Important Information for the Newly Admitted Students

to the

UNDERGRADUATE PROGRAMMES

(B.Tech./B.Arch.)

2022

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

J.L.N. Marg, Jaipur - 302017 INDIA

ABBREVIATIONS / DEFINITIONS	
APEC	Academic Performance Evaluation Committee
Applicant	An individual who applies for admission to any Undergraduate (UG) Programme of the Institute.
BoD	Board of Discipline
BoG/Board	Board of Governors of the Institute
CC	Curriculum Committee
CGPA	Cumulative Grade Point Average
Council	NITs Council
Course	A component of the curricula designatedby a code number and a title.
Course Coordinator	The faculty member, who shall have full responsibility for the course, would coordinate the work of other Course Instructors/faculty member(s) involved in that course, including examinations and the award of grades.
Course Coordination Committee	Committee of the faculty members involved in a course
Course Instructor	The faculty member conducting the course and assisting the Course Coordinator in conducting examinations and compilation of grades.
CSAB	Central Seat Allocation Board
DASA	Direct Admission of Students Abroad
Dean, Academic	Dean, Academic
Dean, SW	Dean, Student Welfare
Degree	Bachelor's degree B.Tech./B.Arch.
DFB	Departmental Faculty Board
Direct Admitted Student	**A** student who is admitted directly and not through JEE (Main) and registered for undergraduate programme for full-time study leading to a Bachelor's degree.
DSC	Departmental Selection Committee
DUGC	Departmental Under Graduate Committee
ENTERPRISE RESOURCE PLANNING (ERP)	ERP is an Enterprise Application that allows institute staff and students to use a system of integrated applications to manage the Institute business and automate back-office functions related to technology, services and human resources.
Exchange Student	A student who is registered for a degree in a recognized Institution/University/organization in India or abroad and is officially sponsored by his/her parent institution to avail laboratory and other academic facilities or for attending a formal set of courses at MNIT Jaipur. OR An MNIT student sent to some other Institutions/Universities/R&D Organizations/Industriesto avail laboratory or other academic facility or to attend a formal set of courses at some other Institutions/Universities/R&D Organizations/Industries for research and academic

	collaboration.
ICCR	Indian Council for Cultural Relations
Institute	Institute shall meanMalaviya National Institute of Technology, Jaipur
JEE	Joint Entrance Examination
JoSAA	Joint Seat Allocation Authority
MCM	Merit cum Means
MEA	Ministry of External Affairs
MoE	Ministry of Education
Programme Advisor	A faculty member nominated by the Department to advise students on the courses to be taken by them and other matters related to the academic programme.
SC	Selection Committee
SC/ST/OBC	Scheduled Castes, Scheduled Tribes and Other Backward Classes as notified by the Central Government from time to time.
Scheme of Examination	Scheme of teaching and examination ofa branch of study as approved by the Senate.
Senate	Body constituted as per provisions mentioned in Clause 14 of NIT Act. Responsible for maintenance of instruction, education and examination in the Institute. Exercises such powers as vested in it by proviso 8 of NIT Statutes.
SGPA	Semester Grade Point Average.
Student	A student registered for a full-time undergraduate programme in the Institute
SUGB	Senate Under Graduate Board
UG	Undergraduate

This document has been prepared by the academic section for summarily presenting the rules/provisions by extracting relevant information from the Rules and Regulations Manual of the UG Programmes and other matters approved by the Senate of MNIT Jaipur. The students are advised to go through the complete information available at https://mnit.ac.in/academics/UG for finding exact rule position/provision.

1. INTRODUCTION

Malaviya National Institute of Technology Jaipur (MNIT Jaipur) was established as Malaviya Regional Engineering College (MREC) in 1963.It was declared as an Institute of National Importance by an Act of Parliament in 2007. MNIT Jaipur offers B.Tech./B.Arch., M.Tech.,M.Sc., MBAand PhD programmes through its various Departments and admits about 1600 UG, PG and Ph.D. students each year.

1.1 Academic Departments/Centres

The Academic Departments involved in running the various Undergraduate Programmes and teaching in the Institute are as follows:

- Architecture & Planning
- Chemical Engineering
- Chemistry
- Civil Engineering
- Computer Science & Engineering
- Electrical Engineering
- Electronics & Communication Engineering
- Humanities & Social Sciences
- Management Studies
- Mathematics
- Mechanical Engineering
- Metallurgical & Materials Engineering
- Physics

Centres:

- Centre for Energy and Environment
- Material Research Centre
- National Centre for Disaster Mitigation & Management

1.2 Undergraduate Programmes of study

Undergraduate programmes approved by the appropriate bodies of the Institute such as Senate/BoG, are offered in the Institute from time to time.The Undergraduate programmes currently offered by the Institute lead to Bachelor's degree in Technology

(B.Tech.) and Bachelor's degree in Architecture,(B.Arch.).Degrees are being offeredin the following fields:

(a) Bachelor of Technology (B.Tech.) - *4 years programmes (Duration: 8 Semesters)*

- Chemical Engineering
- Civil Engineering
- Computer Science and Engineering
- Electrical Engineering
- Electronics & Communication Engineering
- Mechanical Engineering
- Metallurgical & Materials Engineering

(b) Bachelor of Architecture (B.Arch.) - 5 years programme (Duration: 10 Semesters)

The number of seats in each branch of B.Tech./B.Arch. programmes are to be decided by the Senate as per the guidelines issued by theMinistry of Education from time to time.

2. ACADEMIC SESSION

The Academic Session normally begins in July and ends in May as per the academic calendar approved by the Senate. It is divided into two parts, namely, 'Odd semester' and 'Even semester'.

The actual date of the start of the semester is as per the approved academic calendar of the Institute.

Note*:* Academic Session of the First Semester students is decided on the basis of the counselling schedule of JoSAA/CSAB.

3. ACADEMIC CALENDAR

The exact dates of all the important events, such as orientation, registration, late registration, depositing of fee/late fee,commencement of classes, submission of documents, examinations, submissions of grades, vacation, mid-semester break, etc., during the Academic Session are specified in the **Academic Calendar**of the Institute which is approved by the Senate.

4. CURRICULUM

The academic programmes of the Institute follow the credit system. Details of the curriculum for the undergraduate programmes as approved by the Senate on the recommendations of SUGB.The curricular structure of the UG programmes has been revised recently and will be

applicable from the Academic Year 2022-23. The details of the revised curricular structure and revised teaching scheme have been given in the relevant sections of this document. The medium of instruction, examination and project reports is English. The Institute shall strive to design all programmes focusing on learning - based outcomes in order to ensure quality and technical competence of the students enrolled in a programme.

4.1 B.Tech. Programmes

The curriculum structure of the B.Tech. Programmes are divided into two distinct but compatible parts called Core Curriculum and Professional Curriculum. Each student is required to go through the Core Curriculum, irrespective of his/her chosen branch of specialization. It consists of a package of compulsory courses in Physics, Chemistry, Mathematics, Computing, Basic Electronics, Basic Electrical Engineering, Engineering Graphics, Environmental Studies, English, Economics, Management, Workshop Practice besides extracurricular activities which includePhysical Education, Creative Arts, NSS, etc., and a few other courses as approved by the Senate on the recommendations of the SUGB from time to time.

The Professional Curriculum is meant for the chosen branch of specialization. It consists of a set of Programme Cores which are compulsory courses, electives (Open as well as Programme specific), and project work besides courses in Humanities and Social Sciences. The Departments may also organize educational tours and training as part of the Professional Curriculum.

4.2 B.Arch. Programme

The B.Arch. Programme consists of professional courses along with the courses from Civil Engineering, Mathematics, Humanities, Social Sciences and Management. Educational tours and training are an integral part of the curriculum.

5. ADMISSION

Admission to any undergraduate B.Tech/B.Arch Programme requires theeligible applicant to go through the laid-down admission procedure and pay the prescribed fee for the respective programme.

5.1 Refund of Fees

The fees and other charges deposited by a FirstYear student will be refunded, after deducting applicable charges, if the student does not join the programme and leaves the Institute by applying for refund **on or before the date of registration,** The Institute shall refund the fee as per guidelines of Ministry of Education/JoSAA/CSAB/Institute etc.

Students shall be entitled for refund of Caution Money only if they leave the program after the date ofregistration.No fee shall be refunded in case a student is rusticated/suspended for a semester or his/her semester exams are cancelled on account of unfair means.

5.1.1 REFUND OF FEES IN CASE OF SEMESTER WITHDRAWAL

Fee refund policy of the students who are permitted Semester Withdrawal on Medical or any other ground is as follows:

S.No.	Category	Refundable amount
1.	The student has paid the semester fee but has not registered in the enrolled programme and applies forSemester Withdrawal.	Only the Tuition Fee shall be refunded.
2.	The student has paid the semester fee and registered in the enrolled programme and applies for Semester Withdrawal on Medical grounds prior to start of the Mid-Term Exam.	Only the Tuition Fee shall be refunded.
3.	The student has paid the semester fee and registered in the enrolled programme and applies for the Semester Withdrawal on Medical grounds after the start of Mid-Term Exam.	Fee shall not be refunded.
4.	The student has paid the semester fee and registered in enrolled programme and applies for Semester Withdrawal on other than Medical grounds.	Fee shall not be refunded.

5.1.2 REFUND OF FEES IN CASE OF NEW ENTRANTS

S.No.	Category	Amount of fee to be refunded
1.	In case a student registers in the allotted programme and withdraws on or before the last date specified for registration. His/her seat is included for admission in subsequent rounds by CSAB	Entire fee after deduction of Rs.1000/- as processing charge to be refunded
2.	In case a student registers in the allotted programme and withdraws after the last date specified for registration. His/her seat is not reported for SPOT round by CSAB and hence the seat remains vacant subsequently.	Only the caution money will be refunded
3.	In case a student registers in the allotted programme in SPOT round and withdraws during the prescribed registration dates of SPOT round.	No fee except the caution money will be refunded.
4.	In case a student registers in the allotted programme in SPOT round and withdraws during the prescribed registration dates of SPOT round.	No fee except the caution money will be refunded.

5.1.3 REFUND OF FEES IN CASE OF EXISTING STUDENTS WHO CHOOSE TO WITHDRAW FROM THE INSTITUTE

S.No.	Category	Amount of fee to be refunded
1	The student has neither paid the fee nor registered in the enrolled program and withdraws.	Caution money to be returned on submission of the 'No Dues'
2	The student has paid the fee but not registered in the enrolled programme and withdraws	Caution money and Semester Fee paid by the student to be refunded on the submission of the 'No Dues'
3	The student withdraws after paying the fee and registration in the enrolled program.	Only Caution money to be refunded on the submission of the 'No Dues'. However, Semester fee paid shall be forfeited.
4	In case a student not permitted to continue further due to non fulfilment of CGPA requirement/any other reason, has paid fees.	Caution money & Semester Fee paid to be refunded on submission of the No Dues

6. REGISTRATION

6.1 Registration Procedure

All students are required to register in person for each Semester for the courses to be pursued by them, as per the programme, on the dates specified in the Academic Calendar. ***The sole responsibility for registration rests with the student concerned.*** A student is required to register, in person, for each semester. The student is also required to register for the courses that he/she intends to pursue in that semester.

6.2 Late Registration

If, for any compelling reason like illness, a student is unable to register within the notified date(s) of registration, he/she will be allowed to register till the last date of registration specified in the Academic Calendar (which is about one week from the last date of notified period of registration) by depositing a late fee as decided by the Senate from time to time. In no case, the student will be permitted to register after the last date of registration.

If a student does not register in a semester, he/she will be required to take semester withdrawal and permitted to register in the subsequent semester only on payment of the penalty of Rs. 10,000/- + Institute Fee (excluding Tuition Fee) of the gap semester(s) for which the student has not registered for, in addition to the Institute Fee (as applicable) for the semester in which he/she is being registered.

7. TEACHING

7.1 First-Year Class Coordinator

The courses in the First Year shall be coordinated by a First-Year Class Coordinator appointed by the Dean, Academics. The First-Year Class Coordinator shall coordinate the time schedule for the First-Year classes and shall perform such other duties and exercises as assigned by the Dean Academics/Chairperson, SUGB, which are necessary for the organization of the courses, offered in the First Year.

7.2 Credit System

Evaluation procedure follows a model of credit system and a suitable grading system for the Undergraduate Programmes of the institute. A student shall be evaluated for his/her academic performance in a course through Class Work,Sessionals such as tutorials, practicals, home assignments, term papers, field work, seminars and quizzes, the Mid-Term Examination (MTE), and the End-Term Examination (ETE), as applicable according to the guidelines formulated by the SUGB for this purpose.

7.3 Course Credits

The academic programmes in the Institute shall be based on Semester System: Odd and Even Semesters in an academic year. In each semester a number of courses shall be offered as per the course structure approved by the Senate. Each course shall have an integer to denote the number of credits assigned to it which reflects the weightage of marks. The credits are calculated on the basis of the academic load of the course comprising of weekly contact hours of one or more components like lecture/tutorial/studios/design/laboratory classes.

8. EVALUATION SYSTEM

8.1 Continuous Assessment and Scheme of Examination

The evaluation of students in a course is a continuous process and is based on their performance in Class Work Sessionals (CWS), Mid-Term Examinations (MTE), and End-Term Examinations (ETE). The Class Work Sessional Exams shall include quizzes, tutorials, homework assignments, term papers, seminars, surprise tests/ class tests/ MCQ tests/ Open book tests/ Group activities, etc. and may be conducted by the Course Instructor/ Coordinator during the semester as per his/her course plan. Laboratory courses will have Practical Sessionals (PRS) such as practicals, field work, etc. and a Practical End Term Exam (PRE). The distribution of weightage of marks for each component shall be announced by the Course Coordinator at the beginning of the course. There shall be one Mid-Term Examination of one and a half hour duration. The duration of the End Term Examination (ETE) and the Practical

End Term (PRE) Examination shall be of two and a half hours. I**t is mandatory for a student to appear in all ETE and PRE.** The dates of the examinations are notified in the Academic Calendar. The time table of the examinations is notified by the respective Departments/Sections.

8.2 Evaluation Procedure

The Course Coordinator is responsible for setting the question paper and maintaining its secrecy, conducting the examination of a course, evaluating and awarding the grades. Complete transparency shall be maintained in the evaluation system.

The Course Coordinator/Instructor will ensure coverage of all the contents of a course taught during the semester. The End Semester Examination question paper shall cover all the sections of the course.

9. GRADING SYSTEM

9.1 Grades and Grade Points

Theacademic performance of a student shall be graded on a ten-point scale at the end of each semester. A teacher is the best judge in awarding the grades.Complete care,impartiality and transparency should be maintained while awarding grades. The student is awarded a letter grade in each of the course registered by him/her taking into account his/her performance in the various examinations, quizzes, assignments, laboratory work, etc., besides regularity of attendance in classes. The Institute follows absolute grading or statistical grading according to the number of the students registered in a particular course. The awards/grades are to be submitted to the Dean Academics within the prescribed time limit as announced in the Academic Calendar.

Academic Performance	Grades	Grade Points
Outstanding	AA	10
Excellent	AB	9
Very Good	BB	8
Good	BC	7
Average	CC	6
Below Average	CD	5
Marginal	DD	4
Fail Due to poor performance	FP	-
Fail Due to attendance shortage	FA	-

There are nine letter grades: **AA, AB, BB, BC, CC, CD, DD**,**FA and FP** that have grade points with values distributed on a 10-point scale. The letter grades and the corresponding grade points on the 10-point scale are as given in table above.

9.2 Statistical Method for the Award of Grades

The statistical method shall invariably be used if there are more than 30 registered students in the course. The statistical method may be used with marginal adjustment for natural cut off. The mean and standard deviation (σ) of marks obtained by all the students in a course shall be calculated. These values shall be used for awarding grades to the students as per table given below.

Lower Range of Marks	Grade Awarded, if marks falls in range	Upper Range of Marks
≥Mean + 1.5 σ	**AA**	
Mean + 1.0σ ≤	**AB**	< Mean + 1.5 σ
Mean + 0.5 σ ≤	**BB**	< Mean + 1.0σ
Mean ≤	**BC**	< Mean + 0.5 σ
Mean – 0.5 σ ≤	**CC**	< Mean
Mean – 1.0 σ ≤	**CD**	< Mean – 0.5 σ
Mean – 1.5 σ ≤	**DD**	< Mean – 1.0 σ
	FP	< Mean – 1.5 σ

9.3 Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA)

The letter grades awarded to a student in all the courses (except audit courses) shall be converted into semester and cumulative performance index called the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA).

The SGPA is an indicator of the overall academic performance of a student in all the courses that he/she has registered during a given semester. In the above computation, courses with S,X and letter grades (GNI) are ignored. Similarly, the CGPA indicates the overall academic performance of a student in all the courses registered and successfully earned credits up to and including the latest completed semester. It is computed in the same manner as the SGPA, considering all the courses.

10. ATTENDANCE, ABSENCE AND LEAVE

10.1 Attendance Requirement

All the undergraduate students are expected to be present in every lecture, tutorial/studio, practical or drawing classes scheduled for them. An undergraduate student must have a minimum attendance of **seventy five percent** (75%) of the total number of classes including lectures, tutorials and practical held in a course in order to be eligible to appear in the End-Term Examination for that course. **A student should meet the above attendance requirement irrespective of the number of days he/she is on medical and/or other leave for any reason whatsoever.** Attendance of the students shall be monitored and displayed during a semester as per the guidelines approved by the SUGB.

The names of the students who have remained absent with or without leave, for more than 25% of the actual classes held in a course will be intimated by the Course Coordinator to the Convener, DUGC/First Year Class Coordinator on the last teaching day of the semester. The consolidated list of all such students for all the courses in a particular semester will be displayed on the notice board of the Department/Academic Section. The list of such students shall also be forwarded to the Dean, Academics. These students shall not be allowed to appear in the End-Term Examination of that course and shall be awarded FA grade irrespective of their performance in Class Work Sessional(CWS)/Mid-Term Examination (MTE), etc.

10.2 Absence in End Term / Mid Term Examination

If a student is absent during End-Term Examination of a course due to medical reasons (supported by Medical Certificate)or other special circumstances, he/she may apply for the award of 'I' grade to the Convener, DUGC of the concerned Department offering the course, through the Course Coordinator provided that he/she has attended at least 75% of the classes held. The Convener, DUGC in consultation with Course Coordinator/Instructors may grant this request under intimation to the Academic Section. A second examination shall be held normally within ten days of the last day of End-Term Examination to convert 'I' grade to proper letter grade not exceeding 'BB'. A student, who fails to appear in the Mid-Term Examination due to sudden illness (supported by Medical Certificate) or mishap/accident, may be allowed to take another examination within one week of the last date of MTE with intimation to Convener, DUGC. Such exam should be conducted only for 75% of the marks of the original Mid-Term Exam.

The application for the second examination on medical grounds should be supported by a Medical Certificate of the Institute Medical Superintendent, or in his/her absence, by the Medical Officer of the Institute. If, however, a student is outside the Campus at the time of

illness or a mishap/accident, his/her application should be supported by a Medical Certificate issued by a Medical Officer of the rank of the Deputy Chief Medical Officer or above, of the concerned District.

10.3 Semester Withdrawal

A student who is unable to attend classes for more than four weeks in a semester, may apply to the Dean, Academics through Convener DUGC, for withdrawal from the semester, which shall mean withdrawal from all the registered courses in the semester. However, such application shall be made under the advice of the Programme Advisor, as early as possible and latest before the start of the End-Term Examination. Partial withdrawal from the semester shall not be allowed. A student will be permitted for semester withdrawal only twice in the entire duration of his/her programme.

10.3.1 Semester withdrawal on Medical Grounds

In case the period of absence on medical grounds is more than twenty working days during the Semester, a student may apply for withdrawal from the semester, if he/she so desires. Such an application must be made to the Dean, Academics through Convener DUGC, under the advice of the Programme Advisor, as early as possible and latest before the beginning of End Term Examination. Any application on medical grounds shall be accompanied with a medical certificate from the Institute Medical Officer. A certificate from a registered medical practitioner containing the registration number may also be accepted in those cases where a student is normally residing off campus or becomes ill while away from the Institute.

11. ACADEMIC PERFORMANCE REQUIREMENT

11.1 CREDIT REQUIREMENT

A student is required to earn the credit requirement as per the respective programme to be eligible for the award of the degree. The credits for the courses in which a student has obtained 'DD' grade (minimum passing grade for a course) or higher, shall be counted as credits earned by him/her.

