sy	minetit	ianniates,			
	Design of	Composite Materiale	Introduct	tion to d	esign of	comnosite			
	structures	s structural design mat	terial selec	tion con	figuration	selection			
	laminate	joints. Design require	ements a	nd desig	n failure	s criteria			
	lannate	aminate joints, Design requirements and design failures criteria,							

	optimization concepts, design analysis philosophy for composite structures.	
Text Books	1Sehgal, Lindberg R.A. Materials, their Nature, Properties and Fabrication. New Delhi: S Chand. Print. 2Polmear, I. J. Light alloys: Metallurgy of Light Metals. Arnold. 3rd Edition. 1995. Print.	
Reference Books	1Robert, M. Mechanics of Composite Materials. Print.	

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED412 (	PROGRAM ELECTIVE III	I)				
Course Title	Non Destr	ructive Testing					
Course	On the co	mpletion of the course	the stude	nt will be	able to:		
Outcomes	CO1: To av	ware the description of	non-dest	ructive m	ethods.		
	CO2: To ki	CO2: To know about liquid penetration testing methods.					
	CO3: To ki	CO3: To know about magnetic particle testing.					
	CO4: To ki	now about eddy curren	t testing.				
Examination	Theory						
Mode							
Assessment	Written	Written Assignment/Project MSE MTP ESE EPR					
Tools	Quiz	Work					
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							CO Mapping
-							
Unit 1	Introducti	ion					
	Non-destr	uctive versus destruc	ctive test	ing, Ove	rview of	the Non	CO1
	Destructiv	e Testing Methods for	the detect	ion of ma	anufactur	ing defects	
	as well as	material characterization	on, applica	ations in I	NDT.		
	Visual Ins	spection: Introduction	, basic te	erms ass	ociated v	vith visual	
	inspection, equipment and accessories used for visual inspection, Visual						
	Detection	of Discontinuities, Ev	valuation	of test	results, a	pplication,	
	advantage	e and limitations.					
Unit 2	Liquid Per	netration Testing					
	Introducti	on, principle, equipme	ent, chara	cteristics	of pene	trants and	CO2
	their type	s, developer, hazards	precaution	ns, Evalua	ation of te	est results,	
	applicatio	n, advantage and limita	tions.				
	Radiograp	ohic Testing: X-ray r	radiograph	ny princi	ple, equ	ipment &	
	methodol	ogy-Type of industrial	sources a	nd applic	ation –Ra	diographic	
	exposure	factor and Technique	e-gamma	ray and	X-Ray e	quipment-	
	Radiograp	hic procedure, interpr	etation. F	recautio	ns agains	t radiation	
	hazards, a	pplication, advantage a	and limitat	ions.			
Unit 3	Magnetic Particle Testing						
	Principle	of magnetic particle	testing, k	oasic terr	ms assoc	iated with	CO3
	magnetic	particle testing, differer	nt method	s to gene	rate fields	, Magnetic	
	particle testing equipment, Magnetic particle testing procedures,						
	method of de- agnetization, magnetic particle medium, Evaluation of						
	indication, application, advantage and limitations.						
	Ultrasonic Testing: Introduction, principle of operation, basic terms						
	associated	d with ultrasonic testin	ng, type o	f ultrasor	nic propa	gation and	
	probes, ty	pe of transducers, data	represent	ation, A-S	Scan, B-sc	an, C-scan,	
	and Met	hod for evaluating d	iscontinui	ties, ela	stic study	yof wood,	
	applicatio	n, advantage and limita	itions.				
Unit 4	Eddy Current Testing						

	Introduction, principle of operation, basic terms associated with eddy current testing, Factor effecting eddy current-defect-frequency-geometry-conductivity-Proximity (Lift off & Fill Factor), eddy current flow characteristics, test equipment, types of probes, eddy current application and signal display, advantage and limitations.	CO4
Text Books	1. Davies, Troxell, and Hauck G.F.W.The testing of Engineering materials,	
	New York: McGraw Hill. Print.	
Reference	1. Armstrong, W.H. Mechanical Inspection, New York: McGraw Hill. Print.	
Books		
Online	http://nptel.ac.in/courses/113106070/	
Resources		