11.2 Maximum and Minimum Duration

(a) The minimum and maximum duration permitted for each academic programme will be determined in terms of the number of registered regular semesters, hereafter called registered semesters. Any semester in which a student has registered for a course will be called a registered semester subject to the following:

i. Only the First and Second semesters of an academic year can be registered semesters.

ii. A semester, when a student has been granted semester withdrawal or granted semester leave, will not be considered as a registered semester.

iii. The semester when a student is suspended from the Institute on disciplinary grounds will not be counted towards the number of registered semesters.

iv. A semester in which a student is allowed by the Institute to undergo semester-long internship will be counted as a registered semester.

(b) The minimum and the maximum permissible number of registered semesters for completing all degree requirements are defined in table below

Academic programme	Minimum number of registered semesters	Maximum number of registered semesters
B.Tech.	8	14
B.Arch.	10	16

The maximum duration for a student for complying with the degree requirement is EIGHT years (NINE years for B.Arch.) from the date of first registration for his/herFirst Semester.

11.3 Academic Requirement

Minimum requirements for continuation of registration, termination/year-back, probation and warning

A student is expected to earn a minimum number of credits, as specified in table below, at the end of the First Year in order to continue registration. If a student does not meet this criterion, his/her performance is classified as "Academically Deficient", and he/she may opt to start the programme afresh in the First Year and put on the Year-Back, or else his/her registration will be terminated. The option of 'Year Back' is available only once in the First Year.

Check Point	Earned Credits (including earned in Supplementary Examination)	Decision	Remark
At the end of First Year	≥30	Allowed to register in the next semester	Minimum credits for Continuation of Registration
	<30	Year Back (Once only in the First Year)/Termination	Academically deficient

a) If a student chooses Year-Back option after the First Year, then his/her credits earned and semesters registered will be carried over. The Year-Back option will be permitted only once in the First Year. If at the end of the First Year after Year-Back, the earned credits are less than 30, the registration of the student will be terminated.

b) Each student is expected to earn at least 15 credits in each registered semester. If the performance of a student at the end of any registered semester is below this minimum acceptable level, then he/she will be placed on probation, a written warning shall be given to him/her and a written intimation will be sent to the parents by the Academic Section.

c) A student placed on probation shall be monitored by ensuring attendance in classes, giving special tutorials and mentoring. The academic performance of each academically deficient student is monitored by a Mentor/Senior Faculty.

d) From the Second Year onwards if the performance of a student on probation does not meet the criterion mentioned in item (b), the student would be terminated except if permitted to register by the Dean, Academics on the favourable recommendation by Mentor-Senior Faculty. The Mentor's recommendation shall be prepared after consultation with the student, and should include:

   (i) feasibility of completing the programme requirements and

   (ii) Identification of remedial measures for the problems that have led to the poor performance of the student.

The registration of any student will be limited to a minimum of 15 credits and a maximum of 30 credits except Final Year.

12. TERMINATION OF ENROLMENT TO THE PROGRAMME

12.1 General

The enrolment of the undergraduate programme (B.Tech& B.Arch.) of a student may be terminated by the Senate if he/she is:

(a) a First Year student, who has continuously been absent from classes for more than four weeks without authorized leave,

(b) a student who is absent without authorized leave of absence for a major part of the semester and does not appear in the end-semester examination of the courses in which he/she is registered,

(c) a student who fails to report and register by the last date of registration,

(d) a student, who is on academic probation and fails to satisfy the conditions thereof in a particular semester,

(e) a student who has not reported and registered in the Institute for more than 2 Semesters

(f) a student who involves himself/herself, in violation of the code of conduct, in ragging, etc., and is punished on disciplinary grounds, in accordance with the Code of Conduct for the students.

The Course Coordinator shall bring it to the notice of Head of the concerned Department/First Year Class Coordinator the as the case may be, for information to the Academic Section. The names of such students should be removed from Institute rolls. The communication regarding termination of enrolment shall be issued by the Academic Section on the recommendation of APEC.

12.2 APPEAL against Termination

A student, whose enrolment has been terminated, may appeal to the Chairperson, Senate giving fresh reasons for reconsideration within fifteen days from the date of issuance of the communication of termination and the appeal will be disposed of within fifteen days. If the appeal is considered, his/her registration and enrolment shall be restored.

13. CONDUCT AND DISCIPLINE

13.1 Code of Conduct

Each student shall conduct himself/herself in a manner befitting his/her association with an Institute of national importance. He/she is expected not to indulge in any activity, which is likely to bring down the prestige of the Institute. He/she should dress appropriately, show due respect and courtesy to the teachers, administrators, officers and employees of the Institute, and maintain good neighbourly behaviour to fellow students. Due attention and courtesy is to be paid to visitors to the Institute and residents of the Campus.

Lack of courtesy and decorum, unbecoming conduct (both within and outside the Institute), damage and/or removal of Institute property or belongings of fellow students, disturbing others in their studies, adoption of unfair means during examinations, breach of rules and regulations of the Institute, noisy and unseemly behaviour and similar other undesirable activities shall constitute violation of the Code of Conduct for students.

Ragging in any form is strictly prohibited and considered a serious criminal offence and violation of the Code of Conduct. Involvement of a student in ragging may lead to his/her expulsion from the Institute.

13.2 Disciplinary Action and Related Matters

Violation of the Code of Conduct shall invite disciplinary action which may include punishment such as reprimand, disciplinary probation, fine, awarding Black dots, debarring from examinations, withdrawal of scholarship and/or placement services, withholding of grades and/or degrees, cancellation of registration, and even expulsion from the Institute.

13.2.1 Unfair Means

No candidate shall use unfair means or indulge in disorderly conduct at or in connection with examinations.If a student is detected using unfair means,the Course Coordinator/ Instructor of a course shall bring the matter to the notice of the Dean, Academics along with supporting evidenceto debar the student from the examination in which he/she is found guilty. All such cases shall be looked into by a standing Committee (Unfair Means Committee).

Here "candidate" means an examinee taking an examination and "examination" means any examination, Mid-Term, End-Term, quizzes, practical exam, which are considered as part of assessment/evaluation by the instructor while awarding grades in a subject.

Unfair Means shall include the following:

1. During examination time having in possession or access to:
    a. Any paper, book, notebook or any other unauthorised material which has relevance to the syllabus of the examination paper concerned.
    b. Mobile phones or any electronic gadget other than calculator, even in switch off mode, which can potentially be used for communication or copying.
    c. Anything written on any other instrument or any kind of furniture or any other substance which may have relevance to the syllabus of the examination paper concerned.
    d. Anything written or signs made on the body of the candidate or his/her clothes/garments, handkerchief, etc., which may have relevance to the syllabus of the examination paper concerned.
    e. Anything written on the question paper which may have relevance to the syllabus of the examination paper concerned.
2. Giving or receiving assistance in answering the question papers to or from any other candidate/person in the examination hall or outside during the examination hours.
3. Talking to another candidate or any unauthorised person inside or outside the examination room during the examination hours without the permission of the invigilating staff.
4. Swallowing or attempting to swallow or destroying or attempting to destroy a note or paper or any other material.
5. Impersonating any candidate or getting impersonated by any person for taking the examination.

13.3 PUNISHMENT

A candidate found using unfair means or involved in disorderly conduct or disturbing other candidates, at or in connection with an examination shall be referred to the Unfair Means Committee. The Committee after consideration of the case as referred to it by the

Instructor/invigilator can award punishment to the concerned student. The punishment awarded by this Committee will be in addition to the punishment that may have been already awarded by the CourseCoordinator with one or more of the following:

1. Cancellation of the examination of the paper in respect of which he/she is found to be guilty; and/or
2. Cancellation of the examination of the semester examination for which he/she was a candidate and/or debarring from examination for future semester(s).
3. Any other punishment deemed suitable by the Committee.

14. New UG Curricular Structure and Scheme (to be implemented from Academic Year 2022-23)

All UG students are required to earn predetermined credits through mandatory core courses in the areas of basic sciences, humanities and social sciences, and engineering sciences apart from departmental core and elective courses mostly from the core engineering discipline. Few credits are to be earned through elective courses from basic sciences, humanities and social sciences, and engineering sciences as well as other engineering disciplines to develop some inter-disciplinary knowledge base. An employer usually expects that the student is able to demonstrate ability in solving a complex problem through in-depth knowledge from own discipline as well as allied courses.

Following are the requirements of different stakeholders:

A. Employers in the core areas require that the students may be trained more comprehensively in one domain of the parent department, compared to other sub-domains so as to extract maximum benefits from new recruits.

B. On the other hand, few experts have suggested to train the students in disciplines other than the core discipline.

C. The students of the institute join PG courses in IITs and abroad. It is felt that the students will have an edge over other students if they can opt for multidisciplinary research. The option of multidisciplinary research will also provide them more options for future studies as well as for placement opportunities.

D. Many students have started opting for 6 months/yearlong internships. It is desirable to complete the important courses of the core discipline before the students proceed for their respective internship.

E. It is felt that there is a need to bring innovation at the UG level and introduce a flexible academic structure. The students are allotted a branch on the basis of their merit in the JoSAA/CSAB. However, the student may have a spark in other areas also. It will be a good step to allow students to explore other areas as well.

F. Majority of the students at the Institute appear for GATE/IES examination for placement opportunities as well as to pursue higher studies (through GATE). It is a constant demand of the students that the curricular structure shall be such that most of the syllabus for these examinations is covered through various courses during their study.

G. Recently, the National Education Policy (NEP2020) has been implemented which requires that the students may be given multiple exit options. It is necessary that the students are sufficiently trained at the end of different periods so as to ensure sufficient learning of different courses up to the desired level.

Keeping in view the above requirements as well as to fulfil the requirement to update the teaching scheme at regular intervals, the UG credit structure and scheme has been revised after the provisional approval of the Senate of MNIT Jaipur. Following are the salient features of the new scheme:

- It is important to provide an opportunity to the students to learn significantly, and thus specialize to some extent, in any area of his/her choice. This is being offered through Honors and Minor Specialization to earn specialization in parent discipline and outside the parent discipline/programme, respectively. Honors courses are either advanced level courses in parent discipline or are courses designed to give more exposure of a specific area out of the different areas of the parent discipline. Honors courses help to get deeper knowledge in the department to better prepare a student for higher studies or to take a job in a certain specialized area. A UG programme introduces students to a wide breadth of topics and challenges, and an Honors program is intended to explore a chosen area/topic in much greater depth.
- On the other hand, it may be good to get opportunities in the field other than the parent department which can enable a student to work/take part in interdisciplinary research. This can be achieved through minor specialization which can not only add value to the core degree but can also open opportunities in the field of minor specialization.
- Total credits to be earned for basic UG degree has been lowered. The focus here is to cover the important technical courses of the parent department. However, as the student having interest in different areas will have the option of choosing a minor specialization out of the multiple such options, the requirement of imparting interdisciplinary and broad-based education will be fulfilled. In addition to that, only

interested students will be choosing the minor specialization and hence less interested students will be required to only complete the necessary courses as per the requirement of respective programmes.

- The discipline specific courses have been introduced right at the entry level of the UG programme (I semester onwards).

The credit structure of the UG scheme is given in the table below:

<table>
<tr><th rowspan="2">Course type</th><th colspan="3">Credits</th></tr>
<tr><th>B. Tech. Only</th><th>B. Tech. with Honors</th><th>B. Tech. with Minor Specialization</th></tr>
<tr><td>Total Credits (as per respective UG Program)</td><td>178 – 184</td><td>196 – 202</td><td>196 – 202</td></tr>
<tr><td>Institute core</td><td>36#</td><td rowspan="4">Same as for B.Tech. only programme</td><td rowspan="4">Same as for B.Tech. only programme</td></tr>
<tr><td>Basic Sciences</td><td>16</td></tr>
<tr><td>Fundamental Engg. (EAS)</td><td>15</td></tr>
<tr><td>Humanities & Social Science</td><td>5</td></tr>
<tr><td>Discipline specific courses</td><td>121 – 139</td><td>124 – 142 + 18**</td><td rowspan="5">Same as for B.Tech. only programme</td></tr>
<tr><td>Programme core</td><td rowspan="3">109 – 136</td><td rowspan="3">124 - 154</td></tr>
<tr><td>Programme elective</td></tr>
<tr><td>Advance elective</td></tr>
<tr><td>Project</td><td>3 – 12</td><td>3 – 12 + (0 – 3)**</td></tr>
<tr><td>Management</td><td>3</td><td>3</td><td></td></tr>
<tr><td>Other courses</td><td>9 – 21</td><td rowspan="3">Same as for B.Tech. only programme</td><td>9 – 21 + 18**</td></tr>
<tr><td>Open electives</td><td>6</td><td rowspan="2">As per detail of minor program</td></tr>
<tr><td>Programme linked EAS/BS</td><td>3 – 15</td></tr>
</table>

**: For Honors/Minor program as applicable

A. Two projects have been proposed in the new scheme. The minor project (3 credits) will be carried out during VII semester while major project will be carried out during VIII semester (6 – 9 credits). Minor project will be compulsory for all students of the department. Major project will be optional for B.Tech. only program, and the student may earn the required credits against major project through elective courses offered by the parent department. However, students opting for Honors/ Minor Specialization/Internship have to compulsorily register for major project in VIII semester.

B. A student will be allowed to register for 2 additional theory courses beyond the regular courses in a particular semester.

C. The students will have the option to choose from a basket of multiple sub-domains within the parent department (through Honors) or sub-domains of departments other than the parent department (Minor Specialization).

D. Requirements for Honors and Minor Specialization programs

i. Honors and Minor programs start from V Semester.

ii. Minimum CGPA requirements for registration shall be 7.50 at the end of IV semester. Students of a department will be allowed to register for Honors program offered by their parent department, while students of a department will be allowed to register for Minor program offered by any other department.

iii. Number of additional credits shall be 18 with 6 courses (or 5 courses + 1 mini project of 3 credits) as prescribed by the department offering Honors/Minor program.

iv. The student will be required to plan registration for Honors/Minor program courses, in order to complete all the six courses by the end of VIII semester.

v. Maximum number of students enrolled in any course of a Minor program shall be 30. The allotment of students in the minor program shall be on the basis of CGPA.

vi. The student will not be allowed to continue/register for Honors/ Minor specialization if his/her CGPA falls below 7.50. In case, his/her CGPA improves to 7.50 or higher in subsequent semester(s), he/she may be allowed to continue.

vii. Students should be prepared to write more than one exam in a day.

E. After successful completion of the requirements of the Honors program, the student will be awarded a degree in "name of the discipline" with "Honors" (e.g. Bachelor of Technology in Civil Engineering with Honors or Bachelor of Technology in Mechanical Engineering with Honors etc.).

F. After successful completion of the requirements of the Minor program, the student will be awarded a degree in "name of the discipline" with minor specialization in "name of the minor specialization" (e.g. Bachelor of Technology in Electrical Engineering with Minor Specialization in Environmental Engineering or Bachelor of Technology in Computer Science and Engineering with Minor Specialization in Quantum Mechanics etc.).

G. Students will have following exit options:

S. No.	Exit option with	Eligibility Condition
1	Diploma Certificate	After successfully completing all courses of I to IV semesters or The student has earned 100 credits through graded courses
2	B.Sc. (engg.) Degree	After successfully completing all courses of I to VI semesters or

		The student has earned 142 credits through graded courses
3	B.Tech. Degree	After successfully completing all courses of I to VIII semesters

H. Maximum duration of completing a B.Tech. program shall be 6 years (12 semesters) from initial registration excluding semester withdrawals, if the student has not exercised any exit option and has completed his registration in every semester. The corresponding duration for B.Arch. program shall be 7 years (14 semesters).

I. Maximum duration of completing a B.Tech. program shall be 8 years (16 semesters) from initial registration excluding semester withdrawals, for students who have exercised any exit option given in table 3 above. The corresponding duration for B.Arch. program shall be 9 years (18 semesters).

The provisionally approved UG scheme as well as approved courses of study and syllabus for I year UG programs has been given here.

MNIT Jaipur

Courses of Study

Under Graduate Programmes

2022-2023

MNIT Jaipur

Courses

and

Syllabus

for

I Year B.Tech.

(Common to all branches)

List of Institute Core Courses:

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I / II	22CYT101	Engineering Chemistry	CORE	Theory	3	2	1	0
2	I / II	22CYP102	Engineering Chemistry Lab	CORE	Practical	1	0	0	2
3	I / II	22MAT101	Mathematics I	CORE	Theory	4	3	1	0
4	I / II	22MAT102	Mathematics II	CORE	Theory	4	3	1	0
5	I / II	22PHT101	Classical Physics *	CORE	Theory	3	2	1	0
		22PHT102	Modern Physics *						
6	I / II	22PHP103	Classical Physics Lab *	CORE	Practical	1	0	0	2
		22PHP104	Modern Physics Lab *						
7	I / II	22EET101	Basic Electrical and Electronics Engineering	CORE	Theory	3	3	0	0
8	I / II	22EEP102	Electrical Engineering Lab	CORE	Practical	1	0	0	2
9	I / II	22ECP101	Electronics Engineering Lab	CORE	Practical	1	0	0	2
10	I / II	22CET101	Engineering Drawing and Sketching	CORE	Theory	2	1	1	1
11	I / II	22CET102	Environmental Science	CORE	Theory	2	2	0	0
12	I / II	22CST101	Programming with Python	CORE	Theory	2	2	0	0
13	I / II	22CSP102	Programming with Python Lab	CORE	Practical	1	0	0	2
14	I / II	22MET101	Introduction to Mechanical Systems	CORE	Theory	2	2	0	0
15	I / II	22MEP102	Product Realization through Manufacturing	CORE	Practical	1	0	0	2
16	I / II	22HST101	Basic Economics	CORE	Theory	2	2	0	0
17	I / II	22HST102	English Communication Skills (Basic) *	CORE	Theory	2	2	0	0
	I / II	22HST103	English Communication Skills (Advanced) *						
18	I / II	22HSP104	Communication Skills lab (Basic) *	CORE	Practical	1	0	0	2
	I / II	22HSP105	Communication Skills lab (Advanced) *						

Notes:

1. *In addition to the Institute core courses, the UG students will be required to study few program core courses also as per their UG program. Please check* ***Annexure A*** *for details of program core courses*
2. *(*) The students will be required to pursue only one of the two courses mentioned at serial No. 5, 6, 17 & 18.*

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
DEPARTMENT OF CHEMISTRY

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CYT101	**Engineering Chemistry**	**3**	**2**	**1**	**0**	**0**

PREREQUISITE

Basic knowledge about inorganic saltsand chemical analysis

COURSE OBJECTIVE(s)

Engineering Graduates will be able to:	
1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to solve complex engineering problems.
2	**Problem analysis:** Identity, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using the first principles of mathematics, natural sciences, and engineering sciences.
3	**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, societal, and environmental considerations.
4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods, including the design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5	**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.
6	**The engineer and society:** Apply to reason informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7	**Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge and need for sustainable development.
8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and team work:** Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's work as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	**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.