In	hou	Irs	
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED 413( PI	ROGRAM ELECTIVE	III)					
Course Title	Industrial Sa	fety						
Course	• To ir	• To impart the valuable skills to plan and understand importance of Industrial						
Outcomes	Safe	ty.						
	• Tok	now the socio-tech	no-econo	mic aspec	ts related	to the Occup	ational health	
	and	and safety.						
	• To h	<ul> <li>To have the understanding about operational Safety.</li> </ul>						
Examination	Theory							
Mode								
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work						
Weightage	10%	10%	25%		50%		5%	
		Syllabus					CO Mapping	
Unit 1								
	Safety: Mea	aning & need for s	afety. Rel	ationship	of safety	with plant	CO1	
	design, equi	pment design and	work env	ironment	. Industria	l accidents,		
	their nature	, types and causes.	Assessme	nt of accid	lent costs;	prevention		
	of accidents. Industrial hazards, Hazard identification techniques,							
	Accident investigation, reporting and analysis. Safety and economics,							
	safety and productivity. Employee's participation in safety. Safety							
	legislation.							
	Environmen	t: Environmental fa	actors in i	ndustry. E	ffect of te	mperature,	CO2	
Unit 2	Illumination	, humidity noise ar	nd vibratio	ons on hu	man body	and mind.		
	Physiology	of heat regulat	tion. The	rmal en	vironmen	t and its		
	measureme	nt. Thermal comfor	t. Indices d	of neat str	ess. Therm	hal limits for		
	Comfort, eff	iciency and freedo	om from n aditioning	Process w	. Naturai	Control of		
	heat ovpor	ventilation. All con		Process v				
	neat exposures, control at source, insulation, and local exhaust							
Linit 2	Industrial Lighting: Purpose of lighting benefits of good illumination.						<u> </u>	
Unit 5	Dependence of lighting and cafety Lighting and the work Sources and					Sources and	02	
	types of artit	ficial lighting Princi	nles of go	nd illumin	ation Rec	ommended		
	optimum sta	andards of illuminat	tion. Desig	n of lighti	ing installa	tion		
	Noise and V	ibrations: Continue	ous and im	pulse nois	se. The eff	ect of noise		
	on man. No	ise measurement a	and evaluation	ation of n	oise. Nois	e isolation.		
	Noise absor	ption techniques. S	ilencers V	ibrations:	Effect, me	easurement		
	and control	measures.			,			
Unit 4	Operational	Safety: General sa	fety consid	derations	in materia	l handling –	CO3	
	manual and	mechanical, safety	/ in machi	ne shop,	safety in u	use of hand		
	and portable	e (power) tools, saf	ety in use	of electric	city, safety	/ in welding		
	and cutting,	, principles of gua	rding, safe	ety in gri	nding, saf	ety in heat		
	treatment sl	hop, safety in gas fu	urnace ope	eration.				
Text Books	1. Krishnan	N V, "Safety mai	nagement	in Indust	<i>try",</i> Jaico	Publishing		
	House, Delh	i (1993).						

	2. Kocurek Dianna and Woodside Gayle, <i>"Environment, Safety, and Health Engineering"</i> , John Wiley and Sons, New York (1997).
Reference	1. McCormick J, "Human Factors in Engineering and Design", Tata
Books	McGraw Hill Pub Company Limited, New Delhi (1979).
	2. Willie Hammer, Dennis Price, "Occupational Safety Management and
	Engineering", 5th Ed., Pearson Edu (2000).
	3. David Goetsch, "The Safety and Health Handbook", Pearson Education
	(1999).

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED414 ( PROGRAM ELECTIVE III)						
Course Title	Non-Conv	entional Energy Source	es				
Course	On the co	mpletion of the course	the stude	nt will be	able to:		
Outcomes	CO1: Know the need of renewable energy resources, historical and latest developments.						
	CO2: Desc	cribe the use of solar	energy a	nd the v	arious co	mponents ι	ised in the energy
	productio	n with respect to applic	ations like	e-heating,	cooling, c	desalination,	power generation,
	drying, co	oking etc.					
	CO3: App	reciate the need of W	/ind Ener	gy and th	ne variou	s componer	nts used in energy
	generatio	n and know the classific	cations.				
	CO4: Unde	erstand the concept of	Biomass	energy re	sources a	nd their cla	ssification, types of
	biogas Pla	nts- applications					
Examination	Theory						
Mode		ſ	1				
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL
Tools	Quiz	Work					
Weightage	10%	10%	25%	-	50%	-	5%
Syllabus							CO Mapping
Unit 1	Solar Rad	iation					
	Energy so	urce, India's productio	on and re	serves of	commer	cial energy	CO1
	sources, n	eed for nonconvention	al energy	sources,	energy al	lternatives,	
	solar, the	ermal, photovoltaic. \	Nater po	wer, wii	nd bioma	ass, ocean	
	temperatu	ure difference, tidal and	d waves, j	geotherm	hal, tar sa	nds and oil	
	shale, nu	clear (Brief description	ons); adv	antages	and disa	dvantages,	
	compariso	on (Qualitative and Qua	ntitative)				
	Extra-Terr	estrial radiation, spe	ctral dist	ribution	of extra	-terrestrial	
	radiation,	solar constant, solar r	adiation a	at the ea	rth's surfa	ace, beam,	
	diffuse an	d global radiation, sola	r radiatior	n data.			
	Measurem	nent of Solar Rad	diation:	Pyromet	er, sha	ding ring	
	pyrheliom	eter, sunshine recorde	r, schema	ntic diagra	ams and p	principle of	
	working.						
	Solar Radi	ation Geometry: Flux o	on a plane	surface,	latitude,	declination	
	angle, surface azimuth angle, hour angle, zenith angle, solar altitude						
	angle expression for the angle between the incident beam and the						
	normal to a plane surface (No derivation) local apparent time. Apparent						
	motion of sum, day length, numerical examples. Beam, diffuse and						
	reflected radiation, expression for flux on a tilted surface (no derivations)						
	numerical examples.						
Unit 2	Performance Analysis of Liquid Flat Plate Collectors						
	General d	lescription, collector ge	eometry,	selective	surface (	qualitative	CO2
	discussion) basic energy-balance equation, stagnation temperature,						
	transmissivity of the cover system, transmissivity – absorptivity product,						
	numerical	examples. The overall	loss coeff	icient, co	rrelation	for the top	
	loss coef	ticient, bottom and	side loss	s coeffic	ient, pro	blems (all	
	correlatio	ns to be provided). T	emperatu	re distrik	pution be	tween the	
	collector t	ubes, collector heat re	moval fac	tor, colle	ctor efficio	ency factor	
	and colle	ctor flow factor, mea	an plate	tempera	ture, inst	tantaneous	

	efficiency (all expressions to be provided). Effect of various parameters on the collector performance; collector orientation, selective surface,	
	fluid inlet temperature, number covers, dust.	
Unit 3	Wind Energy and Tidal Power	
	Properties of wind, availability of wind energy in India, wind velocity and	CO3
	power from wind; major problems associated with wind power, wind	
	machines; Types of wind machines and their characteristics, horizontal	
	and vertical axis wind mills, elementary design principles; coefficient of	
	performance of a wind mill rotor, aerodynamic considerations of wind	
	mill design, numerical examples.	
	Tidal Power: Tides and waves as energy suppliers and their mechanics;	
	fundamental characteristics of tidal power, harnessing tidal energy,	
	limitations.	
Unit 4	Geothermal Energy Conversion	
	Principle of working, types of geothermal station with schematic	CO4
	diagram, geothermal plants in the world, problems associated with	
	geothermal conversion, scope of geothermal energy.	
	Energy from Bio Mass: Photosynthesis, photosynthetic oxygen	
	production, energy plantation, bio gas production from organic wastes	
	by anaerobic fermentation, description of bio-gas plants, transportation	
	of bio-gas, problems involved with bio-gas production, application of bio-	
	gas, application of bio-gas in engines, advantages.	
Text Books	1 Non-Convention Energy Resources B H Khan McGraw Hill	
	Education (India) Pvt. Ltd. 3rd Edition.	
	2 Solar energy Subhas P Sukhatme Tata McGraw Hill 2 nd Edition,	
	1996.	
	3 Non-Conventional Energy Sources G.D Rai Khanna Publishers 2003	
Reference	1 Renewable Energy Sources and Conversion Technology N.K.Bansal,	
Books	2 Denovichle Energy Technologies Democh D. S. Kumen K. H. Naress	
	2 Reliewable Energy Technologies Ramesh R & Rumar R O Narosa Publishing House New Dalbi	
	3 Conventional Energy Systems K M Non Wheeler Publishing Co. Ltd	
	New Delhi 2003	
	4 Non-Conventional Energy Ashok V Desai Wiley Eastern Ltd. New	
	Delhi 2003	
	https://archive.nptel.ac.in/courses/121/106/121106014/	