COURSE OUTCOME:

CO1	Understand the fundamentals of water chemistry and novel treatment procedures of wastewater from domestic and industrial sources
CO2	Understand the fundamentals of solid/liquid/gaseous fuels and non-conventional energy sources, and the methods to extract maximum energy from fuels
CO3	Understand the basics of lubrication, types of lubricants and their applications, and the essentials to develop highly efficient lubricants
CO4	Understand the New Engineering Materials and their applications in advanced engineering solutions
CO5	Understand the concepts of corrosion and techniques to control corrosion
CO6	Understand the chemical structures of materials and appreciate their design in advanced functional materials useful in energy applications for a sustainable future.
CO7	Understand and apply spectroscopic techniques to advanced engineering problems

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the three components;

S. No.	Component	Weightage
a)	Tutorial Evaluation/Assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Lecture Plan (Hrs.)	Course Content
Unit 1 (8 L)	**Water and its treatment:** Hardness, types of hardness, Units of hardness, and methods of estimation of hardness. **Removal of Hardness (Softening Methods):** Lime Soda process, Permutit or Zeolite process and Deionization or Demineralization process. **Municipal Water Supply:** Purification of water by various methods, Detailed study of methods of Disinfection, Removal of heavy metals from industrial wastewater.
Unit 2 (2 L)	**Lubricants:** Introduction of lubricants and lubrication. Types of the mechanism of lubrication, Uses, and properties of lubricants viz. Viscosity & Viscosity index.
Unit 3 (4 L)	**Fuels and Combustion:** Classification and Properties of fuels, Calorific value Petroleum: refining and fractional distillation of crude petroleum, Cracking, Synthetic petrol, Knocking, Anti-knocking Agents, octane and cetane number. Gaseous fuels and hydrogen fuels.
Unit 4 (3 L)	**New Engineering Materials:** Organic/hybrid photovoltaic materials, Conducting Polymers, Introduction to nanotechnology and nanomaterials (fullerenes and quantum dots).
Unit 5 (4 L)	**Corrosion:** Introduction, theory, and mechanism of of Corrosion, galvanic and differential aeration corrosion, various preventive measures to control Corrosion.
Unit 6 (3 L)	**Advanced electrochemical systems:** Introduction to Energy Storage devices, Li-ion batteries, redox flow batteries, Fuel cells, H_2-O_2 fuel cells.
Unit 7 (4 L)	**Spectroscopy:** Introduction, Classification, and Applications. Ultraviolet-Visible, Infra-Red, and Nuclear Magnetic Resonance Spectroscopy.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

Recommended Text Books	1. Engineering chemistry: A Text book by P.C. Jain, DhanpatRai& Sons. 2. A Text book of Engineering chemistry by Shashi Chawla, Dhanpat Rai and Sons. 3. Engineering chemistry: A Text book by S.S. Dara, S. Chand & Co. 4. Solid State Chemistry and its Applications by Anthony R. West, Wiley 2014 5. Modern Batteries by C.A. Vincent and B. Scrosati, Elsevier 1997. 6. P.S. Kalsi, Spectroscopy of Organic Compounds, New Age International (P) Ltd. Publishers 7. Fundamentals of molecular spectroscopy by Colin Banwell and Elaine McCash, Tata McGraw Hill Education Pvt. Ltd.

LECTURE PLAN

Lecture No.	Topics to be covered
L1-L8	**Water and its treatment:** Hardness, types of hardness, Units of hardness, and methods of estimation of hardness. **Removal of Hardness (Softening Methods):** Lime Soda process, Permutit or Zeolite process and Deionization or Demineralization process. **Municipal Water Supply:** Purification of water by various methods, Detailed study of methods of Disinfection, Removal of heavy metals from industrial wastewater.
L9-L10	**Lubricants:** Introduction of lubricants and lubrication. Types of the mechanism of lubrication, Uses, and properties of lubricants viz. Viscosity & Viscosity index.
L11-L14	**Fuels and Combustion:** Classification and Properties of fuels, Calorific value Petroleum: refining and fractional distillation of crude petroleum, Cracking, Synthetic petrol, Knocking, Anti-knocking Agents, octane and cetane number. Gaseous fuels and hydrogen fuels.
L15-L17	**New Engineering Materials:** Organic/hybrid photovoltaic materials, Conducting Polymers, Introduction to nanotechnology and nanomaterials (fullerenes and quantum dots).
L18-L21	**Corrosion:** Introduction, theory, and mechanism of Corrosion, galvanic and differential aeration corrosion, various preventive measures to control Corrosion.
L22-L24	**Advanced electrochemical systems:** Introduction to Energy Storage devices, Li-ion batteries, redox flow batteries, Fuel cells, H_2-O_2 fuel cells.
L25-L28	**Spectroscopy:** Introduction, Classification, and Applications. Ultraviolet-Visible, Infra-Red, and Nuclear Magnetic Resonance Spectroscopy.

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR
DEPARTMENT OF CHEMISTRY

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CYP102	**Engineering Chemistry Laboratory**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

Basic knowledge about inorganic saltsand chemical analysis

COURSE OBJECTIVE(s):

1	To impart the knowledge of the processes of chemical analysis.Identification of product purities/impurities
2.	To connect real the real life problems to solutions that could be obtained from Chemistry experiments
3.	To provide a rational scientific understanding of some concepts learnt in the theory course

COURSE OUTCOME(s):

CO1	To do laboratory experiments in physical, inorganic, organic and analytical chemistry to understand the principle and theory behind each experiment
CO2	The capability to apply the principles of chemistry experiments to solve real engineering problem

T1: PRS: attendance (10 marks) + record (10 marks) + Quiz (40 marks) = 60 Marks
T2: PRE: Final examination inc. viva (exam (30 marks) + Viva (10 marks) = 40 Marks

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Tutorial Evaluation (Assignments and Records)	20%
b)	Mid-term examination (Quizzes)	40%
c)	End of the Semester Practical Examination (Viva)	10%
d)	End Semester Practical Examination	30%

Course Description:	
S. No.	**Name of the Experiment**
1.	To estimate the strength in g/L of a given unknown solution of potassium dichromate ($K_2Cr_2O_7$) by titrating it with ferrous ammonium sulphate (FAS) using diphenylamine as an internal indicator (Redox Titration)
2.	To estimate the strength in g/L of a given unknown solution of potassium dichromate ($K_2Cr_2O_7$) by titrating it with ferrous ammonium sulphate (FAS) using potassium ferricyanide as an external indicator (Redox Titration)
3.	To determine the total alkalinity of water (NaOH & Na_2CO_3)
4.	To determine the amount of various oxidizing agents iodometrically ($CuSO_4$)
5.	To determine the percentage of available chlorine in given sample of bleaching powder
6.	To determine hardness of Water by EDTA method
7.	Analysis of ores and alloys a) Estimation of iron in plain carbon steel b) Estimation of iron in hematite ore
8.	Synthesis of Urea-Formaldehyde Resin
9.	Synthesize of Thiocol rubber
10.	Estimation of concentration or unknown compound by using colorimetric method.
11.	Estimation of iodine in iodized common salt using iodometry
12.	pH –metric estimation of acid and base
13.	Extraction of caffeine from tea leaves.
14.	Determination of viscosity of oil by Redwood viscometer
15.	To determine the dissolved oxygen content of given water sample by Winkler's method
16.	To determine total moisture content, volatile matter, ash content and fixed carbon in a given coal sample by proximate analysis
17.	Determination of coefficient of viscosity of unknown liquid by Ostwald viscometer
18.	To determine the flash point and fire point of given oil by Penskey- Marten's apparatus

Lecture Plan:

Week Number	Name of the Experiment
1.	To estimate the strength in g/L of a given unknown solution of potassium dichromate ($K_2Cr_2O_7$) by titrating it with ferrous ammonium sulphate (FAS) using diphenylamine as an internal indicator (Redox Titration)
2.	To estimate the strength in g/L of a given unknown solution of potassium dichromate ($K_2Cr_2O_7$) by titrating it with ferrous ammonium sulphate (FAS) using potassium ferricyanide as an external indicator (Redox Titration)
3.	To determine the total alkalinity of water (NaOH & Na_2CO_3)
4.	To determine the amount of various oxidizing agents iodometrically ($CuSO_4$)
5.	To determine the percentage of available chlorine in given sample of bleaching powder
6.	To determine the hardness of Water by the EDTA method
7.	Analysis of ores and alloys a) Estimation of iron in plain carbon steel b) Estimation of iron in hematite ore
8.	Synthesis of Urea-Formaldehyde Resin
9.	Synthesize of Thiocol rubber
10.	Estimation of concentration or unknown compound by using colorimetric method.
11.	Estimation of iodine in iodized common salt using iodometry
12.	pH –metric estimation of acid and base
13.	Extraction of caffeine from tea leaves.
14.	Determination of viscosity of oil by Redwood viscometer
15.	To determine the dissolved oxygen content of given water sample by Winkler's method
16.	To determine total moisture content, volatile matter, ash content and fixed carbon in a given coal sample by proximate analysis
17.	Determination of coefficient of viscosity of unknown liquid by Ostwald viscometer
18.	To determine the flash point and fire point of given oil by Penskey- Marten's apparatus

Reference Books	1. Laboratory Manual on engineering chemistry by S.K. Bhasin & Sudha Rani, Dhanpat Rai Publishing Company, New Delhi. 2. A text book of Practical chemistry by K. D. Gupta & K.K. Saxena University Press, Jaipur.

DEPARTMENT OF MATHEMATICS

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MAT101	**Mathematics-I**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE

Single Variable Calculus

COURSE OBJECTIVE(s)

To provide essential knowledge of basic tools of Matrix Algebra, Differential Calculus, Integral Calculus and Vector Calculus.

COURSE OUTCOMES

CO1	Be able to apply the concepts of matrices in solving system of linear equations, finding eigen values and eigen vectors, and diagonalization.
CO2	Be able to evaluate partial derivatives and apply for extrema of multivariable function.
CO3	Be able to carry out various integral calculations and work with applications of multiple integrals.
CO4	Be able to find physical meaning of vector differentiation, gradient, divergence, curl and directional derivative.
CO5	Be able to apply Integrals: Green's, Gauss and Stokes' theorem to evaluate vector integrals.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Matrix Algebra: Rank of a matrix, Solution of linear simultaneous equations. Eigenvalues and Eigenvectors of a matrix, Cayley- Hamilton theorem (Statement only), Diagonalization of a matrix.

Differential Calculus: Functions of two variables: Limit, Continuity, Partial derivatives, Euler's theorem on homogeneous functions, Chain rule, Jacobians, Taylor's theorem for two variables (Statement only), Error approximations. Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers.

Integral Calculus: Review of curve tracing, Double and Triple integrals, Change of order of integration. Change of variables. Gamma and Beta functions. Applications of Multiple integrals.

Vector Calculus: Differentiation of vectors, gradient, directional derivative, divergence, curl and their physical meaning. Identities involving gradient, divergence and curl. Line integrals. Green's, Gauss and Strokes' theorem (Statement only) and their applications.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Advanced Engineering Mathematics: Kreyszig E, Wiley, 2011.
2. Advanced Engineering Mathematics: Jain R.K. & Iyengar S.R.K., Narosa Publishing House, 2016.
3. Thomas' Calculus: Hass J., Heil C. & Weir M.D., Pearson Education, 2018.
4. Advanced Engineering Mathematics: Zill D.G. & Wright W.S., Viva, 2011.
5. Advanced Engineering Mathematics: O'Neil P.V.,Cengage Learning, 2017.
6. Higher Engineering Mathematics: Grewal B.S., Khanna Publishers, 2021.

LECTURE PLAN

Lecture No.	Topics to be covered
8	**Matrix Algebra:** Rank of a matrix, Solution of linear simultaneous equations. Eigenvalues and Eigenvectors of a matrix, Cayley- Hamilton theorem (Statement only), Diagonalization of a matrix.
10	**Differential Calculus:** Functions of two variables: Limit, Continuity, Partial derivatives, Euler's theorem on homogeneous functions, Chain rule, Jacobians, Taylor's theorem for two variables (Statement only), Error approximations. Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers.
12	**Integral Calculus:** Review of curve tracing, Double and Triple integrals, Change of order of integration. Change of variables. Gamma and Beta functions. Applications of Multiple integrals.
10	**Vector Calculus:** Differentiation of vectors, gradient, directional derivative, divergence, curl and their physical meaning. Identities involving gradient, divergence and curl. Line integrals. Green's, Gauss and Strokes' theorem (Statement only) and their applications.

DEPARTMENT OF MATHEMATICS

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MAT102	**Mathematics-II**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE

Mathematics I

COURSE OBJECTIVE(s)

To provide knowledge of essential mathematical tools used in solving ordinary and partial differential equations, initial and boundary value problems.

COURSE OUTCOMES

CO1	Be able to find solutions (including series solution) of the ordinary differential equations.
CO2	Be able to find solution of partial differential equations of first and second order.
CO3	Be able to express a function in terms of Fourier series.
CO4	Be able to apply Laplace and Fourier Transforms.
CO5	Be able to apply above as encountered in various engineering problems.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Ordinary Differential Equations: Solution of linear differential equations with constant coefficients using operator method. Euler-Cauchy equations, Solution of second order differential equations by changing dependent and independent variables. Method of variation of parameters, Introduction to series solution method about an ordinary point.

Partial Differential Equations: Formation of first and second order partial differential equations. Solution of first order partial differential equations: Lagrange`s equation, Charpit's method. Linear partial differential equations with constant coefficients.

Laplace Transform: Laplace and inverse Laplace transform of some standard functions, Shifting theorems, Laplace transform of derivatives and integrals. Convolution theorem, Initial and final value theorem. Laplace transform of periodic functions, Error functions, Heaviside unit step function and Dirac delta function. Applications of Laplace transform.

Fourier series: Fourier series and its convergence. Fourier series of even and odd functions. Fourier half-range series.

Fourier Transforms: Fourier integrals, Fourier sine and cosine integrals. Fourier and inverse Fourier transform, Fourier sine and cosine transforms and their elementary properties. Convolution theorem. Application of Fourier transforms.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Advanced Engineering Mathematics: Kreyszig E., Wiley, 2011.
2. Advanced Engineering Mathematics: Jain R.K. & Iyengar S.R.K., Narosa Publishing House, 2016.
3. Advanced Engineering Mathematics: Zill D.G. & Wright W.S., Viva, 2011.
4. Advanced Engineering Mathematics: O'Neil P.V., Cengage Learning, 2017.
5. Higher Engineering Mathematics: Grewal B.S., Khanna Publishers, 2021.

Lecture Plan

Lecture No.	Topics to be covered
10	**Ordinary Differential Equations:** Solution of linear differential equations with constant coefficients using operator method. Euler-Cauchy equations, Solution of second order differential equations by changing dependent and independent variables. Method of variation of parameters, Introduction to series solution method about an ordinary point.
9	**Partial Differential Equations:** Formation of first and second order partial differential equations. Solution of first order partial differential equations: Lagrange`s equation, Charpit's method. Linear partial differential equations with constant coefficients.
10	**Laplace Transform:** Laplace and inverse Laplace transform of some standard functions, Shifting theorems, Laplace transform of derivatives and integrals. Convolution theorem, Initial and final value theorem. Laplace transform of periodic functions, Error functions, Heaviside unit step function and Dirac delta function. Applications of Laplace transform.
5	**Fourier series:** Fourier series and its convergence. Fourier series of even and odd functions. Fourier half-range series.
6	**Fourier Transforms:** Fourier integrals, Fourier sine and cosine integrals. Fourier and inverse Fourier transform, Fourier sine and cosine transforms and their elementary properties. Convolution theorem. Application of Fourier transforms.

DEPARTMENT OF PHYSICS

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22PHT101	**Classical Physics**	**3**	**2**	**1**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

This course aims to familiarize and equip the students with fundamental knowledge of coordinate systems, forces & moments, simple harmonic motion, moment of inertia etc. The learned knowledge would enable the students to tackle the engineering problems.

COURSE OUTCOMES:

CO1	To impart fundamental Physics knowledge to engineering UG students, primarily in the areas of mechanics (statics and dynamics).
CO2	Capability to use the fundamental knowledge in relevant applications.
CO3	To enable the students to independently solve engineering problems, by using the concepts of physics learned during the course.
CO4	To enable and encourage students to apply the learned concepts in interdisciplinary areas.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Internal assessment (based upon assignments, quizzes and attendance)	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

UNIT 1 - Coordinate systems, Forces and Moments, Equivalent force system, equations of equilibrium, free body diagram; Frame of reference, Newton's laws and applications (to include friction and constraint equations); conservative forces, work energy theorem, conservation of linear momentum and collisions.

(No. of lectures- 8)

UNIT 2 - Simple Harmonic Motion, Compound Pendulum, Damped Harmonic Motion, Forced oscillations: Transient and steady states, Resonance: sharpness of resonance and quality factor.

(No. of lectures- 5)

UNIT 3 - Conservation of Angular Momentum, Rotation about a fixed axis, Moment of Inertia, Theorem of parallel and perpendicular axes, Principal moment of inertia, Polar moment of Inertia, Mass moment of inertia, Determination of moment of inertia of discrete and continuous objects [1-D, 2-D & 3-D (rectangular, cylindrical and spherical)], Gyroscope, Euler's equation; Elastic deformation: Hooke's Law, Stress, strain, Young's Modulus, Sheer Modulus, Bulk Modulus, Section Modulus.

(No. of lectures- 8)

UNIT 4 - Definition of Fluid, Fluid Dynamics, Pressure difference in accelerating fluid, Bernoulli's equation, viscosity, Surface tension, equation of continuity and Euler's equation, Navier-Stokes theorem.

(No. of lectures- 5)

TEXT BOOKS/ REFERENCE BOOKS: -

1. An Introduction to Mechanics by Kleppner and Kolenkow, McGraw Hill Education
2. Mechanics by D. S. Mathur, S. Chand
3. Engineering Mechanics: Statics and Dynamics by J. L. Meriam and L. G. Kraige, Wiley
4. Fluid Mechanics by Landau L.D. & Lifschitz E.M, Butterworth-Heinemann
5. Engineering Physics by D. R. Joshi, McGraw Hill Education
6. Vector Mechanics for Engineers: Statics and Dynamics by F. P. Beer and E. R. Johnston, McGraw Hill Education

Lecture Plan

Lecture No.	Topics to be covered
1.	Coordinate systems, Forces and Moments
2.	Equivalent force system
3.	Equations of equilibrium
4.	Free body diagram; Frame of reference
5.	Newton's laws and applications
6.	Friction and constraint equations
7.	Conservative forces, work energy theorem
8.	Conservation of linear momentum and collisions
9.	Simple Harmonic Motion
10.	Compound Pendulum
11.	Damped Harmonic Motion
12.	Forced oscillations: Transient and steady states
13.	Resonance: sharpness of resonance and quality factor
14.	Conservation of Angular Momentum, Rotation about a fixed axis
15.	Moment of Inertia, Theorem of parallel and perpendicular axes
16.	Principal moment of inertia, Polar moment of Inertia
17.	Mass moment of inertia
18.	Determination of moment of inertia of discrete and continuous objects (1-D (rectangular, cylindrical and spherical))
19.	Determination of moment of inertia of discrete and continuous (2-D & 3-D (rectangular, cylindrical and spherical))
20.	Gyroscope, Euler's equation
21.	Elastic deformation: Hooke's Law, Stress, strain, Young's Modulus, Sheer Modulus, Bulk Modulus, Section Modulus
22.	Definition of Fluid, Fluid Dynamics
23.	Pressure difference in accelerating fluid
24.	Bernoulli's equation, viscosity, Surface tension
25.	Equation of continuity and Euler's equation
26.	Navier-Stokes theorem

DEPARTMENT OF PHYSICS

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22PHT102	**Modern Physics**	**3**	**2**	**1**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

This course aims to familiarize and equip the students with fundamental knowledge of quantum mechanics, solid state physics and electrodynamics. The learned knowledge would enable the students to tackle the engineering problems.

COURSE OUTCOMES:

CO1	To impart fundamental Physics knowledge to engineering UG students, primarily in the areas of Quantum Mechanics, Solid state Physics and Electrodynamics.
CO2	Capability to use the fundamental knowledge in relevant applications.
CO3	To enable the students to independently solve engineering problems, by using the concepts of physics learned during the course.
CO4	To enable and encourage students to apply the learned concepts in interdisciplinary areas.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Internal assessment (based upon assignments, quizzes and attendance)	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Quantum Mechanics - Introduction to Quantum mechanics, Wave-Particle duality, Wave function and its properties, Energy and momentum operators, Schrodinger equation-both time dependent and time independent, solution of Schrodinger equation in simple cases such as 1-D potential well, 3D-box.

(No. of lectures- 6)

Solid State Physics - Basic crystal structures, Reciprocal lattice, Brillouin Zone, Bragg's law, X-ray diffraction and its applications, Free electron theory of metals, density of states, Origin of energy bands, Fermi energy, Bloch Theorem, Kronig-Penney Model, distinction between metals, semiconductors, and insulators, Intrinsic and extrinsic semiconductors and carrier concentration, Hall effect in metals and semiconductors.

(no. of lectures- 11)

Electrodynamics - Laws of electromagnetism, Continuity equation and Displacement current, Maxwell's equations (Differential and Integral forms) and their physical significance, Poynting theorem and power flow, Electromagnetic wave equation and its solution in free space, Transverse nature of EM waves, Energy and Momentum in Electromagnetic waves, The Potential Formulation: Scalar and Vector Potentials, Gauge Transformations: Coulomb Gauge and Lorenz Gauge.