In	hou	Irs	
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED461 (	PROGRAM ELECTIVE IV	/)									
Course Title	Mechanic	al Behaviour of Materi	als									
Course	On the co	mpletion of the course	the stude	nt will be	able to:							
Outcomes	CO1: Unde	erstand the mechanical	behavior	of ductile	and britt	le materials	;					
	CO2: Anal	yze creep, fatigue and f	fracture m	echanism	s for vario	ous materia	ls					
	CO3: Deve	elop fracture mechanisr	m maps ar	nd analyze	e the reas	ons for failu	re of materials					
	CO4: Selee	ct a characterization teo	chnique to	evaluate	the beha	vior of mate	erials					
Examination	Theory											
Mode												
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	ABL/PBL					
Tools	Quiz	Work										
Weightage	10%	10%	25%	-	50%	-	5%					
Syllabus							CO Mapping					
Unit 1	Introducti	on to mechanical beha	viour:									
	A brief rev	view of elastic and plast	tic deform	ation, dis	locations	and their	CO1					
	properties	5. Dislocations in FCC, I	BCC and H	ICP meta	ls, interac	tions with						
	point defe	ects and other disloca	itions. Ter	nsile beha	avior, eva	luation of						
	strength a	nd ductility parameters	s, Effect o	f strain ra	te and te	mperature						
	on tensile	behavior, and Protevin	Le-Chate	lier effect		•						
	Types and	mechanisms of creep	o deforma	tion, Cree	ep under	combined						
	stresses, c	leformation mechanisn	n maps, Su	uper plast	icity, envi	ronmental						
	effects, re	maining life assessmen	t.		•							
Unit 2	Fatigue Behaviour:											
	High and	low cycle fatigue, proc	ess of fati	igue fract	ure, effec	t of mean	CO2					
	stress, Cyc	clic stress/strain respon	se of mat	erials, est	ablishme	nt of cyclic						
	stress/ str	ain curve, transition fa	atigue life,	, Coffin-N	lanson re	lationship,						
	Evaluatior	n of parameters, chara	cterizing	resistance	e against	high cycle						
	and Low c	ycle fatigue, Creep fati	gue intera	iction, en	vironmen	tal effects,						
	thermochemical fatigue.											
Unit 3	Fracture Mechanics & Failure analysis:											
	Brief revie	w of the basic concept	s of linear	elastic an	nd elastic-	plastic	CO3					
	fracture m	nechanics, stress intens	sity param	eter, J- in	ntegral an	d crack tip						
	opening displacement as fracture criteria, standard procedures for											
	experimental determination of these parameters.											
	Analyzing Fractures, Micro mechanisms of brittle and ductile fracture,											
	fracture mechanism maps, fractography, Visual Examination &											
	Management of Applied Failure Analysis, Manage Failure Analysis.											
Unit 4	Materials	characterization techn	niques:									
	Optical n	nicroscopy techniques,	Quantitat	ive metal	lography,	Scanning	CO4					
	electron	microscopy: Image for	mation me	ethods in	SEM. App	lications.						
Text Books	1. Mechai	nical Metallurgy, Georg	ge E. Diete	er, McGra	aw Hill, <mark>2</mark> r	nd Edition,						
	2005.											
	2. Introdu	ction to Fracture Mech	anics, Hell	an K, McO	Graw Hill,	2002.						
	3. Mechar	nical Behavior of Materi	ials at Elev	ated Tem	perature	s, J.E.Dorn,						
	McGraw H	lill, 2000.			McGraw Hill, 2000.							

Reference	1. Engineering Materials I : Introduction to Properties, Applications and	
Books	Design, M.F Ashby and David R H Jones :,2010.	
	2. Mechanical behaviour of Materials, Marc Andre Meyers and Krishna	
	Kumar Chawla, 2009.	

In	hou		
L	Т	Ρ	Credit
3	0	0	3

			A						
Course Code	MED462 (	PROGRAM ELECTIVE IV	<u>')</u>						
Course Title	Product D	esign and Developmer	nt						
Course	On the co	mpletion of the course	the stude	nt will be	able to:				
Outcomes	CO1: To a	CO1: To aware the description of non-destructive methods.							
	CO2: To k	CO2: To know about liquid penetration testing methods.							
	CO3: To k	now about magnetic pa	rticle test	ing.					
	CO4: To k	now about eddy curren	t testing.						
Examination	Theory								
Mode			-				-		
Assessment	Written	Assignment/ Project	MSE	MTP	ESE	EPR	AB	L/PBL	
Tools	Quiz	Work							
Weightage	10%	10%	25%	-	50%	-	5%		
Syllabus		•		•			СО	Mapping	
Unit 1	Introducti	ion							
	Introducti	on to product design.	Significanc	e of proc	duct desig	n. product	СО	1	
	design		5			, p. 1.1.00			
	and devel	lopment process, sequ	ential Eng	ineering	design me	ethod. the			
	challenge	s of product develo	onment.	Developr	nent Pro	cess and			
	Organizati	ions-Generic Developn	nent Proc	ess. Con	icent Dev	elopment			
	Adanting	the generic PD proce	ss flows	AMF de	velonmen	t Process			
	Product D	evelonment Organizati	ons The A	ME Orga	nization	1100033,			
	Product P	lanning			1112011011.				
	Product [	Dianning and Identifyir	ng Custon	nor Noor	he-Droduct	+ Dlanning			
	nrocoss li	nternret raw data in ter	me of cus	tomors n	and organ	nizo noods			
	in hiorarch	av and octablish the role	tivo impo	toniers n	noode ro	iow of the			
		Ty and establish the rea	Ectablich	target co	neeus, rev	new of the			
	final cooci	fications	ESLODIISII	target sp	ecincation	is, setting			
Linit 2	Concont C	Consideration in Produc	+ Docian						
Unit 2	Concept C		t Design		ما مین از باز م			2	
	Concept G	eneration-Activities of	concept g	eneration	i, clarityinį	g problem,	0	2	
	search bo	th internally and extern	ially, explo	re the ou	itput,				
	Concept s	Selection-Overview, co	ncept scre	eening ai	na concep	ot scoring,			
	methods	of selection. Concept 1	esting-Lie	ments of	r testing:	qualitative			
	and quant	itative methods includi	ng survey,	measure	ement of c	ustomers``			
	response.								
	Designing	of product Product	ct Archite	ecture-M	odular 8	د Integral			
	architecture, implications, establishing the architecture, Delayed								
	differentiation, Platform Planning. Industrial Design-Assessing need for								
	industrial design, Impact of industrial Design, Industrial								
	design process, management of industrial design process, assessing								
	quality of industrial design.						_		
Unit 3	Value Eng	ineering and product L	Design				_		
	Introducti	on, Historical perspe	ctive, wł	nat is v	alue? Na	ature and	CO	3	
	Measuren	nent of value, Maxim	ium value	e, norma	l Degree	of value,			
	Importance	ce of value, The value	Analysis	job plan	, Creative	, Steps to			
	problem	<ul> <li>solving and value</li> </ul>	Analysis,	value A	nalysis To	est, value			

	Engineering Idea Study on Tap Switch Control Assembly, Material and	
	process Selection in value Engineering. Designer contributes, Role of	
	Aesthetics in product Design, Functional Design Practice.	
	Modern Approaches to Product Design	
	Concurrent Design, Quality Function Deployment (QFD)	
Unit 4	Eddy Current Testing	
	Human Engineering Considerations in Product Design	CO4
	Introduction, Human being as Applicator of Forces, Anthropometry: Man	
	as occupant of Space, the Design of Controls, The Design of Displays,	
	Man/Machine Information Exchange.	
	Embodiment Design:	
	Design for Manufacturing, prototyping. Robust Design. Intellectual	
	Property and Environmental Guidelines-Intellectual Property: Elements	
	and outline, patenting procedures, claim procedure, Environmental	
	regulations from government, ISO system.	
Text Books	1. Ulrich Karl T. & Epinger Steven D. Product Design & Development-	
	Tata- McGraw Hill - 3 rd Edition, New Delhi, 2004	
	2. Jones Tim, Heinmam Butterworth, New product Development, Oxford	
	- UIC, 1997	
Reference	1.EngeneKinetoviczRoland,New product Development: Design &	
Books	Analysis, Wiley and Sons Inc., New York, 1990.	
	2.Hollins Bill, Pugh Stwout,Successful Product Design, Butterworth,	
	London,1990	
	3. Otto Kevin and Wood Kristini. Product Design, Pearson India, New	
	Delhi, 2004.	
Online	http://nptel.ac.in/courses/112107217/	
Resources		

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MED463 ( PROGRAM ELECTIVE IV)							
Course Title	Ergonomics and Workplace Design							
Course	• Toi	mpart the knowled	ge of vario	ous princip	les of erg	onomics.		
Outcomes	<ul> <li>To know various considerable factors of workplace design.</li> </ul>							
	• To u	• To understand the compatibility of man and machine.						
	• To k	• To know various factors affecting life stress.						
Examination	Theory			,				
Mode								
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Project Work						
Weightage	10	10	25		50		5	
		Syllabus					CO Mapping	
Unit 1								
	Introduction	n to Human Factors	6				CO1	
	Scope of h	uman factors, Stu	udy of hu	uman fac	tors as a	science,		
	Cost/benefi	t analysis of human	factors co	ntribution	ns, Human	factors in		
	the product	design lifecycle, Us	ser center	ed design,	Sources	for design		
	work.							
	Front End A	nalysis						
	User analys	sis, Environmental	analysis,	Function	and task	analysis,		
	Perform, Co	ollect, Summarize	and Anal	yse task	data, Idei	ntify user		
	preferences and requirements.							
	Iterative De	sign and Testing:						
	Providing i	n design,						
	Prototype,							
	evaluation							
	Human Vari	ability and Statistic	cs:				CO2	
Unit 2	Human varia	ability, Statistical an	nalysis					
	Anthropometric Data:							
	Measurement devices and methods, Civilian and Military data,							
	Structural and functional data, Use of anthropometric data in design.							
		icipies of workspa		icore Doo	ch roquin	monte of		
	the smaller	Liearance requirements of the largest users, Reach requirements of						
		requirements \	/isihility	and norm	nal line	of sight		
	Component	arrangement	/isionity			or signt,		
	Design of St	anding and Seated	Work Are	as:				
	Choice betw	een standing and s	eated wor	'k areas. W	/ork surfa	ce height.		
	Work surfac	e depth, Work surf	ace inclina	ation.				
Unit 3	Muscle Stru	cture and Metabol	ism:				CO2	
	Muscle Stru	cture, Aerobic and	Anaerobic	metaboli	sm			
	Circulatory							
	The circulat	ory systems, the res	spiratory s	ystems				
	Energy Cost	of Work and Work	load Asse	ssment:				
	Energy cost	of work, Measurem	nent of Wo	orkload.				
	Physical Wo	ork Capacity and W	hole-Body	/ Fatigue:				