(no. of lectures- 9)

TEXT BOOKS/ REFERENCE BOOKS: -

1. Introduction to Electrodynamics, David J. Griffiths, Prentice Hall
2. Quantum Mechanics, Nouredine Zettili, Wiley
3. Solid State Physics by S. O. Pillai, New Age Science
4. Solid State Physics, M. A. Wahab, Narosa
5. Engineering Physics,Hitendra K. Malik and A. K. Singh, McGraw Hill Education
6. Concepts of Modern Physics, Arthur Beiser, McGraw Hill Education
7. Quantum Mechanics, B. H. Bransden and C. J. Joachain, Pearson

Lecture Plan

Lecture No.	Topics to be covered
1.	Introduction to Quantum mechanics
2.	Wave-Particle duality, Wave function and its properties
3.	Energy and momentum operators
4.	Schrodinger equation (time dependent and time independent)
5.	Solution of Schrodinger equation for 1-D potential well, 3D-box
6.	Solution of Schrodinger equation for 3D-box
7.	Basic crystal structures, Reciprocal lattice
8.	Brillouin Zone, Bragg's law
9.	X-ray diffraction and its applications
10.	Free electron theory of metals
11.	Fermi energy, Density of states
12.	Bloch Theorem
13.	Kronig-Penney Model
14.	Origin of energy bands
15.	Distinction between metals, semiconductors, and insulators
16.	Intrinsic and extrinsic semiconductors and carrier concentration
17.	Hall effect in metals and semiconductors
18.	Laws of electromagnetism
19.	Continuity equation and Displacement current
20.	Maxwell's equations (Differential and Integral forms) and their physical significance
21.	Poynting theorem and power flow
22.	Electromagnetic wave equation and its solution in free space
23.	Transverse nature of EM waves
24.	Energy and Momentum in Electromagnetic waves
25.	The Potential Formulation: Scalar and Vector Potentials
26.	Gauge Transformations: Coulomb Gauge and Lorenz Gauge

DEPARTMENT OF PHYSICS

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22PHP103	Classical Physics Lab	1	0	0	2	0

PREREQUISITE

None

COURSE OBJECTIVE

To familiarize and equip the students with basic and experimental knowledge of Physics.

COURSE OUTCOMES

CO1	Basic understanding of theoretical concepts in Physics by application of experimental methods.
CO2	Ability to interpret and evaluate the process and outcomes of an experiment quantitatively and qualitatively.
CO3	Ability to design new experimental instrumentation.
CO4	Ability to apply mathematical and graphical techniques to study experimental data.
CO5	Ability to extend the scope of an investigation (whether or not results come out as expected) and revise an experimental procedure iteratively and reflectively.
CO6	Ability to conduct experiments collaboratively and ethically.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following four components

S. No.	Component	Weightage (%)
a)	Weekly report submission, weekly viva	40%
b)	Daily performance and participation	20%
c)	Mid-term practical examination	20%
d)	End-term practical examination	20%

COURSE CONTENTS

The course will consist of the following experiments

1. [Basic measurements, error analysis and curve fitting]: To learn about various types of basic measurement tools and devices, error propagation and curve fitting using least squares method.
2. [Photoelectric effect]: To determine the value of Plank's constant by measuring the stopping potential of different color filters.
3. [I-H curve]: To plot I-H curve for an iron rod.
4. [Newton rings]: To determine the wavelength of sodium light by Newton's ring.
5. [Diffraction grating]: To determine the wavelength of any three lines of mercury light by diffraction grating in1st order spectrum.
6. [Specific rotation by Polarimeter]: To determine the specific rotation of glucose by Polarimeter using three different concentrations.
7. [Moment of Inertia and Conservation of Angular Momentum]: To verify conservation of angular momentum, and parallel and perpendicular axis theorems for rotating rigid bodies.
8. [Torsional Pendulum]: To verify equation of motion of a torsional pendulum, and the limits of its applicability.
9. [Verification of Bernoulli's theorem]: To verify Bernoulli's Theorem, and the limits of its applicability.

Text Books / Reference Books:

1. *Concepts of Modern Physics,* Arthur Beiser, Shobhit Mahajan, S. Rai Choudhary (Mc Graw Hill), 2017
2. *Classical Mechanics*, T. W. Kibble; F. H. Berkshire (Imperial College Press), 2004
3. *Introduction to Electrodynamics* (4th edition), Griffiths (Pearson), 2015
4. *Essentials of Engineering Physics,* A. S. Vasudeva (S. Chand), 2010
5. *Optics* (4th edition), Ajoy Ghatak (Tata McGraw Hill), 2008

Experiment Plan

S. No.	Name and objectives
1	[Basic measurements, error analysis and curve fitting] To learn about various types of basic measurement tools and devices, error propagation and curve fitting using least squares method.
2	[Photoelectric effect] To determine the value of Plank's constant by measuring the stopping potential of different color filters.
3	[I-H curve] To plot I-H curve for an iron rod.
4	[Newton rings] To determine the wavelength of sodium light by Newton's ring.
5	[Diffraction grating] To determine the wavelength of any three lines of mercury light by diffraction grating in1st order spectrum.
6	[Specific rotation by Polarimeter] To determine the specific rotation of glucose by Polarimeter using three different concentrations.
7	[Moment of Inertia and Conservation of Angular Momentum] To verify conservation of angular momentum, and parallel and perpendicular axis theorems for rotating rigid bodies.
8	[Torsional Pendulum] To verify equation of motion of a torsional pendulum, and the limits of its applicability.
9	[Verification of Bernoulli's theorem] To verify Bernoulli's Theorem, and the limits of its applicability.

DEPARTMENT OF PHYSICS

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22PHP104	Modern Physics Lab	1	0	0	2	0

PREREQUISITE

None

COURSE OBJECTIVE

To familiarize and equip the students with basic and experimental knowledge of Physics.

COURSE OUTCOMES

CO1	Basic understanding of theoretical concepts in Physics by application of experimental methods.
CO2	Ability to interpret and evaluate the process and outcomes of an experiment quantitatively and qualitatively.
CO3	Ability to design new experimental instrumentation.
CO4	Ability to apply mathematical and graphical techniques to study experimental data.
CO5	Ability to extend the scope of an investigation (whether or not results come out as expected) and revise an experimental procedure iteratively and reflectively.
CO6	Ability to conduct experiments collaboratively and ethically.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following four components

S. No.	Component	Weightage (%)
a)	Weekly report submission, weekly viva	40%
b)	Daily performance and participation	20%
c)	Mid-term practical examination	20%
d)	End-term practical examination	20%

COURSE CONTENTS

The course will consist of the following experiments.

1. [Basic measurements, error analysis and curve fitting]: To learn about various types of basic measurement tools and devices, error propagation and curve fitting using least squares method.
2. [Photoelectric effect]: To determine the value of Plank's constant by measuring the stopping potential of different color filters.
3. [I-H curve]: To plot I-H curve for an iron rod.
4. [Newton rings]: To determine the wavelength of sodium light by Newton's ring.
5. [Diffraction grating]: To determine the wavelength of any three lines of mercury light by diffraction grating in1st order spectrum.
6. [Specific rotation by Polarimeter]: To determine the specific rotation of glucose by Polarimeter using three different concentrations.
7. [Four Probe experiment]: To determine the energy band gap of Germanium crystal by Four Probe Method.
8. [Hall Effect]: To determine the Hall coefficient of a given sample.
9. [Dielectric constant]: To determine the dielectric constant of a given solid.

Text Books / Reference Books

1. *Concepts of Modern Physics,* Arthur Beiser, Shobhit Mahajan, S. Rai Choudhary (Mc Graw Hill), 2017
2. *Introduction To Semiconductor Materials And Devices*, M.S Thyagi (John Wiley & Sons), 1991
3. *Introduction to Electrodynamics* (4th edition), Griffiths (Pearson), 2015
4. *Essentials of Engineering Physics,* A. S. Vasudeva (S. Chand), 2010
5. *Optics* (4th edition), Ajoy Ghatak (Tata McGraw Hill), 2008

Experiment Plan

S. No.	Name and objectives
1	[Basic measurements, error analysis and curve fitting] To learn about various types of basic measurement tools and devices, error propagation and curve fitting using least squares method.
2	[Photoelectric effect] To determine the value of Plank's constant by measuring the stopping potential of different color filters.
3	[I-H curve] To plot I-H curve for an iron rod.
4	[Newton rings] To determine the wavelength of sodium light by Newton's ring.
5	[Diffraction grating] To determine the wavelength of any three lines of mercury light by diffraction grating in1st order spectrum.
6	[Specific rotation by Polarimeter] To determine the specific rotation of glucose by Polarimeter using three different concentrations.
7	[Four Probe experiment] To determine the energy band gap of Germanium crystal by Four Probe Method.
8	[Hall Effect] To determine the Hall coefficient of a given sample.
9	[Dielectric constant] To determine the dielectric constant of a given solid.

DEPARTMENT OF ELECTRICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22EET101	**Basic Electrical and Electronics Engineering**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

Physics and Mathematics (Pre-university level)

COURSE OBJECTIVE(s)

- To provide comprehensive idea about AC and DC circuit analysis, working principles and applications of basic machines in electrical engineering.
- To understand the essential basic electronics principles and operation of diodes, transistors, simple transistor circuits and applications.
- To learn the basics of Boolean algebra, function minimization and elementary digital circuits.

COURSE OUTCOMES

CO1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
CO2	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
CO3	Describe the working of various types of static and rotating electrical machines
CO4	To be able to explain working principles of diode and related circuits
CO5	To be able to describe operation of transistors and their usage in applications
CO6	To be able to design simple digital circuits.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Quiz	10%
d)	Assignment	10%

COURSE CONTENTS

Unit I- DC circuits: Introduction to electrical circuits, Source conversion, Node voltage and mesh current methods, Delta-Star, and Star-Delta transformations, Superposition principle, Thevenin's and Norton's Theorems.

(no. of lectures- 6)

Unit II- Single Phase A. C. Circuits: Phasor Algebra, Solution of R, L, C series, parallel and series-parallel circuits. Concept of Resonance.

Three-Phase A. C. Circuits: Three-phase e.m.f. generation. Delta and Star Connections. Line and phase quantities, Solution of three-phase balanced circuits.

(no. of lectures- 7)

Unit III- Construction, theory, and operation of single-phase transformer, e.m.f. equation. Definition of Efficiency and voltage regulation. Basic principle of operation of DC motors, 3-phase induction motors and synchronous motor. (Qualitative treatment only).

(no. of lectures- 8)

Unit IV- Analog Electronics (I): Diode Circuits: Introduction to diodes, Current components in diode, Zener diode and applications. Half -wave and full -wave rectifiers & their analysis, comparison of bridge and center -tap rectifier, various types of RLC filters, clipping & clamping circuits. Introduction and working principles of LED and Solar cell.

(no. of lectures-9)

Unit V- Analog Electronics (II): Transistors: Bipolar Junction Transistor, Current components in transistor, transistor construction, various configurations (CE, CB. CC) and characteristics (Input and Output) of BJT's configurations. The transistor as an amplifier and switch, Introduction to MOSFETs, Construction, characteristics and working principles of MOSFETs (depletion type MOSFET and Enhancement type MOSFET).

(no. of lectures- 6)

Unit VI- (i) Digital Gates and Functions: Introduction to number systems and binary arithmetic, Logic Gates and universal gates, Boolean algebra, SOP & POS forms of a Boolean function, simplification of logical functions using Karnaugh map.

(ii) Digital Circuits: Half and full adder, subtractor, multiplier, encoders, decoders, multiplexers, demultiplexers.

(no. of lectures- 6)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Fundamental of Analog and Digital Electronic Circuits by Anant Agarwal and Jeferey H. Lang, Elsevier
2. Electrical Engineering Fundamentals, By V. Del Toro, PHI
3. Problems in Electrical Engineering by S. Parker Smith, CBS Publishers and Distributors Pvt. Ltd.
4. Electric Circuits, Joseph Edminister, Mahmood Nahvi, Schaum's Outlines, Tata McGraw-Hill
5. Circuit Theory: Analysis and Synthesis, Abhijit Chakrabarti, Dhanpat Rai & Co.
6. A Textbook of Electrical Technology - Volume I & II, by A. K. Theraja and B.L. Theraja, S Chand and Company Ltd.
7. Electrical Machinery and Transformers, Irving Kosow, Pearson Publications
8. Electronic Devices and Circuit Theory, R. L. Boylestad, Pearson Education
9. Digital Electronics, Moris-Mano, PHI
10. Basic Electronics and linear Circuits, N N Bhagava, TMH
11. Integrated Electronics, Millman Halkias, TMH.
12. Electronic Devices and Circuit, David A. Bell, Oxford
13. Digital Circuits and Design, S Salivahanan, Vikas Publishers

Lecture Plan

Lecture No.	Topics to be covered
1	Introduction to electrical energy and DC circuits
2	Active and passive two terminal elements, Ohm's Law, fundamental elements with voltage and current sources
3	Node voltage and mesh current method with problem solving session
4	Introduction to Delta-Star and Star-Delta transformation
5	Superposition theorem with problem solving session
6	Thevenin's and Norton's theorem with problem solving session
7	Introduction to AC Circuits, Representation of sinusoidal waveforms
8	peak and rms values, phasor representation, real power, reactive power, apparent power, power factor
9	Analysis of single-phase ac circuits with series and parallel R, L C elements
10	Resonance in single-phase AC circuits
11	Introduction to three phase AC generation, Star and Delta connected source and load
12	Line and phase quantities in star and delta systems
13	Three-phase balanced circuits problem solving session
14	Principle of static and dynamic electromagnetic induction, transformer construction
15	Operation of transformer with no load and load with relevant phasor

	diagrams
16	Equivalent circuit, efficiency and voltage regulation of transformer
17	Construction and types of dc motors
18	Introduction to rotating MMF and induction motor
19	Construction and operation of three-phase induction motor
20	Single-phase induction motor types and operation
21	Band structure of insulators, metals and semiconductors, mobility, conductivity
22	Band structure of insulators, metals and semiconductors, mobility, conductivity
23	Doping, Electrons and holes in semiconductors, Charge densities in semiconductor, Hall effect
24	Analysis of current components in Diode
25	Half wave and full wave rectifiers and their analysis
26	Zener Diode as voltage regulator
27	Various kinds of LC filters
28	Clipper circuits
29	Clipper circuits and clamper circuits
30	Introduction and working principles of LED and Solar cell
31	BJT: introduction, current components,
32	Mode of operation, configurations.
33	Input and output characteristics of CE, CB and CC configurations
34	Transistor as an amplifier and switch
35	Introduction to MOSFETs, Construction,
36	Characteristics of MOSFETs (depletion type MOSFET and Enhancement type MOSFET)
37	Introduction to number systems and binary arithmetic,
38	Logic Gates and universal gates, Boolean algebra,
39	SOP & POS forms of a Boolean function,
40	Simplification of logical functions using Karnaugh map.
41	Half and full adder, subtractor, encoders
42	Decoders, Multiplexers, demultiplexers

DEPARTMENT OF ELECTRICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22EEP102	**Electrical Engineering Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

None

COURSE OBJECTIVES:

- Implement different electric networks and verify the circuit concepts for DC and AC circuits
- Prove the various fundamental circuit Laws and theorems for reducing the complexity of electrical network
- Understand the various types of electric wiring and operation of single-phase induction machine

COURSE OUTCOMES:

CO1	Solve the electrical circuit source resistance, currents, voltage, and power by applying various network reduction techniques
CO2	To be able to understand and apply the fundamental circuit Laws and Theorems
CO3	To be able to understand various practical wirings and performance of lighting equipment
CO4	Examine and operate the single-phase induction motor

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Continuous lab-based evaluation	60%
b)	Mid-semester evaluation	20%
c)	End-semester evaluation	20%

LIST OF EXPERIMENTS

ROTOR-I

1. To measure the power consumed by a given choke coil at different voltages and determine the choke coil's power factor, resistance, and inductance.
2. To verify Kirchhoff's Current Law (KCL) and Kirchhoff's Voltage Law (KVL) for a given circuit.
3. To observe the operation of a given fluorescent lamp at different voltages and determine the power consumed and power factor.
4. To verify Thevenin's and Norton's theorem for a given network and to obtain the equivalent circuit thereof.

ROTOR-II

1. To make connections of

(a) Staircase wiring

(b) House wiring

2. To determine the power consumed by two incandescent lamps connected in parallel at different supply voltages.
3. To connect, run, and reverse the direction of rotation of the single-phase induction motor.
4. To study the V-I characteristics of an incandescent lamp.

General Study

1. To study safety precautions in the lab.
2. To study symbols of various electrical equipment.
3. To study different types of electricity tariffs.
4. To study the working of various electrical apparatus in the lab.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22ECP101	**Electronics Engineering Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

- To know about the working and operation of Multimeter, DSO, Function Generator and Power Supply.
- To experimentally verify the diode characteristics
- To analyze various diode applications and outputs of related circuits.

COURSE OUTCOMES :

CO1	To be able to know about various electronic instruments
CO2	To be able to generate and analyze the various waveforms on DSO
CO3	To be able to verify and analyze the diode characteristic
CO4	To be able to analyze the applications of diode

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Continuous lab-based evaluation	50%
b)	Mid-semester evaluation	20%
c)	End-semester evaluation	30%

LIST OF EXPERIMENTS

1. Study of various electronic instruments such as Multimeter, DSO, Function Generator and Power Supply.
2. To observe sine, square and triangular waveforms on the DSO and to measure amplitude and frequency of the waveforms.
3. Familiarization of Electronics Components such as: - Resistor, Capacitor, Diode, Transistor, LED, Photodiode, Phototransistor, IC and also test them with the help of Multimeter.
4. To obtain V-I characteristics of PN junction diode.
5. To obtain V-I characteristics of Zener diode.
6. To observe waveform at the output of half wave rectifier with and without capacitor filter and also measure its DC voltage, DC current and ripple factor.
7. To observe waveform at the output of center tapped full wave rectifier with and without capacitor filter and also measure its DC voltage, DC current and ripple factor.
8. To observe waveform at the output of full wave bridge rectifier with and without capacitor filter and also measure its DC voltage, DC current and ripple factor.
9. To observe waveforms at the output of various clipper circuits.
10. To observe waveforms at the output of various positive and negative clamper circuits.

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CET101	**Engineering Drawing and Sketching**	**2**	**1**	**1**	**1**	**0**

PREREQUISITE

None

COURSE OBJECTIVE

To familiarize and equip the students with basic knowledge of engineering drawing and develop skills for visualization of geometric forms

COURSE OUTCOMES:

CO1	To understand the theory of projection in engineering drawing
CO2	To be able to visualize complex 3-D geometries
CO3	To be able to communicate complex 3-D geometries with the help of engineering drawings

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade) will be made up of the following:

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS (Description type I)

Unit I – Importance of drawing, Layout and printing of drawing, Principles and methods of dimensioning, Scaling; Introduction to different types of projections and their uses, Orthographic projection, I angle and III angle projections; Projection of points lying in different quadrants; Projection of lines inclined to one or more planes, Traces, True length of line and its inclination with principal planes **(no. of lectures- 4)**

Unit II – Projection on auxiliary planes; Projection of planes other than reference planes: Planes perpendicular and inclined to principal planes, Traces, Cases of planes of different shapes and making different angles with one or both reference planes, True shape of the plane figure. **(no. of lectures- 4)**

Unit III – Method of drawing projections: Isometric to Orthographic projections; Isometric projections; Oblique projections **(no. of lectures- 4)**

COURSE CONTENTS (Description type II)

Basic Concepts:- Importance of drawing, Layout and printing of drawing, Principles and methods of dimensioning, Scaling

Introduction to AutoCAD

Orthographic Projections:- Introduction to different types of projections and their uses, Orthographic projection, I angle and III angle projections; Projection of points lying in different quadrants

Projections of lines: Lines inclined to one or more planes, Traces, True length of line and its inclination with principal planes

Projection on auxiliary planes

Projection of planes other than reference planes: Planes perpendicular and inclined to principal planes, Traces, Cases of planes of different shapes and making different angles with one or both reference planes, True shape of the plane figure.

Method of drawing projections:- Isometric projections; Oblique projections

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. ND Bhatt (2014), "Engineering Drawing", Charotar Publication
2. PS Gill (2013), "Engineering Drawing", SK Kataria & Sons
3. B Agarwal and CM Agarwal (2019) "Engineering Drawing", McGraw Hill India
4. DA Jolhe (2017), "Engineering Drawing", McGraw Hill Education
5. NS Parthasarathy and V Murali (2015), "Engineering Drawing", Oxford University Press

ONLINE/E RESOURCES

1. https://nptel.ac.in/courses/112/103/112103019/
2. https://nptel.ac.in/courses/112/104/112104172/
3. https://nptel.ac.in/courses/105/104/105104148/
4. https://nptel.ac.in/courses/112/102/112102304/
5. https://nptel.ac.in/courses/112/105/112105294/

Lecture Plan

Lecture #	Topics to be covered
1	Theory of Projection and Projection of Points
2	Projection of Lines – I: Lines inclined to one and 2 planes
3	Projection of Lines – II: Lines inclined to one and 2 planes
4	Projection of Lines – III: Traces of Lines
5	Projections on Auxiliary Planes – I
6	Projections on Auxiliary Planes – II
7	Projections of Planes – I
8	Projections of Planes – II
9	Isometric to Orthographic Projections
10	Orthographic to Isometric Projections – Straight Lines and Dimensioning
11	Orthographic to Isometric Projections – Curves and Complex Shapes
12	Oblique Projections and Development of Simple Lateral Surfaces

LIST OF LAB SESSIONS

Session #	Topic to be Covered
1	Introduction to AutoCAD; Layout and printing of drawing, Dimensioning, Scaling
2	Projection of Lines – I: Lines inclined to one plane
3	Projection of Lines – II: Lines inclined to both principal planes
4	Projection of Lines – III: Traces of Lines
5	Projections on Auxiliary Planes – I
6	Projections on Auxiliary Planes – II
7	Projections of Planes – I
8	Projections of Planes – II
9	Isometric to Orthographic Projections
10	Orthographic to Isometric Projections – Straight Lines and Dimensioning
11	Orthographic to Isometric Projections – Curves and Complex Shapes
12	Oblique Projections

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CET102	**Environmental Science**	**2**	**2**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE

To equip the students with basic knowledge of environmental issues, challenges and identifying solutions on local and global scale.

COURSE OUTCOMES

CO1	To be able to critically examine aspects of local and global environmental issues and apply understating to create informed opinions about how to interact with the environment on both a personal and a social level.
CO2	To recognize environmental issues as among the highest educational priorities and as a key determinant to sustainable development.
CO3	To sensitize about existing environmental conditions, policies, programs and practices for implementation at different stages of life in an environmentally sound manner.
CO4	To create awareness about various techniques/practices to conserve and protect the environment.

COURSE ASSESSMENT

Course Assessment (culminating to the final grade), will be made up of the following:

S. No.	Component	Weightage
a)	Assignments / Scrap Book / Activities	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Air Pollution **(No. of Lectures – 6)**

Types of air pollutants, classification, sources and impacts; Air Quality Index; NAAQS; Tropospheric ozone and photochemical smog; Monitoring of air pollutants; Dispersion of air pollutants; Air pollution disasters; Vehicular pollution and control; Introduction to indoor environmental quality

Noise Pollution **(No. of Lectures – 2)**

Sources, measurements, monitoring, impacts, standards, control measures of noise pollution

Water Pollution **(No. of Lectures – 5)**

Sources of water pollution; Classification of pollutants; Drinking water standards; Impacts of poor water quality; Water conservation; Restoration of water bodies.

Soil and marine Pollution **(No. of Lectures – 2)**

Nature & composition of soil; fertilizers & nutrient enrichment, soil pollutants, nutrient loss & degradation of quality; case study: soil pollution by solid waste.

Solid Waste Management **(No. of Lectures – 5)**

Composition of Municipal solid waste (MSW); Generation rate, properties, collection, storage, transport, treatment technologies (composting, incineration, gasification etc.) and disposal of MSW; e-waste; Plastic waste; Hazardous waste; MSW rules 2016; Zero-waste cities.

Social issues and Environment **(No. of Lectures – 10)**

Sustainable Development Goals (SDGs) of the UN; Climate change, global warming, ozone layer depletion, acid rain and urban heat island (UHI). Introduction to ISO 14000; Green Building Concepts; Conservation of energy and Renewable energy technologies; Environmental Impact Assessment (EIA); Role of an individual in preventing pollution.

Case studies on various topics related to environmental degradation / restoration

TEXT BOOKS/ REFERENCE BOOKS (Authors, Title, Publisher)

1. Bala Krishnamoorthy," Environmental Management" PHI Pvt. Ltd., 2005
2. R. Rowe and H. S. Peavy, “Environmental Engineering”, McGraw Hill Education, 2017.
3. R. Rajagopalan, “Environmental Studies”, Oxford university press, 2015.
4. Standards and Manuals of Central Pollution Control Board. WHO, USEPA reading materials.
5. Municipal Solid Waste Management Manual, Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, 2016

Lecture Plan

S.No.	Topics to be covered	Number of lectures
1	**Basic Concepts:** Importance of environment and ecosystem, introduction to different forms of environmental pollution like air, water, land, marine etc. Introduction to carbon footprint.	1
2	Concept of an ecosystem, ecological succession, introduction to biodiversity Food chains, food webs, loss of species, ecological pyramids and recovery of damaged ecosystem (case studies).	2
3	**Air Pollution:** Definition, air pollution parameters, sources, types of air pollutants, global effects of air pollution, introduction to air	1

	quality emission standards.	
4	Health effect of air pollution, introduction to criteria pollutants and their health effects, characteristics of particulate matter, Environmental significance of air pollutants.	**2**
5	Introduction to Air Quality Index (AQI), impact of AQI, Air pollutants considered for calculating AQI, calculation and ranges of AQI.	**1**
6	Air pollution from Automobiles and its impact on human health, introduction to Bharat Stage (BS) engine and fuel, characteristics of the air pollutants emitted from automobiles, introduction to the air pollution control policies, case studies discussion.	**2**
7	**Social issues and environment:** Introduction to Green House Gases (GHGs), sources and its impact on the ecosystem. Introduction to global warming potential. Introduction to Montreal and Kyoto protocol, introduction to ozone depleting potential and its consequences, environmental and social impacts.	**3**
8	**Noise Pollution:** Introduction to noise pollution and controlled measures, effects and control measures (transportation and industrial noise), measurement of noise pollution (numerical). role of an individual, standards, preventive aspects.	**2**
9	**Solid Waste Management (SWM):** Waste generation aspects, types and characteristics of waste, waste collection, storage and transport, waste disposal, introduction to waste processing techniques, E-waste, plastic waste, source reduction, product recovery and recycling, incineration and energy recovery, environmental impact of SWM and its control measures of residential, commercial and industrial wastes. role of an individual in preventing pollution, pollution case studies. introduction to SWM rules and regulation, 2016.	**3**
10	**Water Pollution:** Introduction to water pollution, sources, classification, effects, introduction to water treatment processes, introduction to standard and guidelines for water and waste water treatment, rainwater harvesting, water conservation, fluorosis, nitrate and arsenic toxicity (case studies).	**4**
11	**Soil, Marine, Thermal Pollution:** Definition, causes, sources, effects and remedial measures.	**1**
12	**Sustainable development:** Green buildings, environmental management system (introduction to ISO 14000), case studies.	**2**
13	Introduction to urban problems related to energy, renewable energy technologies; solar and wind energy (advantages and disadvantages), environmental protection act, air act etc.	**2**

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CST101	**Programming with Python**	**2**	**2**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

This course is aimed at offering the fundamental concepts of Python scripting language to the students. It starts with the basics of Python programming and deals with lists, dictionaries, functions, exceptions and files. The objective of this course is to enable the students to develop the applications using the concepts of Python.

COURSE OUTCOMES :

CO1	Understand basic principles of computers and basics of binary computation.
CO2	Understand the basic terminology used in computer programming to write, compile and debug programs in Python programming language.
CO3	Use different data types to design programs involving decisions, loops, and functions.
CO4	Represent compound data using Python lists, tuples, and dictionaries.
CO5	Read and write data from/to files in Python Programs

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Unit I- Introduction to computer system and binary number systems – addition, subtraction (2's complement), multiplication, left shifting and right shifting.

(no. of lectures- 4)

Unit II- Introduction to Python: Python variables, Python basic Operators, Understanding python blocks. Python Data Types, Declaring and using Numeric data types: int, float etc. Python Program Flow Control Conditional blocks: if, else and else if, Simple for loops in python, for loop using ranges, string, list and dictionaries. Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.

(no. of lectures- 6)

Unit III- Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary.

(no. of lectures- 6)

Unit IV- Building blocks of python programs: string manipulation methods, List manipulation, Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions, Introduction to classes.

(no. of lectures- 6)

Unit V- Python File Operations: Reading files, Writing files in python, Case study: development of mini projects using libraries like matplotlib, numpy, etc.

(no. of lectures- 6)

TEXT BOOKS/ REFERENCE BOOKS:-

1. Core Python Applications Programming: Wesley J. Chun, Pearson Education, 2016.
2. Introduction to Computer Science using Python: Charles Dierbach, Wiley, 2015.
3. Python for Programmers: Paul J. Deitel, Harvey Deitel , Pearson, 2020
4. Learning Python: Mark Lutz, Orelly Publication, 2013
5. Python Programming: An Introduction to Computer Science: John Zelle, Course Technology Cengage Learning Publications, 2013.

LECTURE PLAN

Lecture No.	Topics to be covered
1	Introduction to computer system.
2	Different components of computer system
3	Binary number systems – addition, subtraction (2's complement)
4	Binary multiplication, left shifting and right shifting
5	Introduction to Python: Python variables

6	Python basic Operators, understanding python blocks
7	Python Data Types, Declaring and using Numeric data types: int, float etc.
8	Python Program Flow Control Conditional blocks: if, else and else if
9	Simple for loops in python, for loop using ranges, string, list and dictionaries.
10	Use of while loops in python, Loop manipulation using pass, continue, break and else. Programming using Python conditional and loop blocks.
11	Python Complex data types
12	Using string data type and string operations
13	Defining list and list slicing
14	Use of Tuple data type
15	String and List
16	Dictionary
17	Building blocks of python programs: string manipulation methods
18	List manipulation, Dictionary manipulation
19	Programming using string, list
20	Dictionary in-built functions. Python Functions
21	Organizing python codes using functions
22	Introduction to classes
23	Python File Operations: Reading files, Writing files in python
24	Python File Operations: Reading files, Writing files in python
25	Case study: development of mini projects using libraries like matplotlib, numpy, etc.
26	Using matplotlib
27	Using numpy
28	Case study: development of mini projects using libraries like matplotlib, numpy, etc.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CSP102	Programming with Python Lab	1	0	0	2	0

PREREQUISITE

None

COURSE OBJECTIVE(s)

1. Acquire programming skills in core Python.
2. Acquire Object-oriented programming skills in Python.
3. Acquire Python programming skills to move into specific branches - Internet of Things (IoT), Data Science, Machine Learning (ML), Artificial Intelligence (AI) etc.

COURSE OUTCOMES:

CO1	Understand the basic terminology used in computer programming to write, compile and debug programs in Python programming language.
CO2	Use different data types to design programs involving decisions, loops and functions.
CO3	Demonstrate operations on built-in container data types (list, tuple, set, dictionary) and strings.
CO4	Design solutions to simple engineering problems by applying the basic programming principles of Python Programming.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

The following proposed coverage are broad guiding areas lab. The programs mentioned here just sample programs and they are just for reference purpose. The instructor offering the course in consultation with the theory offered can adopt further variations in tune with concerned theory course.

Installation of Python Tool, Introduction to Python programming, and python datatypes [1 Lab]

Data types, Input/Output and library imports [1 Lab]

Python strings operations, Doc strings [1 Lab]

Objects - List, Tuples and Dictionaries [3 Lab]

Control flow, functions working and some advanced functions [2 Lab]

Python File Operations: Reading files, Writing files in python [1 Lab]

Introduction to classes [1 Lab]

Numpy, Matlabplotlib utility functions [2 Lab]

TEXT BOOKS/ REFERENCE BOOKS

1. Core Python Applications Programming: Wesley J. Chun, Pearson Education, 2016.
2. Introduction to Computer Science using Python: Charles Dierbach, Wiley, 2015.
3. Python for Programmers: Paul J. Deitel, Harvey Deitel , Pearson, 2020
4. Learning Python: Mark Lutz, Orelly Publication, 2013
5. Python Programming: An Introduction to Computer Science: John Zelle, Course Technology Cengage Learning Publications, 2013.

LAB PLAN

Week	Experiments in the Programming with Python Lab
1	Introduction to python programming , Python datatypes and Python print statement
2	Programs related to basic arithmetic and Logical operations, swapping of numbers etc.
3	Python string operations: counting, reverse a string, changing case etc.
4	Read a list of numbers and perform various operations on List
5	Writing programs related to Tuples, its operations
6	Working with dictionaries in Python
7	Conditional statements: Programs with applications of conditional statements: if else, elif nested if else, continue, break, pass
8	Applications of concepts of while and for loops (leap year, palindrome, displaying prime numbers etc).Functions and Recursions (factorial, Fibonacci etc)
9	Reading and writing through files
10	Programs related to class and objects
11	Python programs demonstrating Numpy
12	Plotting graphs using matplotlib

DEPARTMENT OF MECHANICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MET101	**Introduction to Mechanical Systems**	**2**	**2**	**0**	**0**	**0**

PREREQUISITE

None.

COURSE OBJECTIVE(s)

To acquaint the students with mechanical systems and manufacturing processes so that they are equipped with the basic knowledge needed to develop energy-efficient solutions.

COURSE OUTCOMES

CO1	To understand the construction and working of a mobility system.
CO2	To ascertain the manufacturing processes appropriate for hardware development.
CO3	To select favourable engineering material(s) for the given application.
CO4	To analyze the efficiency of different thermal systems.
CO5	To select appropriate power transmission drive(s) for the given application.

COURSE ASSESSMENT

Course Assessment (culminating to the final grade), will comprise of following three components.

S. No.	Component	Weightage
a)	CWS (Weekly assignments, Quizzes)	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Unit I - Modes of road transportation, power plants for road vehicles, transmission and transmission systems, running system including steering, frame and body, electrical systems. Other mobility systems.

(no. of lectures- 3)

Unit II - Machining operations and machine tools: lathe, drilling, shaper, milling; Joining methods: shielded metal arc welding, oxy-acetylene gas welding, basic welded joints, soldering, brazing; foundry tools and sand casting; additive manufacturing.

(no. of lectures- 7)

Unit III - Classification, properties, criteria for material selection.

(no. of lectures- 1)

Unit IV - Power generation systems: Steam generation, properties of steam, thermodynamic cycle, steam tables, Mollier diagram; internal combustion engines, thermodynamic cycles, petrol and diesel engine, cooling systems.

(no. of lectures- 9)

Unit V - Refrigeration and Air conditioning: Refrigerator, heat pump, heat engine, coefficient of performance, unit of Refrigeration, thermodynamic cycles; domestic refrigerator, desert cooler, unitary air conditioner, ice plant.

(no. of lectures- 4)

Unit VI - Simple and compound machines, belts, ropes, chains, gears, clutches.

(no. of lectures- 4)

COURSE CONTENTS

Mobility systems: Modes of road transportation, power plants for road vehicles, transmission and transmission systems, running system including steering, frame and body, electrical systems. Other mobility systems.

Manufacturing Processes: Machining operations and machine tools, joining methods, foundry tools and sand casting, additive manufacturing.

Engineering materials: Classification, properties, criteria for material selection.

Thermal systems and Efficiency: Power generation systems: Steam generation, properties of steam, thermodynamic cycle; Internal combustion engines, thermodynamic cycles, cooling systems. Refrigeration and Air conditioning: Refrigerator, heat pump, heat engine, coefficient of performance, unit of Refrigeration, thermodynamic cycles; domestic refrigerator, desert cooler, unitary air conditioner, ice plant.

Basics of Machines and Power Transmission: Simple and compound machines, belts, ropes, chains, gears, clutches.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Basics of Mechanical Engineering by Pravin Kumar, Pearson publishing co.
2. Elements of Mechanical Engineering by D. S. Kumar, Kataria & Sons, New Delhi.
3. Engineering Thermodynamics by P. K. Nag, McGraw-Hill Publishing Co., New Delhi.
4. Workshop Technology by S. K. Garg, Laxmi Publications, New Delhi.

Lecture Plan

Lecture No.	Topics to be covered
1	Modes of road transportation, power plants for road vehicles, transmission and transmission systems.
2	Running system including steering, frame and body.
3	Electrical systems, other mobility systems.
4	Operating principle of a lathe machine, lathe operations, construction of a centre lathe.
5	Operating principle of a drilling machine, drilling operations, construction of a vertical bench drilling machine. Operating principle of a shaper, shaper operations, construction of a horizontal shaper.
6	Operating principle of a milling machine, milling operations, construction of a horizontal milling machine.
7	Basic welded joints, shielded metal arc welding.
8	Oxy-acetylene gas welding, soldering, brazing.
9	Foundry tools, composition and properties of moulding sand.
10	Sand moulding process, additive manufacturing.
11	Classification, properties, criteria for material selection.
12	System, surrounding, control mass, control volume, internal energy, enthalpy, first law of thermodynamics.
13	Steady flow energy equation (SFEE), air and Steam, steam generation process, T-S diagram.
14	Properties of steam: Dryness fraction, internal energy, enthalpy, entropy, steam tables, Mollier diagram.
15	Typical tutorial problems involving steam utilization.
16	Steam Generators: Important terms (viz. boiler shell, combustion chamber, grate, furnace), mounting and Accessories.
17	Classification of internal combustion engines, main components of an engine.
18	Petrol engine, diesel engine, thermodynamic cycles, mean effective pressure.
19	Indicated thermal efficiency, brake thermal efficiency. Two stroke engine, four stroke engine. Air and Water Cooling system.
20	Typical tutorial problems involving air-standard efficiency of internal combustion engines.
21	Refrigerator, heat pump, second law of thermodynamics, ideal refrigeration cycle.
22	Coefficient of performance, unit of refrigeration, typical tutorial problems involving an ideal refrigerator and heat pump.
23	Simple vapor compression refrigeration cycle, typical tutorial problems.
24	Operating principle and construction of a domestic refrigerator, desert cooler, unitary air conditioner, ice plant.
25	Simple and compound machines, types of belt drive, length of a belt, velocity ratio of a belt drive, belt slippage.

26	Power transmitted by a belt drive, ratio of tensions, merits and demerits. Rope and chain drives, merits and demerits.
27	Typical tutorial problems involving belt drives.
28	Types of gear drives, clutches, merits and demerits. Selection of a mechanical power drive.

DEPARTMENT OF MWCHANICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MEP102	**Product Realization through Manufacturing**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

Nil

COURSE OBJECTIVE(s)

This course aims to make the student aware of the basics of workshop practice which includes laboratory exercises involving machining, fitting, casting, welding and 3D printing processes.

COURSE OUTCOMES:

CO1	To select suitable tools and equipment to prepare jobs related to welding, fitting, machine, foundry processes and digital manufacturing techniques.
CO2	To prepare the machine/machine tool for the production of the job.
CO3	To produce job using materials of specific shape and size by a suitable set of operations.
CO4	To measure the accuracy of job using different measuring instruments.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Continuous Evaluation	60%
b)	Mid-term Practical Examination	20%
c)	End-term Practical Examination	20%

COURSE CONTENTS (Description type I)

1. **Introduction and Orientation -- 1 Turns**
   Product Realization through 3D Printing, Welding, Foundry, Machining, and Assembly
2. **Machine Shop -- 2 Turns**
   Demo and Job on lathe machine--Simple Turning, Step turning, facing, Knurling, etc.
3. **Welding Shop -- 2 Turns**
   Demo and Job on Arc and Gas welding.
4. **Foundry Shop -- 2 Turns**
   Demo to molding tools and Molding Job.
5. **Fitting Shop -- 2 Turns**
   Demo of tools and fitting jobs using Filing, Drilling, Tapping etc.
6. **3D Printing Lab -- 2 Turns**
   Demo to 3D Printing and Printing Jobs including Post Processing.

COURSE CONTENTS (Description type II)

Sr. No.	Shop	Topic	Turn	Time (Hrs.)
1	**All Shops**	Product Realization through 3D Printing, Welding, Foundry, Machining, and Assembly	**1**	**2**
2	**Machine Shop**	Introduction/Classification of Machine tools (Lathe, Shaper, Drilling, Grinder, Milling machines), Single and Multi-point Cutting tools, Safety/Precautions during machine shop. Preparation of Job on Lathe Machine Tool — Simple Turning, Step turning, facing, Knurling, etc.	**2**	**4**
3	**Welding Shop**	Introduction/Classification/Advantages and Disadvantages of welding processes (i.e. Arc, Gas and Resistance Welding), Safety/Precautions during welding shop. Preparation of Butt/Lap/Corner/T-Joint on Arc welding machine	**2**	**4**
4	**Foundry Shop**	Introduction to Oil/Electric Furnace/Foundry tools/ Moulding Sand, Types of patterns, Types of Allowances, Safety/Precautions during foundry shop. Preparation of Mould cavity and Casting Job	**2**	**4**

5	**Fitting Shop**	Introduction to various Fitting tools/Measuring tools/ Marking tools, Safety/Precautions during foundry shop. Preparation of Paper weight using following operations (Filing, Drilling, Tapping etc.)	**2**	**4**
6	**3D Printing Lab**	Introduction to various 3D Printing processes. Demo to 3D Printing and Printing Jobs including Post Processing.	**2**	**4**
		Total	**11**	**22**

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Elements of Mechanical Engineering –Hajra Choudhury & others, Media Promoters 2010.