	Short term and Long term work capacity, Causes and Control of whole	
	body fatigue, Static work and Local muscle fatigue	
Unit 4	Environmental Stressors:	CO4
	Motion, Thermal Stress, Air quality	
	Psychological Stressors:	
	Cognitive appraisal, Ethical issues, Level of arousal, Performance	
	changes with over arousal, Remedial of psychological stress.	
	Life Stress	
	Workload Overload:	
	Remediation, Mental workload measurement	
	Fatigue and Sleep Disruption:	
	Vigilance and under arousal, Sleep disruption and Performance	
	effects, Remediation of sleep disruption.	
	Safety Accidents and Human Errors	
Text Books	1. Wickens and Lee. An introduction to Human Factor Engineering. New	
	Delhi: PHI. 2014. Print.	
Reference	1. Murrell, K.F.H, Champan& Hall. Ergonomics: Man in his working	
Books	environment. London. 2012.Print.	
	2. Alexander, D.C. The Practice and Management of Industrial	
	Ergonomics. Prentice-Hall, Englewood Cliffs, NJ. 1986. Print.	
	3. Astrand, P.O. and Rhodahl, K. Textbook of Work Physiology. New	
	York: McGraw-Hill. 2003. Print.	
Online Source	http://nptel.ac.in/courses/107103004	

In	hou		
L	Т	Ρ	Credit
3	0		3

Course Code	MED464 ( PROGRAM ELECTIVE IV)						
Course Title	Power Pla	nt Engineering					
Course	On the co	mpletion of the course	the stude	nt will be	able to:		
Outcomes	CO1: Anal	yze the reversed Carno	t cycle and	d vapour	compress	sion refrigera	ation cycle (VCR).
	CO2: Sele	ct the air-refrigeration	systems	for aircra	ift, and v	apour absor	ption refrigeration
	syste	m for rural and remo	ote areas	and sele	ect envir	onmental fr	iendly refrigerants
	consi	dering the internationa	l standard	ls.			
	CO3: Ider	ntify the Psychometri	c process	ses for (	different	application	s and design the
	parameter	rs of air-conditioning sy	stem as p	er standa	irds.		
	CO4: Estin	hate cooling load and he	eating loa	a conside	ring num	an comfort a	ind optimize the air
Evamination	Theory	ng system as per requir	ements.				
Examination	meory						
Assossment	W/ritton	Assignment/Droject	MCE	MTD	ECE	EDD	
Tools	Ouiz	Work	IVIJE	IVITE	LJE	LFN	ADL/FDL
Weightage	10%	10%	25%		50%		5%
Syllabus	1070	1076	2370	_	5070	-	CO Manning
Junit 1	Introducti	on to Energy Sources					
Onit I	Energy so	urces for generation of	electric r	ower en	ergy noli	cy of India	CO1
	nresent st	atus and future trends	maior no	ower nlar	nts in Indi	ia Thermal	001
	Power Pla	ants: Selection of site	general	lavout d	of the ol	ant maior	
	componer	nts- Boilers, Economiser	s Super-h	neaters. A	ir pre-hea	aters fuels	
	fuel and	ash handling equipm	ent's. Hi	gh press	ure Boil	ers. steam	
	turbines.	station heat balance an	d plant ef	ficiency.		,	
Unit 2	Thermal P	Power and Hydro Powe	r Plant				
	Diesel Pov	wer Plant: Diesel engin	e, engine	perform	ance and	operation,	CO2
	super cha	rging, Diesel Electric po	ower plan	t layout.	Gas Turl	bine Power	
	Plants: Ga	s turbine power plants,	basic cycl	es, cycle	calculatio	n, the ideal	
	and real o	perating cycles, compo	nents and	a layout.	Hydro Po	wer Plants:	
	Classificat	ion of nydro-plants, so		of site, ra	iin tali ai	na run oπ,	
		selection of hydraulic t	, plant le	ayout, es ad their a	overning	or power	
Linit 2	Available,	ower Plants	ui billes ai	iu then g	overning.		
	Introducti	on Atomic structure	and radio	activitio		reactions	CO3
	hinding energy Nuclear Peactors Types of reactors Processized water						203
	reactors boiling beater reactors. Heavy water-cooled and moderated						
	(CANDII) reactor Gas-cooled reactors liquid metal cooled reactors						
	Indian Nuclear nower installations, comparison between Nuclear and					luclear and	
	Thermal plants Non-Conventional Power Plants' Geothermal power						
	plants, Tidal power plants. Wind power plants, solar power plants						
	M.H.D. Generators, OTEC						
Unit 4	Power Plant Economics & environmental aspect						
	Plant inve	estment costs, fixed c	harges, C	peration	cost, er	nergy cost,	CO4
	depreciati	on and operating cos	sts on th	e selecti	on of ec	quipment's,	
	increment	al cost, comparison of	fixed and	operatin	g costs, g	greenhouse	
	effect, the	ermal pollution, other p	ollutants.				