2. The Elements of Workshop Technology - Vol I & II, S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjhar Roy, 11th edition 2001 others, Media Promoters and Publishers, Mumbai.

DEPARTMENT OF HUMANITIES & SOCIAL SCIENCES

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE:

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22HST101	**Basic Economics**	**2**	**2**	**0**	**0**	**0**

PREREQUISITE: None

COURSE OBJECTIVES:

-To make students understand principles of economics, and relate them to the world they live in

-To make students understand how and why markets work and how prices are determined

-To help students hone skill sets of analyzing, interpreting economic variables through diagrams, and graphs

-To develop students' critical thinking and analytical abilities around concepts of macroeconomics

COURSE OUTCOMES:

CO1	To understand the core microeconomic and macroeconomic concepts, theories, models, principles, tools, and techniques
CO2	To understand the role of market and prices in influencing key economic activities
CO3	To develop the skills to interpret, analyze the economic concepts and variables through diagrams, tables and graphs
CO4	To relate the key economic principles to real life situations, which would help students to make informed decisions

COURSE ASSESSMENT:

The Course Assessment (culminating to the final grade), will be made up of the following three components-

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Assignment/MOOC/Quiz	20%

COURSE CONTENTS

Unit I: (No. of lectures- 5)

- Why study Economics?
- Scope of Economics: Microeconomics & Macroeconomics, Diverse fields of Economics, Positive and Normative Economics
- The Economic Problem: Scarcity, Choice and opportunity Cost; Production Possibility Frontier

Unit II: (No. of lectures- 6)

- How Market Works: Market forces of Demand and Supply, Elasticity and its applications
- Consumer Behaviour: Utility & its measurability, Indifference Curves Approach, Optimum Choice

Unit III: (No. of lectures- 6)

- Production: Short-run and long-run production functions, Law of Variable Proportions, Iso-quants, Returns to Scale
- Cost: Short-run and long-run cost curves, Revenue,

Unit IV: (No. of lectures- 6)

- Market Structures: Perfect Competition, Monopoly, Monopolistic Competition, Oligopoly
- Revenue: Concept of TR, AR and MR under perfect and imperfect competition, Break-even Analysis
- Economic Appraisal Techniques: Payback period, NPV, IRR, Cost-benefit ratio

Unit V: (No. of lectures- 5)

- National Income: Circular Flow of Income, Measures of national income, GDP as a measure of Economic Well-Being
- Macroeconomic Issues: Growth and Development, Inflation, and Unemployment
- Introduction to Fiscal and Monetary Policies

REFERENCE BOOKS:

1. Principles of Economics, N. Gregory Mankiw; South western Cengage Learning
2. Economics; Paul A Samuelson, William D Nordhaus; Tata Mc Graw Hill, Special Indian Edition (Indian Adaptation by Sudip Chaudhari and Anindya Sen)
3. Principles of Economics, Karl E Case, Ray C Fair & Sharon M Oster, Prentice Hall, Pearson

ONLINE/E RESOURCES:

1. Beginner level course on 'Microeconomic Principles' offered by University of Illinoi on *Coursera (https://www.coursera.org/learn/microeconomics)*
2. Massive Open Online Courses (MOOCs) on EdX (https://www.edx.org/learn/economics)
3. The Economist (https://www.economist.com/films)
4. Economist Intelligence Unit (https://www.eiu.com)

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE:

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22HST102	**English Communication Skills (Basic)**	**2**	**2**	**0**	**0**	**0**

PREREQUISITE: None

COURSE OBJECTIVES:

•To improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading, Listening, Speaking, and Writing skills

•To equip students to study academic subjects more effectively using the theoretical and practical components of English Communication Skills syllabus

•To develop study skills and communication skills in formal and informal situations

COURSE OUTCOMES:

CO1	Expand vocabulary through several interactive exercises
CO2	Improve ability to read and understand the written word in everyday life through the study of basic comprehension skills, such as main idea, major and minor details, and patterns of organization
CO3	Enhance the listening and speaking skills through several interactive exercises
CO4	Locate explicit textual information, draw complex inferences, describe, analyse, and evaluate the information within and across multiple texts of varying lengths
CO5	Write complete, concise, concrete, correct, clear, and courteous letters, and e-mails

COURSE ASSESSMENT:

The Course Assessment (culminating to the final grade), will be made up of the following three components-

S. No.	Component	Weightage
a)	Mid-Term examination	30%
b)	End Semester Examination	50%
c)	Flagship Project/ MOOC/Attendance and Class performance	20%

COURSE CONTENTS:

Unit I- Texts:

Letter from Infosys Founder Narayan Murthy to his daughter Akshata;
Email from Satya Nadella's to his employees on his first day as CEO, Microsoft
Essay entitled Freedom and Choice by N. Krishnaswamy, Lalitha Krishnaswamy and Revathi Krishnaswamy

(no. of lectures- 6)

Unit II-Vocabulary

Vocabulary from the prescribed texts– Using Words in different Forms – Root Words - Affixes– Synonyms and Antonyms – Homonyms, Homophones –One-word Substitutes

(no. of lectures-6)

Unit III- Grammar

Grammar topics addressed in the texts– Parts of Speech --Articles – Subject Verb Agreement –Tense –Conditional Sentences – Question Tags– Common Errors

(no. of lectures- 6)

Unit IV- Reading

Short Comprehension Passages – Skimming-Scanning and Predicting --–Intensive Reading

(no. of lectures- 6)

Unit V- Writing

Techniques for Effective Writing– Paragraph Writing– Letter Writing –Format, Styles, Parts–Formal Letters including Job Application with Resume– Writing Emails.

(no. of lectures-6)

Flagship Project

The students will be given a situation and they will present it in role play in groups.

MOOC Course

English and Academic Preparation - Pre-Collegiate offered by Rice University on Coursera, an online free course of 23 hrs. (The students will submit the certificate of completion at the end of the semester and will be evaluated on the basis of it.)

TEXT BOOKS/ REFERENCE BOOKS:-

Text Book:

1. Raman, Meenakshi and Sharma, Sangeeta. Technical Communication- Principles and Practice. Third Edition. New Delhi: Oxford University Press. 2015. Print.

Reference Books:

1. Roberts, Rachel, Antonia Clare and J.J. Wilson. New Total English Intermediate Students Book. Pearson Longman. 2011
2.Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)
3. Rizvi, M. Ashraf. Effective Technical Communication. Tata Mc Graw –Hill. 2015 (Print)

4. Pickett, Nell Ann, Ann A. Laster and Katherine E. Staples. Technical English: Writing, Reading and Speaking. New York: Longman, 2001.
5. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.
6. Morgan, David and Nicholas Regan. Take-Off: Technical English for Engineering Reading: Garnet Publishing Limited, 2008.
7. Thorn, Michael and Alan Badrick. An Introduction to Technical English. Harlow: Prentice Hall Europe, 1993.
8. Taylor, Grant. English Conversation Practice. Mc Graw Hill, 2001
9. Jones, Leo. Functions of English a course for upper-intermediate and more advanced students - Student's Book. New York: Cambridge University Press,1982

ONLINE/E RESOURCES

1. English and Academic Preparation - Pre-Collegiate offered by Rice University on Coursera

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE:

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22HST103	**English Communication Skills (Advanced)**	**2**	**2**	**0**	**0**	**0**

PREREQUISITE: None

COURSE OBJECTIVES:

•To improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading, Listening, Speaking, and Writing skills

•To equip students to study academic subjects more effectively using the theoretical and practical components of English Communication Skills syllabus

•To develop study skills and communication skills in formal and informal situations

COURSE OUTCOMES:

CO1	Expand vocabulary through several interactive exercises
CO2	Improve ability to read and understand the written word in everyday life through the study of basic comprehension skills, such as main idea, major and minor details, and patterns of organization
CO3	Enhance the listening and speaking skills through several interactive exercises
CO4	Locate explicit textual information, draw complex inferences, describe, analyse, and evaluate the information within and across multiple texts of varying lengths
CO5	Write complete, concise, concrete, correct, clear, and courteous letters, and e-mails

COURSE ASSESSMENT:

The Course Assessment (culminating to the final grade), will be made up of the following three components-

S. No.	Component	Weightage
a)	Mid-Term examination	30%
b)	End Semester Examination	50%
c)	Flagship Project/ MOOC/Attendance and Class performance	20%

COURSE CONTENTS:

Unit I- Texts

1.Letter from Infosys Founder Narayan Murthy to his daughter Akshata

2. Email from Satya Nadella's to his employees on his first day as CEO, Microsoft

3. Essay entitled Freedom and Choice by N. Krishnaswamy, Lalitha Krishnaswamy and Revathi Krishnaswamy

(no. of lectures- 6)

Unit II-Vocabulary

Vocabulary from the prescribed texts– A brief history of Words – Using Words in different Forms – Root Words - Affixes– Collocations– Synonyms and Antonyms – Homonyms, Homophones –Idiomatic Expressions –One-word Substitutes – Foreign words and Phrases in English

(no. of lectures-6)

Unit III- Grammar

Grammar topics addressed in the texts– Articles – Subject Verb Agreement –Tense – Phrasal Verbs – Conditional Sentences – Question Tags– Common Errors

(no. of lectures- 6)

Unit IV- Reading

Short Comprehension Passages – Skimming-Scanning and Predicting –Intensive Reading–Extensive Reading

(no. of lectures- 6)

Unit V- Writing & Listening

Techniques for Effective Writing– Note Making– Paragraph Writing– Precis Writing – Letter Writing –Format, Styles, Parts–Formal Letters including Job Application with Resume– Writing Emails.

Listening - Listening the audio clips from British Council, Cambridge, and Podcasts followed by discussion.

(no. of lectures-6)

Flagship Project

The students will create and submit their podcasts in groups.

MOOC Course:

English and Academic Preparation - Pre-Collegiate offered by Rice University on Coursera, an online free course of 23 hrs. (The students will submit the certificate of completion at the end of the semester and will be evaluated on the basis of it.)

TEXT BOOKS/ REFERENCE BOOKS:

Text Book:

1. Raman, Meenakshi and Sharma, Sangeeta. Technical Communication- Principles and Practice. Third Edition. New Delhi: Oxford University Press. 2015. Print.

Reference Books:

1. Roberts, Rachel, Antonia Clare and J.J. Wilson. New Total English Intermediate Students Book. Pearson Longman. 2011

2.Green, David. Contemporary English Grammar –Structures and Composition. MacMillan India. 2014 (Print)

3. Rizvi, M. Ashraf. Effective Technical Communication. Tata Mc Graw –Hill. 2015 (Print)

4. Pickett, Nell Ann, Ann A. Laster and Katherine E. Staples. Technical English: Writing, Reading and Speaking. New York: Longman, 2001.

5. Bailey, Stephen. Academic Writing: A practical guide for students. New York: Rutledge, 2011.

6. Morgan, David and Nicholas Regan. Take-Off: Technical English for Engineering Reading: Garnet Publishing Limited, 2008.

7. Thorn, Michael and Alan Badrick. An Introduction to Technical English. Harlow: Prentice Hall Europe, 1993.

8. Taylor, Grant. English Conversation Practice. Mc Graw Hill, 2001

9. Jones, Leo. Functions of English a course for upper-intermediate and more advanced students - Student's Book. New York: Cambridge University Press,1982

ONLINE/E RESOURCES

1. English and Academic Preparation - Pre-Collegiate offered by Rice University on Coursera

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech.

(All branches I/II Semester)

DETAILS OF THE COURSE:

Course Code	Course Title	Credits	Lecture	Tutorial	Practical
22HSP104 / 22HSP105	**Communication Skills Lab (Basic / Advanced)**	**1**	**0**	**0**	**2**

PREREQUISITE: None

COURSE OBJECTIVES:

- To provide opportunities to the students to improve their language skills through the Language Laboratory software.
- To engage them in interactive exercises focusing on improving their communication skills and fluency in English.
- To prepare and deliver effective presentations

COURSE OUTCOMES:

CO1	To carry over the knowledge of linguistic items and incorporate it in their speech
CO2	To develop confidence in speaking in public
CO3	To make effective presentations

COURSE ASSESSMENT:

The Course Assessment (culminating to the final grade), will be made up of the following three components-

S. No.	Component	Weightage
a)	Continuous Assessment	60%
b)	Mid-term examination	20%
c)	End Semester Examination	20%

COURSE CONTENTS:

1. Language Skills: Practice in Vocabulary, Grammar, Reading, Listening and Writing on Language Laboratory software
2. Speaking Skills Practice: Self-presentation, Extempore Speaking, Just a Minute, Weave a Story, Debate, Group Discussion, Elevator Pitch, Role Play
3. Presentation Skills: Preparing and delivering effective presentations

TEXT BOOKS/ REFERENCE BOOKS:

1. Dale Carnegie: *The Quick and Easy Way to Effective Speaking*, Lexicon Publications
2. Carmine Gallo: *Talk Like Ted*
3. McKay, Matthew, Martha Davis, Patrick Fanning. *Messages: The Communication Skills Book*. New Harbinger Publications
4. Dale Carnegie and J. Berg Esenwein: *The art of public speaking,* Rupa Publications
5. Andrew Leigh & Michael Maynard: *The Perfect Presentation*, Random House
6. Andrew Leigh & Michael Maynard: *Perfect Communications*, Random House

RELEVANT LAB SOFTWARE & ONLINE/E RESOURCES

1. Tense Buster
2. Business Writing
3. Study Skills Success
4. Issues in English
5. Ted Talks

Program Core Courses

and

Syllabus

for

I Year B.Tech.

(Chemical Engineering)

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I	22CHT101	Introduction to Chemical Engineering	PC	Theory	3	3	0	0
2	I	22CHT102	Chemical Engineering Thermodynamics-I	PC	Theory	4	3	1	0
3	II	22CHT103	Chemical Process Calculations	PC	Theory	4	3	1	0
4	II	22CHT104	Process Instrumentation	PC	Theory	3	3	0	0
					Total Credits	**14**			

DEPARTMENT OF CHEMICAL ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Chemical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CHT101	**Introduction to Chemical Engineering**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE Nil.

COURSE OBJECTIVE(s)

To introduce the basic features and concepts of Chemical Engineering to the students.

COURSE OUTCOMES:

CO1	Understanding the chemical engineering and its future prospects
CO2	To acquire knowledge of chemical process industries
CO3	To acquire knowledge of basic principles of chemical engineering
CO4	Knowledge of new developments in chemical engineering and career prospects

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade) will be made up of the following three components.

S. No.	Component	Weightage
a)	Weekly Submissions/assignments/quizzes (CWS)	20%
b)	Mid-term examination (MTE)	30%
c)	End Semester Examination (ETE)	50%

COURSE CONTENTS

Unit I- Introduction: Definition of chemical engineering, historical perspective and contribution; job description and attributes of a chemical engineer, chemical engineering and its seamless integration with other sciences and engineering disciplines; Societal needs and role of chemical engineer for society development; Economic scale of production; Waste utilization and recycle, sustainable technology; Employment opportunities, knowledge resources; Frontiers & future roadmap; Challenges of chemical engineering practice.

(No. of lectures- 8)

Unit II- Chemical Process Industries: Framework of chemical industry and its classification, Evolution of chemical industries, Technological developments in major challenges; Chemical industries structure and segments of chemical industry, raw material and production pattern; Petroleum, petrochemical and fertilizer industry integration; Cleaner and greener technologies.

(No. of lectures- 8)

Unit III- Basic Principles of Chemical Engineering: Basic principles of chemical processes, unit processes and unit operations and various routes to produce chemicals; Material and Energy balances; Basic concept of mass, energy, and momentum transport; Equilibrium and rate-based processes.

(No. of lectures- 8)

Unit IV- Thermodynamics and kinetics: Reaction engineering and reactors; Measuring instruments, automation, and control; Concept of equipment design, modelling and simulation.

(No. of lectures- 8)

Unit V- Process Engineering Design Software (Aspen Plus, Hysys, Matlab, etc.), Engineering computation using Microsoft Excel, Process Flow and Instrumentation Diagram, Important developments and milestones in chemical engineering, R&D in chemical engineering; Recent advances in Chemical Engineering

(No. of lectures- 8)

TEXTBOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):

1. Nnaji, U., "Introduction to Chemical Engineering: For Chemical Engineers and Students", Wiley, 2019.
2. Solen, K.A. and Harb, J.N., "Introduction to Chemical Engineering Tools for Today and Tomorrow", 5th edition, John-Wiley, 2011.
3. Denn, M.M., "Chemical Engineering: An Introduction", Cambridge University Press, 2012.
4. Pushpavanam, S., "Introduction to Chemical Engineering", PHI Learning Pvt. Ltd. 2012.
5. Ghosal, S.K., Sanyal, S.K., Datta, S., "Introduction to Chemical Engineering", Tata McGraw Hill, 1997.
6. Himmelblau D.M. and Riggs J.B., "Basic Principles and Calculations in Chemical Engineering", 8th Edition, PHI, 2014.
7. Austin, G. T., "Shreve's Chemical Process Industries", 5th Edition, McGraw-Hill, Company, 1984.

Lecture Plan

Lecture No.	Topics to be covered
1-8	**Introduction:** Definitions and Concepts: System, Surroundings, Property, Energy, Work, Thermodynamic equilibrium, stability of equilibrium states. **Zeroth Law of Thermodynamics**: Perfect gas scale. **First Law of Thermodynamics:** First law of Thermodynamics and Its Applications, First law analysis of processes, Control mass and control volume analysis, Steady state, and Transient state flow processes.
9-16	**Volumetric Properties of Pure Fluids:** PVT behavior of pure substances, virial equation and its applications, cubic equations of state, generalized correlations for gases and liquids.
17-24	**Heat Effects:** Sensible heat effects, heat effects accompanying phase changes of pure substances, standard heats of reaction, formation and combustion, effect of temperature on the standard heat of reaction.
25-32	**Second law of Thermodynamics:** Limitation of First Law, Kelvin-Planck and Clausius Statements, Reversible and Irreversible Processes, Carnot cycle, Entropy, Second Law analysis of a control volume. Exergy.
33-40	**Basic Concepts & Application of Statistical Thermodynamics:** Need of statistical thermodynamics, Macrostates and microstates, Degenerate energy levels, Bose-Einstein statistics, Fermi-Dirac statistics, Entropy, Ideal gas, Maxwell speed distribution, Einstein model of solid, Debye model of solid

DEPARTMENT OF CHEMICAL ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Chemical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CHT102	**Chemical Engineering Thermodynamics-I**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE Nil.

COURSE OBJECTIVE(s)

To learn the principles of work and energy and understand the laws of thermodynamics to apply in industries.

COURSE OUTCOMES:

CO1	To understand the basic concepts and first law of thermodynamics
CO2	To understand the PVT behaviour of fluids
CO3	To understand the heat effects
CO4	To understand the second law of thermodynamics
CO5	To understand the concepts of statistical thermodynamics

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade) will be made up of the following three components.

S. No.	Component	Weightage
a)	Weekly Submissions/assignments/quiz	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Unit I- Introduction: Definitions and Concepts: System, Surroundings, Property, Energy, Work, Thermodynamic equilibrium, stability of equilibrium states.
Zeroth Law of Thermodynamics: Perfect gas scale.
First Law of Thermodynamics: First law of Thermodynamics and Its Applications, First law analysis of processes, Control mass and control volume analysis, Steady state, and Transient state flow processes.

(No. of lectures- 8)

Unit II- Volumetric Properties of Pure Fluids: PVT behavior of pure substances, virial equation and its applications, cubic equations of state, generalized correlations for gases and liquids.

(No. of lectures- 8)

Unit III- Heat Effects: Sensible heat effects, heat effects accompanying phase changes of pure substances, standard heats of reaction, formation and combustion, effect of temperature on the standard heat of reaction.