Text Books	<ol> <li>A Course in Power Plant Engineering: / Arora and S. Domkundwar.</li> <li>Power Plant Engineering – P.C.Sharma / S.K.Kataria Pub</li> </ol>	
Reference	1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.	
Books	2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.	
	3. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering,	
	2nd ed., McGraw Hill, 1998.	
Online	https://onlinecourses.nptel.ac.in/noc22_me73/preview	
Resources:		

In	hou		
L	Т	Ρ	Credit
3	0	0	3

Course Code	MEDXXX ( PROGRAM ELECTIVE IV)(Open Elective)							
Course Title	Automob	Automobile Engineering						
Course	On the completion of the course the student will be able to:							
Outcomes	CO1: To understand the construction and working principle of various parts of an automobile.							
	CO2: To u	nderstand the Lubricati	ing System	i, Cooling	System, C	Chassis & Transm	ission	
	CO3: To understand the steering and breaking systems of automobile							
	CO4: To k	now about the resent a	dvanceme	ents in aut	tomobiles			
Examination	Theory							
Mode		Γ	1	1	1	1		
Assessment	Written	Assignment/Project	MSE	MTP	ESE	EPR	ABL/PBL	
Tools	Quiz	Work						
Weightage	10%	10%	25%	-	50%	-	5%	
Syllabus							CO Mapping	
Unit 1	Introducti	ion						
	Introducti	i <b>on:</b> History of automo	biles; Cla	ssificatior	n of autor	mobiles; Power	CO1	
	plant class	sification; Engine termi	nology; Ty	pes of cyo	cles; Work	ing principle of		
	an IC engi	ine; Advanced classifica	ation of er	ngines an	d multi cy	linder engines;		
	Engine ba	lance and firing order.						
	Fuel Syste	em, Ignition System and	d Electrica	l system:	: Spark Igr	nition engines –		
	fuel tank,	fuel filter, fuel pump, a	ir filter, ca	rburetor,	direct inj	ection of petrol		
	engines; C	Compression Ignition en	<i>gines</i> – fue	el injectio	n (air and	solid), pressure		
	charging,	super charging and turl	bo chargin	g; Ignitio	n systems	<ul> <li>components,</li> </ul>		
	battery ignition, magneto ignition, electronic ignition and ignition timing;							
	Main elec	ctrical circuits – gener	ating & st	tarting ci	rcuit, ligh	ting, indicating		
	devices.							
Unit 2	Lubricating System and Cooling System, Chassis & Transmission							
	Lubricating System and Cooling System: Functions & properties of lubricants,						CO2	
	methods of lubrication; Oil filters, oil pumps, oil coolers; Characteristics of an					acteristics of an		
	effective cooling system; types of cooling systems; Radiator, thermostat, air							
	cooling & water cooling.							
	Chassis & Transmission: Parts of automobile body; Automobile frames -							
	functions,	constructions, sub fra	mes, mate	erials and	defects;	Transmission –		
	axles, clu	utches, propeller sha	itts, diffe	rential,	gear box	es, automatic		
	transmissi	ion, electronic transmis	sion contro	ol, functic	ons and typ	pes of front and		
	rear axles	, types and functions of	clutches,	Hotchkiss	s drive tor	que tube drive,		
	traction control.							
Unit 3	Steering,	Braking and Suspensio	n ov v					
	Steering,	Braking and Suspension	on: Steeri	ng mecha	anism, ste	ering gear box	CO3	
	types, wh	ieel geometry; Brakes	– principl	e, tunctio	ons, types	s, construction,		
	operation	and parking brake; Su	spension	- types of	spring sh	IOCK absorbers,		
	objectives	and types of suspensi	ion system	ı, rear ax	ie suspens	sion, electronic		
	control an	in proactive suspension	i system.	h				
	Automoti	ve Air Conditioning: Ve	entilation,	neating, a	air conditi	on, refrigerant,		
	compress	or and evaporator.						
Unit 4	Wheels a	nd Tyres						