(No. of lectures- 8)

Unit IV- Second law of Thermodynamics: Limitation of First Law, Kelvin-Planck and Clausius Statements, Reversible and Irreversible Processes, Carnot cycle, Entropy, Second Law analysis of a control volume. Exergy.

(No. of lectures- 8)

Unit V- Basic Concepts & Application of Statistical Thermodynamics: Need of statistical thermodynamics, Macrostates and microstates, Degenerate energy levels, Bose-Einstein statistics, Fermi-Dirac statistics, Entropy, Ideal gas, Maxwell speed distribution, Einstein model of solid, Debye model of solid

(No. of lectures- 8)

TEXTBOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year): -

1. Smith, J. M., Van Ness, H. C. and Abbott, M. M., "Introduction to Chemical Engineering Thermodynamics", 8th Ed., McGraw-Hill, 2019.
2. Rao, Y. V. C., "An Introduction to Thermodynamics," University Press,2004.
3. Cengel, Y.A., "Thermodynamics: An Engineering Approach," 9th Ed., McGraw-Hill, 2019.
4. Nag, P.K., "Engineering Thermodynamics", 6th edition, McGraw-Hill, 2017.

Lecture Plan

Lecture No.	Topics to be covered
1	**Introduction:** Definition of chemical engineering, historical perspective and contribution; job description and attributes of a chemical engineer.
2	Chemical engineering and its seamless integration with other sciences and engineering disciplines.
3-4	Societal needs and role of chemical engineer for society development; Economic scale of production
5-6	Waste utilization and recycle, sustainable technology
7	Employment opportunities, knowledge resources
8	Frontiers & future roadmap; Challenges of chemical engineering practice.
9-10	**Chemical Process Industries**: Framework of chemical industry and its classification.
11-12	Evolution of chemical industries, Technological developments in major challenges
13-14	Chemical industry's structure and segments of chemical industry, raw material, and production pattern;
15-16	Petroleum, petrochemical and fertilizer industry integration, Cleaner and greener technologies
17-18	**Basic Principles of Chemical Engineering:** Basic principles of chemical processes, Unit processes and unit operations, Various routes to produce chemicals
19-20	Material and Energy balances
21-24	Basic concept of mass, energy, and momentum transport; Equilibrium and rate-based processes.
25-26	**Thermodynamics and kinetics**: Reaction engineering and reactors
27-28	Measuring instruments, automation, and control
29-30	Concept of equipment design
31-32	Concept of modelling and simulation
33-35	Process Engineering Design Software (Aspen Plus, Hysys, Matlab, etc.),
36-37	Engineering computation using Microsoft Excel
38	Process Flow and Instrumentation Diagram
39-40	Important developments and milestones in chemical engineering, R&D in chemical engineering; Recent advances in Chemical Engineering

DEPARTMENT OF CHEMICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Chemical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CHT103	**Chemical Process Calculation**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE Nil.

COURSE OBJECTIVE(s)

To introduce to the fundamental principles of chemical process analysis.

COURSE OUTCOMES:

CO1	Correlate between different Unit systems and their conversions for various process variables.
CO2	Learn how to perform materials balance in any chemical processes with or without chemical reactions.
CO3	Apply the gas laws to solve problems related to ideal gases and mixtures.
CO4	Apply the energy balance to solve particular problems with and without chemical reactions
CO5	Solve de-coupled and coupled equations of mass and energy balance, numerically and computationally.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade) will be made up of the following three components.

S. No.	Component	Weightage
a)	Weekly Submissions/assignments/quizzes	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Unit I-Introduction to Chemical Engineering Calculations: Conversion of Units, dimensional consistency and data analysis, significant figures, precision and accuracy, concepts of molarity, molality, normality, ppm, weight fraction, mole fraction and volume fraction, density and specific gravity, process variables and principles of stoichiometry.

(No. of lectures- 10)

Unit II- Materials balance with and without chemical reactions: Flowchart, mole and mass balance for multi-component systems under: steady and unsteady state, single-phase and multiphase, material balances in processes including recycle, bypass and purge, Steady state material balances for reactions: species and elemental balances, combustion reactions, concept of limiting, excess reactants, fractional conversion and percentage of conversion, yield, ultimate and proximate analysis of fuels, excess air, air-fuel ratio calculations.

(No. of lectures- 10)

Unit III- Thermodynamics of Multi-phase system: Vapor-liquid equilibrium: Ideal and real gas, equation of state, Bubble point, dew point calculations, Phase diagram, Gibbs phase rule, Antoine equation, phase equilibria of vapour-liquid, solid-liquid and immiscible liquid-liquid systems.

(No. of lectures- 10)

Unit IV- Energy balance with and without chemical reactions: De-Coupled and coupled mass and energy balances, calculation of enthalpy changes, steady state mass and energy balance with and without reactions, heats of solution and mixing, Use of Psychometric chart, and steam table, thermochemistry, Hess's law of summation- heat of formation, Hess's Law and heats of combustion, Unsteady state material and energy balances, isothermal and adiabatic processes, Numerical and computation approach to solve problems with simultaneous mass and energy balance.

(No. of lectures- 10)

TEXTBOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year): -

1. Himmelblau, D., Riggs, J., "Basic Principles and Calculations in Chemical Engineering", 8th edition, Pearson, 2012.
2. Hougen, O.A, Watson, K.M and Ragatz R.A, "Chemical Process Principles: Part .1 (Chemical Process Principles: Material and Energy Balances)", 2nd edition, CBS 2004
3. Bhatt B.I, and Vora S.M, "Stoichiometry", 4th edition, McGraw-Hill, 2004.
4. Felder, R.M., Rousseau, R.W., and Bullard, L.G., "Elementary Principles of Chemical Processes", 4th edition, John Wiley and Sons, 2016.
5. Narayanan, K.V., and Lakshmikutty, B., "Stoichiometry & Process Calculations", 2nd edition, Prentice Hall Publishing, 2016.
6. Chopey, N., Hicks, T., "Handbook of Chemical Engineering Calculations", 4th edition, McGraw-Hill Education, 2012.

Lecture Plan

Lecture No.	Topics to be covered
1-10	**Introduction to Chemical Engineering Calculations:** Conversion of Units, dimensional consistency and data analysis, significant figures, precision and accuracy, concepts of molarity, molality, normality, ppm, weight fraction, mole fraction and volume fraction, density and specific gravity, process variables and principles of stoichiometry.
11-20	**Materials balance with and without chemical reactions:** Flowchart, mole and mass balance for multi-component systems under: steady and unsteady state, single-phase and multiphase, material balances in processes including recycle, bypass and purge, Steady state material balances for reactions: species and elemental balances, combustion reactions, concept of limiting, excess reactants, fractional conversion and percentage of conversion, yield, ultimate and proximate analysis of fuels, excess air, air-fuel ratio calculations.
21-30	**Thermodynamics of Multi-phase system**: Vapor-liquid equilibrium: Ideal and real gas, equation of state, Bubble point, dew point calculations, Phase diagram, Gibbs phase rule, Antoine equation, phase equilibria of vapour-liquid, solid-liquid and immiscible liquid-liquid systems.
31-40	**Energy balance with and without chemical reactions**: De-Coupled and coupled mass and energy balances, calculation of enthalpy changes, steady state mass and energy balance with and without reactions, heats of solution and mixing, Use of Psychometric chart, and steam table, thermochemistry, Hess's law of summation-heat of formation, Hess's Law and heats of combustion, Unsteady state material and energy balances, isothermal and adiabatic processes, Numerical and computation approach to solve problems with simultaneous mass and energy balance.

DEPARTMENT OF CHEMICAL ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Chemical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CHT104	**Process Instrumentation**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE Nil.

COURSE OBJECTIVE(s)

To study various types of instruments in terms of fundamentals concepts, functional elements, calibration, and characteristics.

COURSE OUTCOMES:

CO1	To understand scientific concepts, principles, and theories appropriate to instrumentation.
CO2	Students developed an understanding of various process instruments, control valves, pressure measurement, temperature measurement, flow measurement devices.
CO3	Students gained understanding of the performance criteria of instruments (range: precision, accuracy, sensitivity and range ability).
CO4	To understand scientific concepts, principles, and theories appropriate to instrumentation.
CO5	Students developed an understanding of various process instruments, control valves, pressure measurement, temperature measurement, flow measurement devices.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade) will be made up of the following three components.

S. No.	Component	Weightage
a)	Weekly Submissions/assignments/quiz	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Unit I - Introduction: Application of instrument systems, functional elements of a measurement system, classification of instruments, standards and calibration, instrument symbols & tag numbering system.

(No. of lectures- 6)

Unit II - Temperature Measurement: Temperature scales, temperature measuring instruments, liquid in glass thermometer, bimetallic thermometer, resistance temperature detectors (RTD), thermocouples, pyrometry**.**

(No. of lectures- 4)

Unit III - Pressure Measurement: Measurement of moderate pressure, high pressure and low pressure (vacuum), calibration and standardization.

(No. of lectures- 3)

Unit IV - Flow Measurement: Positive displacement meters, variable head meters, variable area meters (rotameters), Weirs and notches, pitot tube, electromagnetic flow meter, hot wire anemometer, ultrasonic flow meters, laser Doppler anemometer.

(No. of lectures- 5)

Unit V - Acoustics Measurement: Characteristics of sound, Sound pressure, Power and intensity levels, Loudness, Typical Sound Measuring systems & Microphones.

(No. of lectures- 3)

Unit VI - Static characteristics of instruments: Liquid level, pH, viscosity, conductivity, humidity, gas composition, and nuclear radiation, Errors and uncertainties in performance parameters, propagation of uncertainties in compound quantities, static performance parameters.

(No. of lectures- 6)

Unit VII - Dynamic characteristics of instruments: Formulation of system equations, dynamic response, compensation, Transducers, building blocks of an instrument, Control centre, Instrumentation diagram, online instrumentation in modern plants.

(No. of lectures- 5)

Unit VIII - Control Valves: Valve terminology, Valve capacity, Valve rangeability, Valve type based on body Design: Globe bodies, Angle, Needle, Ball, Eccentric rotating, Plug, Butterfly, Diaphragm, Pinch, Drag flow characteristic, Trim design, Mechanical feature, Actuator, Pneumatic types, Electric types, Electrohydraulic types. Positioner-Pneumatic, Electro pneumatic, Positioner features & accessories, Control Valve Accessories-Testing procedure of control valve: CV and Rangeability (Valve sizing-initial level), Pressure Relieving Devices: Relief valve, Safety valves and Rupture discs.

(No. of lectures- 6)

Unit IX - Signal Converting Elements: Pneumatic to electrical convertors, Electric to Pneumatic convertors, Voltage to Current convertor, Current to Voltage convertor, Frequency to voltage & voltage to Frequency convertor, Transmitter and Transducer signals.

(No. of lectures- 4)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year): -

1. Himmelblau, D., Riggs, J., "Basic Principles and Calculations in Chemical Engineering", 8th edition, Pearson, 2012.
2. Eckman, D. P., "Industrial Instrumentation," Wiley Eastern, 2004.
3. Nakra, B.C. and Chaudhry, K.K., "Instrumentation, Measurement and Analysis," 2nd ed., Tata McGraw Hill, New Delhi, 2016.
4. Patranabis, D., "Principles of Industrial Instrumentation," Tata McGraw Hill, New Delhi, 2007.
5. E.O. Doebelin, "Measurement Systems", McGraw Hill, Fourth ed., 1990.
6. Lipták, B.G., "Instrument Engineers' Handbook: Process Measurement and Analysis," Vol 1 & 2, CRC Press, 2003.
7. Andrew, W. G., et al., "Applied Instrumentation in the Process Industries," Gulf Pub., 1993.
8. Wightman, E. J., "Instrumentation in Process Control," Butterworths, 1999.
9. Doebelin, E., "Measurement Systems: Applications and Design," 6th ed., McGraw-Hill, 2011.

Lecture No.	Topics to be covered
1-2	**Introduction to Instruments and their Representation:** Application of instrument systems
3-4	Functional elements of a measurement system
5-6	Classification of instruments, standards and calibration
7-8	**Temperature Measurement:** Temperature Scales, temperature measuring instruments: liquid in glass thermometer
9-10	Bimetallic thermometer, resistance temperature detectors (RTD), thermocouples, Pyrometry
11-13	**Pressure Measurement**: Measurement of moderate pressure, high pressure and low pressure (vacuum), calibration and standardization
14-15	**Flow Measurement:** Positive displacement meters, variable head meters

16-17	Variable area meters (rotameters), Weirs and notches, pitot tube
18	Electromagnetic flow meter, hot wire anemometer, Ultrasonic flow meters, laser Doppler anemometer
19-24	**Static characteristics of instruments:** Liquid level, pH, viscosity, conductivity, humidity, gas composition, nuclear radiation, errors and uncertainties in performance parameters, propagation of uncertainties in compound quantities, static performance parameters
25-29	**Dynamic characteristics of instruments:** Formulation of system equations, dynamic response, compensation, transducers, building blocks of an instrument, control centre, instrumentation diagram, online instrumentation in modern plants
30-35	**Control Valves:** Valve terminology, valve capacity, valve rangeability, valve type based on body design: globe bodies, angle, needle, ball, eccentric rotating, plug, butterfly, diaphragm, pinch, drag flow characteristic, trim design, mechanical feature, actuator, pneumatic types, electric types, electrohydraulic types. positioner-pneumatic, electro pneumatic, positioner features & accessories, control valve accessories-testing procedure of control valve: CV and rangeability (valve sizing-initial level), pressure relieving devices: relief valve, safety valves and rupture discs.
36-42	**Signal Converting Elements:** Pneumatic to electrical convertors, electric to pneumatic convertors, voltage to current convertor, current to voltage convertor, frequency to voltage & voltage to frequency convertor, transmitter and transducer signals.

Program Core Courses

and

Syllabus

for

I Year B.Tech.

(Civil Engineering)

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I	22CET103	Surveying	PC	Theory	3	3	0	0
2	I	22CEP104	Surveying lab	PC	Practical	1	0	0	2
3	I	22CEP105	Introduction to Civil Engineering	PC	Practical	1	0	0	2
4	II	22CET106	Mechanics of Solids	PC	Theory	4	3	1	0
5	II	22CET107	Engineering Geology	PC	Theory	3	3	0	0
6	II	22CEP108	Engineering Geology lab	PC	Practical	1	0	0	2
					Total Credits	**13**			

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Civil Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CET103	**Surveying**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE

To equip the students with basic knowledge of surveying, and its applications in various areas and projects related to civil engineering as well as in upcoming challenges facing the society.

COURSE OUTCOMES

CO1	To know the importance of surveying in various fields of civil engineering
CO2	To find out the relative position of a given station concerning another station in the horizontal and vertical plane
CO3	To learn about plotting traverse and finding its area
CO4	To learn the use of basic and advanced surveying equipment

COURSE ASSESSMENT

Course Assessment (culminating to the final grade), will be made up of the following:

S. No.	Component	Weightage
a)	Assignments / Term Papers	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Basic principles, Maps, their scales, referencing system and uses, plotting accuracy;

Map coordinate system; projections and their types, Compass and other instruments; Measurement of distances and directions; Theodolite, Temporary and permanent adjustments of Theodolite, Traversing,

Adjustment of survey data; Computation of coordinates, Levelling, Tacheometery, Trigonometrical levelling,

Introduction to Total Station Plane Table survey, Contouring, Curves.

TEXT BOOKS/ REFERENCE BOOKS (Authors, Title, Publisher)

1. Surveying Instruments by James M.Anderson & Edward M.Mikhail
2. Surveying Vol. I & II by S.K.Duggal
3. Surveying, by A. M. Chandra, Narosa Pub. House., New Delhi

Lecture Plan

Lec #	Topics to be covered
L1	1.1.1 • Introduction
L1	1.1.2 • Object
L1	1.1.3 • Importance of surveying to engineers
L1	1.1.4• Classification
L1	1.1.5 • Plane and geodetic surveying
L2	1.2.1 • principle of surveying from whole to part
L2	1.2.2 • conventional signs
L2	1.2.3 • units of measurement
L3	1.3.1• Different types of chains tapes and their uses
L3	1.3.2 • Sources of error and precautions
L4	1.3.3• corrections to tape measurements
L4	1.3.4• Field problems in distance measurement.
L5	2.1.1 • Direction measuring instruments
L5	2.1.2 • Types
L5	2.1.3• Uses
L5	2.1.4 • Reference meridians
L0	Introduction to the Subject and its Significance.
L6	2.1.6 • W.C.B. & Q.B. system
L6	2.1.7 • Numerical
L7	2.2.1• F.B. & B.B.
L7	2.2.2• Conversion W.C.B. & Q.B System
L7	2.2.3 • Numerical
L8	2.2.4 • Magnetic declination and its variation
L8	2.2.5• Local attraction
L8	2.2.6• Numericals
L9	2.2.7 • Compass
L9	2.2.8• Types
L9	2.2.9 • Uses & Adjustment
L10	2.3.1 • Theodolite
L10	2.3.2• Types
L10	2.3.3• Uses & Adjustment

L10	2.3.4• Measurement of horizontal angle
L11	2.3.5• Numericals
L12	2.3.6 • Measurement of vertical angle
L12	2.3.7 • Application of theodolite in field problems
L13	UNIT TEST 1
L14	3.1.1• Different methods of traversing
L14	3.1.2• Chain traverse
L14	3.1.3• Chain & compass traverse
L14	3.1.4 • Transit-tape traverse
L15	3.1.5• Transit-tape traverse by measurement of angle between lines
L15	3.1.6• Check in travers
L16	3.1.7 • Plotting a traverse
L16	3.1.8 • By angle & distance method
L16	3.1.9 • By co-ordinate method
L17	3.1.10• Balancing the traverse
L17	3.1.11 • Bowditch's method
L17	3.1.12 • By transit method
L18	3.1.13• Axis method
L18	3.1.14• Graphical method
L18	3.1.15• Gales traverse table
L19	UNIT TEST- 2
L20	4.1.1• Definitions of various terms in leveling
L20	4.1.2• Types of leveling
L20	4.1.3 Leveling instruments
L21	4.1.4• Dumpy level
L21	4.1.5• Tilting level
L21	4.1.6• Reversible level
L22	4.1.7• Leveling staff
L22	4.1.8• Surveying telescope
L22	4.1.9• Temporary adjustment of level
L23	4.1.10• Steps in leveling
L23	4.1.11• Differential leveling
L23	4.1.12• Height of instrument method
L24	4.1.13• Rise and fall method
L24	4.1.14• Numericals
L25	4.1.15• Leveling curvature
L25	4.1.16• Refraction corrections
L25	4.1.17• Reciprocal leveling
L26	4.1.18• Profile leveling

L26	4.1.19• L-Section
L26	4.1.20• Cross-sections
L26	4.1.21• Errors in Leveling
L27	5.1.1• Elements of plane table survey
L27	5.1.2• Working operations
L27	5.1.3• Methods of plane table survey
L27	5.1.4• Intersection
L28	5.1.5• Methods of plane table survey
L28	5.1.6• Traversing
L28	5.1.7• Resection
L29	5.1.8• Two point problems.
L29	5.1.9• Three point problems.
L30	5.1.10• Errors in plane table
L30	5.1.10• Advantage & disadvantage
L30	5.1.11• plane table
L31	5.2.1• Characteristics of contours
L31	5.2.2• Contour interval
L31	5.2.3• Contour gradient
L32	5.2.4• Methods of locating contours
L32	5.2.5• Direct method
L32	5.2.6• Horizontal control
L32	5.2.7• Vertical control
L33	5.2.8• Indirect method
L33	5.2.9• By squares
L33	5.2.10• By cross-section
L34	5.2.11• By tachometric method
L34	5.2.12• Uses of contour maps.
L35	Revision
L36	Revision

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Civil Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CEP104	**Surveying Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

Surveying (taken concurrently)

COURSE OBJECTIVE

To equip the students with basic knowledge of

1. Using different instruments in field of surveying
2. Calculating errors in linear measurement with chain and tapes
3. Performing field exercise for measuring bearing of lines and closing errors
4. Performing level difference of different points in vertical plane
5. Drawing contour plan of given field

COURSE OUTCOMES

CO1	To plot a traverse using different approaches and measuring devices.
CO2	To determine the level difference and relative position in the vertical plane.
CO3	To plot the contour maps using tacheometric instrument.
CO4	To learn the use of advanced surveying equipment

COURSE ASSESSMENT

Course Assessment (culminating to the final grade), will be made up of the following:

S. No.	Component	Weightage
a)	Lab Sessions	60%
b)	End Semester Examination	40%

COURSE CONTENTS

Basic principles of Maps, their scales, referencing system and uses, plotting accuracy; Map coordinate system; projections and their types, Compass and other instruments; Measurement of distances and directions using Theodolite, Temporary and permanent adjustments of Theodolite, Traversing, Adjustment of survey data; Computation of coordinates, Levelling, Tacheometery, Trigonometrical levelling, Introduction to Total Station survey, Contouring

TEXT BOOKS/ REFERENCE BOOKS (Authors, Title, Publisher)

1. Surveying Instruments by James M.Anderson & Edward M.Mikhail
2. Surveying Vol. I & II by S.K.Duggal
3. Surveying, by A. M. Chandra, Narosa Pub. House., New Delhi
4. Departmental Manual

LIST OF EXPERIMENTS

Lab #	Name of the Experiment
1	Introduction demonstration of surveying equipments
2	Introduction to different distance measurement methods and equipments like chains and tapes
3	Measurement of bearings using Compass
4	Measurement of angles and determination of local attraction using compass
5	Temporary adjustment of Theodolite
6	Measurement of horizontal using Theodolite
7	Measurement of vertical angles using theodolite
8	Compass Traversing
9	Theodolite traversing
10	Differential levelling using Dumpy level
11	Differential levelling using Tilting level
12	Contouring exercise

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Civil Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CEP105	**Introduction to Civil Engineering**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

None

COURSE OBJECTIVE

To provide an overview of the scope, reach, and breadth of the discipline of Civil Engineering to the first-year undergraduate students.