	Wheel quality, assembly, types of wheels, wheel rims. Construction of tyres and tyre specifications.	CO4
	Environment effect and mitigation.	
Text Books	1. A.K. Babu, S.C. Sharma, Automobile Mechanics, Khanna Book Publishing, 2019.	
	2. A.K. Babu, S.C. Sharma, Automobile Engines, Khanna Book Publishing, 2019.	
	3. Kirpal Singh, Automobile Engineering, 7th ed., Standard Publishers, New Delhi, 1997.	
Reference Books	1. Jain K.K. and Asthana R.B., Automobile Engineering, Tata McGraw Hill, New Delhi, 2002.	
	<ol> <li>Heither J., Automotive Mechanics, 2nd ed., East-west Press, 1999.</li> <li>Heisler H., Advanced Engine Technology, SAE International Publ., USA, 1998.</li> </ol>	
Online Resourses	https://archive.nptel.ac.in/courses/107/106/107106088/	

In hours			
L	Т	Ρ	Credit
3	0	0	3

Course Code	MEDXXX ( P	MEDXXX ( PROGRAM ELECTIVE IV/Open elective)							
Course Title	Industrial E	Industrial Engineering Techniques							
Course	• Toi	To impart the knowledge of Production and Productivity.							
Outcomes	• To provide the knowledge of PPC and facility location.								
	• To c	• To conduct time and motion study to improve the methods/system and to							
	incr								
	• Toi	f material							
	management and Cost Estimation and Control.								
Examination	Theory	-							
Mode	-								
Assessment	Written	Assignment/	MSE	MTP	ESE	EPR	ABL/PBL		
Tools	Quiz	<b>Project Work</b>							
Weightage	10%	10%	25%		50%		5%		
	•	CO Mapping							
Unit 1									
	Industrial E	CO1							
	Introduction								
	organizatior								
	Approach,								
	Industrial E								
	Engineering								
	Production								
	Introduction								
	production								
	productivity								
	System, Tec								
	Increased P								
	Production	CO2							
Unit 2	Introduction								
	Planning an								
	production								
	of Production System (Job, Batch and Continuous), Break even analysis								
	Plant Location and Layout								
	Introduction, Site Selection, Reasons for appropriate location								
	selection, Fa								
	areas, Econ								
	Principles of								
	procedure,								
	layout, Wor								
Unit 3	Work Study	CO2							
	Introduction								
	Procedure								
	viotion and								
	Economy								

	<b>Work Measurement:</b> Definition, Objectives, Procedure, Techniques of work measurement (Time Study, PMTS), Performance Rating, and	
	Allowalice.	604
Unit 4	Cost Estimation and Control	CO4
	Introduction, Cost and its Classification, Costing, Cost Estimation,	
	Difference between Cost Estimation and Costing, Elements of Cost,	
	Ladder of Cost, Overhead Expenses, Mathematical Formulae to	
	Calculate Volume of Components, Densities of Metals, Depreciation,	
	Cost Control	
	Material Management	
	Material Management (Functions, Advantages, Objectives), Purchasing	
	(Functions, Objectives, VPR, Purchasing Procedure), Store	
	Management (Functions and Duties, Location and Layout of Stores,	
	Principles of efficient store layout, Approaches of store location, Types	
	of store layouts,) Inventory (Inventory Control, Classification, Need,	
	Benefits, Disadvantage, Objectives), Various levels of Inventory	
	Control, Inventory Control Techniques, Introduction to JIT	
Text Books	1. Bansal, V.B. Industrial Engineering and Production Management.	
	New Delhi: Kapson Publishers. 2015. Print.	
	2. Raju, N.V.S. Industrial Engineering and Management. New Delhi:	
	Cengage Learning. 2013. Print.	
Reference	1. Chunawala. <i>Production and Operation Management</i> . New Delhi:	
Books	Himalaya Publication. 2013. Print.	
	2. Dalela, and Ali, Mansoor. <i>Industrial Engineering and Management</i>	
	Systems. New Delhi: Standard Publishing Distributors. 2010.	
	Print.	
	3. Hicks. Industrial Engineering & Management-A new perspective.	
	New Delhi: Tata McGraw Hill. 2014. Print.	
	4. Shankar, Ravi. Industrial Engineering and Management. New	
	Delhi: Galgotia Publishers. 2010. Print.	
	5. Jain and Agarwal. Production Planning & Control. New Delhi:	
	Khanna Publishers. 2013. Print.	
	6. Verma, A.P. Industrial Engineering and Management. New Delhi:	
	Katson Books. 2010. Print.	
Online Source	http://nptel.ac.in/courses/112107143/	
	http://nptel.ac.in/courses/112107142/	

Open elective course syllabus provided by other departments as passed in respective BOS meetings with L T P 3 0 0 3.



## Contact

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