COURSE OUTCOMES:

CO1	To gain knowledge about the various sub-disciplines of Civil Engineering and the breadth of application areas
CO2	To gain an insight about the practical application and importance of each sub-discipline of Civil Engineering
CO3	To gain an insight about the importance of Civil Engineering to industry as well as the society at large

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade) will be made up of the following:

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	100%

COURSE CONTENTS (Description type I)

Unit I – Introduction to Civil Engineering; an overview of 4-year curriculum **(1 session)**

Unit II – Site visits to various places around Jaipur with respect to each sub-discipline of Civil Engineering **(8 sessions)**

Unit III – Site visits to various industries around Jaipur to highlight the breadth of applications of Civil Engineering **(3 sessions)**

COURSE CONTENTS (Description type II)

Introduction to Civil Engineering and Overall Curriculum

Introduction to Surveying and Geodesy

Introduction to Engineering Geology

Introduction to Environmental Engineering
Introduction to Geotechnical Engineering
Introduction to Transportation Engineering
Introduction to Structural Engineering
Introduction to Water Resources Engineering
Introduction to Construction and Project Management
Industrial visits in and around Jaipur City show casing practical applications in Civil Engineering

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

None

Plan of Sessions

Session #	Highlight of Site Visits
1	Introduction to Civil Engineering and Overall Curriculum
2	Site visit to highlight the nature of work and importance of Surveying and Geodesy
3	Site visit to highlight the nature of work and importance of Engineering Geology
4	Site visit to highlight the nature of work and importance of Environmental Engineering
5	Site visit to highlight the nature of work and importance of Geotechnical Engineering
6	Site visit to highlight the nature of work and importance of Transportation Engineering
7	Site visit to highlight the nature of work and importance of Structural Engineering
8	Site visit to highlight the nature of work and importance of Water Resources Engineering
9	Site visit to highlight the nature of work and importance of Construction and Project Management
10	Site visit to a local industry to highlight the practical application and importance of Civil Engineering
11	Site visit to a local industry to highlight the practical application and importance of Civil Engineering
12	Site visit to a local industry to highlight the practical application and importance of Civil Engineering

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CET106	**Mechanics of Solids**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE

Physics

COURSE OBJECTIVE(s)

To equip the students with basic knowledge of mechanical properties of materials and introduce application of loads and its effect in deformable bodies.

COURSE OUTCOMES:

CO1	To develop ability to estimate forces, stresses, and strains of different structural components subjected to axial and torsional loads
CO2	To be able to analyze the structures and to draw shear force and bending moment diagrams
CO3	To be able to determine stresses in beams and buckling load of long columns
CO4	To be able to transform the stresses on an inclined element to obtain principal stresses and maximum shear stresses

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS (Description type I)

Unit I- Introduction: concept of stress and strain, shear stress and strain, stress-strain behaviour of ductile and brittle material in uniaxial state of stress, relationships between elastic constants, type of beams, type of supports, type of loads.

(no. of lectures- 8)

Unit II- Axially loaded members: free body diagrams, determination of axial-force, deformation of axial members, stiffness and flexibility, statically indeterminate structures, thermal effects.

(no. of lectures- 8)

Unit III- Axial Force, shear Force and bending Moment: determination of axial-force, shear force and bending moment at a section. Axial force diagram, shear force diagram and bending moment diagrams for simple determinate beams and plane frames, differential relation between loads, shear force and bending moment.

(no. of lectures- 6)

Unit IV- Stresses in beams: assumption and derivation of simple bending theory, relation between bending moment, bending stress and curvature beams. Shear stresses in simple beams, shear stress distribution.

(no. of lectures- 6)

Unit V- Complex stress system**:** state of stress in two dimensions, state of stress in three dimensions, principal stresses, Maximum shear stress, Use of Mohr's circle. strain gauge rosettes. combined bending and direct stresses.

(no. of lectures- 6)

Unit VI- Buckling of column**:** slenderness ratio, Euler's buckling load for slender column, effective length for different end condition.

Torsion: torsion of circular sections, assumptions and derivation of relation between torsion moment, shear stress and angle of twist.

Analysis of truss: method of joints and method of section for analysis of determinate truss.

(no. of lectures- 6)

COURSE CONTENTS (Description type II)

Introduction: concept of stress and strain, shear stress and strain, stress-strain behavior of ductile and brittle material in uniaxial state of stress, relationships between elastic constants, type of beams, type of supports, type of loads.

Axially loaded members: free body diagrams, determination of axial-force, deformation of axial members, stiffness and flexibility, statically indeterminate structures, thermal effects.

Shear force and bending moment diagrams: determination of axial-force, shear force and bending moment at a section. Axial force diagram, shear force diagram and bending moment diagrams for simple determinate beams and plane frames, differential relation between loads, shear force and bending moment.

Stresses in beams: assumption and derivation of simple bending theory, relation between bending moment, bending stress and curvature beams. Shear stresses in simple beams, shear stress distribution.

Complex stress system: state of stress in two dimensions, state of stress in three dimensions, principal stresses, Maximum shear stress, Use of Mohr's circle. Strain gauge rosettes.

Combined bending and direct stresses: eccentric load on column**,** kern of section, maximum and minimum stress.

Buckling of column: slenderness ratio, Euler's buckling load for slender column, effective length for different end condition.

Torsion: torsion of circular shafts, assumptions and derivation of relation between torsion moment, shear stress and angle of twist.

Analysis of truss: method of joints and method of section for analysis of determinate truss.

TEXT BOOKS/ REFERENCE BOOKS):-

1. Mechanics of Materials: Barry Goodno & James Gere, Cengage Learning, 2012
2. Mechanics of Materials: Beer F. P., Johnston E. R., DeWolf J. T., & Mazurek D. F., MeGraw-Hill Education Ltd., 2015
3. Mechanics of Materials: Hibbeler, R. C., Pearson Education, 2005
4. Statics and Mechanics of materials: Hibbeler, R. C., Pearson Education, 2016

Lecture Plan

Lecture No.	Topics to be covered
1	**Introduction:** Introduction to mechanics of solids, rigid and deformable bodies
2	**Introduction:** Types of loads, supports, beams
3	**Introduction:** Concept of stress and strain
4	**Introduction:** Shear stress and strain, Hooke's law in shear
5	**Introduction:** Stress-strain behaviour of ductile and brittle material in uniaxial state of stress
6	**Introduction:** Free body diagram
7	**Introduction:** Relationships between elastic constants (E, G and K)
8	**Introduction:** Numericals on simple stress and strain, elastic constants
9	**Axially loaded members:** Relationship between stress and strain
10	**Axially loaded members:** Deformation of axially loaded members
11	**Axially loaded members:** Stress and deformation of axially loaded members
12	**Axially loaded members:** Stiffness and flexibility, factors of safety
13	**Axially loaded members:** Statically determinate and indeterminate structures
14	**Axially loaded members:** Statically indeterminate structures
15	**Axially loaded members:** Thermal effects in axially loaded members
16	**Axially loaded members:** Stresses on inclined sections
17	**Shear force and bending moment:** Reactions at the support
18	**Shear force and bending moment:**Concept of unbalanced forces at a transverse section
19	**Shear force and bending moment:**Shear force and bending moment diagrams for simple determinate beams
20	**Shear force and bending moment:**Shear force diagram and bending moment diagrams for simple determinate beams
21	**Shear force and bending moment:**Differential relation between loads, shear force and bending moment.
22	**Shear force and bending moment:**Shear force diagram and bending moment diagrams for simple determinate plane frames
23	**Stresses in beams:** Assumption and derivation of simple bending theory, pure bending
24	**Stresses in beams:** Relation between bending moment, bending stress and

	curvature beams.
25	**Stresses in beams:** Bending stress distribution in beams
26	**Stresses in beams:** Shear stresses in simple beams, shear stress formula
27	**Stresses in beams:** Shear stresses in web, limitations of shear stress formula
28	**Stresses in beams:** Shear stress distribution in beams
29	**Combined bending and direct stresses::** Combined bending and direct stresses
30	**Combined bending and direct stresses::** Kern of section, maximum and minimum stress
31	**Complex stress system:** Transformation of plane stress
32	**Complex stress system:** Principal stresses and maximum shear stresses
33	**Complex stress system:** Mohr's circle method
34	**Complex stress system:** Introduction to transformation of strains
35	**Buckling of column:** Stability of column, long and short columns, slenderness ratio
36	**Buckling of column:** Euler's buckling load for slender column, effective length for different end condition
37	**Torsion:** Torsion of circular sections, assumptions and derivation of relation between torsion moment, shear stress and angle of twist. Torsional rigidity, torsional stiffness
38	**Torsion:** Estimation of shear stresses and angular deformations due to torsion
39	**Analysis of truss:** Types of trusses, analysis of determinate truss using method of joints
40	**Analysis of truss:** Analysis of determinate truss using method of section

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Civil Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CET107	**Engineering Geology**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE

To equip the students with basic knowledge of engineering geology, and its applications in various areas and projects related to civil engineering as well as in upcoming challenges facing the society.

COURSE OUTCOMES

CO1	To develop an understanding of the role and impact of surface and subsurface geology in the planning and design of various Civil Engineering projects
CO2	To develop an understanding of the engineering properties of geologic materials and their usage and utility in various Civil Engineering applications
CO3	To become aware and gain knowledge about the geological challenges and disasters facing the society today, and their possible remedies
CO4	To become aware and gain knowledge about modern technology and tools available for collecting geological information from the field

COURSE ASSESSMENT

Course Assessment (culminating to the final grade), will be made up of the following:

S. No.	Component	Weightage
a)	Assignments / Term Papers	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS (Description type I)

Unit I: Introduction and Structure of the Earth (No. of Lectures – 6)

Introduction: Geology and civil engineer; atmosphere & clouds; earth's internal structure
Structural Geology: Folds & faults; joints & unconformities; plate tectonics

Unit II: Surface Processes Shaping our Planet (No. of Lectures – 6)

Geomorphology: Geologic action & engineering consideration of– weathering & erosion agents; winds & deserts; glaciers; streams & rivers; seas & oceans; groundwater

Unit III: Minerals and Rocks (No. of Lectures – 6)

Mineralogy: Minerals– properties & crystallography; formation processes & classification
Petrology: Igneous; Sedimentary; Metamorphic

Unit IV: Engineering Applications (No. of Lectures – 6)

Engineering Applications: Engineering properties of rocks; dams; tunnels; powerhouses; bridges; land use planning; selection of waste disposal sites

Unit V: Geological Disasters and Challenges in Present Times (No. of Lectures – 6)

Geological Disasters: Earthquakes; landslides
Energy Geology: Fossil fuels; renewable sources; emerging and future sources

Unit VI: Field Data Collection and Miscellaneous Topics (No. of Lectures – 6)

Field Investigations: Geophysical; geological; remote sensing
Miscellaneous: ore deposits; natural wetlands; stratigraphy of India

COURSE CONTENTS (Description type II)

Introduction: Geology and civil engineer; atmosphere & clouds; earth's internal structure
Structural Geology: Folds & faults; joints & unconformities; plate tectonics
Geomorphology: Geologic action & engineering consideration of– weathering & erosion agents; winds & deserts; glaciers; streams & rivers; seas & oceans; groundwater
Mineralogy: Minerals– properties & crystallography; formation processes & classification
Petrology: Igneous; Sedimentary; Metamorphic
Engineering Applications: Engineering properties of rocks; dams; tunnels; powerhouses; bridges; land use planning; selection of waste disposal sites
Geological Disasters: Earthquakes; landslides
Energy Geology: Fossil fuels; renewable sources; emerging and future sources
Field Data Collection: Geophysical; geological; remote sensing
Miscellaneous: ore deposits; natural wetlands; stratigraphy of India

TEXT BOOKS/ REFERENCE BOOKS (Authors, Title, Publisher)

1. Parbin Singh, "Engineering and General Geology", 8e, SK Kataria & Sons
2. Subinoy Gangopadhyay, 2013, "Engineering Geology", Oxford University Press
3. Carla Montgomery, "Environmental Geology", 10e, McGraw Hill (India)
4. Press, Seiver, Jordan, Grotzinger, "Understanding Earth", 5e, WH Freeman & Co
5. SL Solanki, 2012, "Engineering Geology", Neelkanth Publishers

Lecture Plan

Lec #	Topics to be covered
1	Introduction – Geology; Scope of Engineering Geology.
2	Introduction – Our Atmosphere; Clouds
3	Introduction – Seismology; Internal Structure of the Earth
4	Structural Geology – Folds and Faults
5	Structural Geology – Joints and Unconformities
6	Structural Geology – Plate Tectonics and Continental Drift Theory
7	Geomorphology – Agents of Weathering and Erosion
8	Geomorphology – Wind as a Geologic Agent
9	Geomorphology – Ice as a Geologic Agent
10	Geomorphology – Surface Water as a Geologic Agent
11	Geomorphology – Sea Water as a Geologic Agent
12	Geomorphology – Ground Water as a Geologic Agent
13	Mineralogy – Physical properties of Minerals; Crystallography
14	Mineralogy – Classification of Minerals; Internal Structure
15	Petrology – Igneous Rocks: Structure and Forms
16	Petrology – Igneous Rocks: Texture and Formation Processes
17	Petrology – Metamorphic Rocks
18	Petrology – Sedimentary Rocks
19	Engineering Applications – Engineering Properties of Rocks
20	Engineering Applications – Dams and Reservoirs
21	Engineering Applications – Tunnels
22	Engineering Applications – Powerhouses
23	Engineering Applications – Bridges
24	Engineering Applications – Land Use Planning
28	Geological Disasters – Earthquakes
29	Geological Disasters – Earthquakes and Tsunami
30	Geological Disasters – Landslides
31	Energy Geology – Fossil Fuels
32	Energy Geology – Renewable Sources of Energy
33	Energy Geology – Gas Hydrates and Coal Bed Methane
25	Field Data Collection – Geophysical Surveys
26	Field Data Collection – Geological Surveys
27	Field Data Collection – Remote Sensing
34	Miscellaneous – Ore Deposits
35	Miscellaneous – Natural Wetlands
36	Miscellaneous – Stratigraphy of India

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Civil Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CEP108	**Engineering Geology Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

Engineering Geology (taken concurrently)

COURSE OBJECTIVE

To equip the students with basic knowledge of

1. Reading and deriving relevant information from geologic maps
2. Drawing, reading and deriving relevant information from stereographic projections
3. Performing simple calculations of dip and strike
4. Identification of mineral and rock samples and deriving their engineering properties
5. The latest developments in the field of astronomy

COURSE OUTCOMES

CO1	To be able to read and derive information from geologic maps and simple field observations
CO2	To be able to draw, read, and derive information from stereographic projections and their applications in Engineering Geology
CO3	To be aware of the recent trends in Astronomy and the latest space explorations in India and the world
CO4	To be aware of the various tests performed on mineral and rock samples to derive their engineering properties for use in various applications and projects related to Civil Engineering

COURSE ASSESSMENT

Course Assessment (culminating to the final grade), will be made up of the following:

S. No.	Component	Weightage
a)	Lab Sessions	60%
b)	End Semester Examination	40%

COURSE CONTENTS

Geologic Maps: Reading and deriving information from them

Dip and Strike Calculations

Stereographic projections: drawing, reading, and deriving information from them

Rock samples and their engineering properties

Recent developments in Astronomy

Engineering features of tunnels and dams

TEXT BOOKS/ REFERENCE BOOKS (Authors, Title, Publisher)

1. NW Gokhale, 1996, "Exercises on Geologic Maps and Dip and Strike Problems", CBS Publishers
2. RJ Lisle & PR Leyshon, "Stereographic Projection Techniques for Geologists and Civil Engineers", 2e, Cambridge University Press
3. Subinoy Gangopadhyay, 2013, "Engineering Geology", Oxford University Press

LIST OF EXPERIMENTS

Lab #	Name of the Experiment
1	Astronomy – recent developments in India and the world
2	Geologic Maps – I: Subsurface Profiles for Horizontal Rock Beds
3	Geologic Maps – II: Subsurface Profiles for Uniformly Dipping Rock Beds (2-point and 3-point methods)
4	Geologic Maps – III: Uniformly and Non-Uniformly Dipping Rock Beds
5	Geologic Maps – IV: Complex Geologic Features
6	Dip and Strike Calculations
7	Stereonets – I: Plotting and reading planes and lineations on a stereonet
8	Stereonets – II: Applications in Structural Geology and Seismology
9	Mineralogy and crystallography
10	Rocks – Identification Engineering properties of
11	Dams – engineering features
12	Tunnels – engineering features

Program Core Courses

and

Syllabus

for

I Year B.Tech.

(Computer Science & Engineering)

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I	22CST103	Problem Solving using C	PC	Theory	2	2	0	0
2	I	22CST104	Discrete Mathematics	PC	Theory	3	3	0	0
3	I	22CSP105	Problem Solving using C Lab	PC	Practical	1	0	0	2
4	II	22CST106	Data Structures	PC	Theory	3	3	0	0
5	II	22CST107	Logic System Design	PC	Theory	2	2	0	0
6	II	22CSP108	Data Structures Lab	PC	Practical	1	0	0	2
7	II	22CSP109	Logic System Design Lab	PC	Practical	1	0	0	2
					Total Credits	**13**			

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Computer Science and Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CST103	Problem solving using C	2	2	0	0	0

PREREQUISITE

None

COURSE OBJECTIVE(s)

- Develop understanding of problem-solving skills.
- Provide in-depth understanding and training for design and development of C programs.
- Demonstrate real world problem solving using C.

COURSE OUTCOMES

CO1	Illustrate and explain the basic computer concepts and programming principles.
CO2	Learn problem-solving through Computer programming.
CO3	Formulate a solution for a given problem as a well-defined sequence of actions.
CO4	Translate the sequence of steps (Algorithms) to C programs.
CO5	Design solutions to simple engineering problems by applying the basic programming principles of C language.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Quiz, Assignments	20%

COURSE CONTENTS

Unit I- Introduction to Computers, Basic Computer Organization, Computational Thinking and problem solving, Planning the Computer Program - Debugging, Types of errors, Techniques of Problem. Aspects of programming language: Syntax, semantics. System Software, Application Software. Compiler - Compilation process - Compiler and interpreter. Basics: C language introduction, C language Standards, Data Types and Storage Classes: Different data types, Storage Classes – auto, static, extern, register. Reserved words, operators, constants in C, identifiers, printf/ scanf (formatted printf/scanf), assignment statement, built-in data types – int, char, float, double; usage of sizeof(), integer arithmetic, typecasting. **(no. of lectures- 6)**

Unit II- IF/IF..ELSE control construct through maximum of two numbers, ternary operator for maximum of three numbers, SWITCH statement through figure to words problem, Swapping of variables, Solving problem of gcd of two numbers, Introduction to 1D arrays in C, implementation of strings as char array, string function implementation: example problem could be palindrome, Loop constructs: significance of initialization, terminating condition and increment/decrement (pre/post increment/decrement operator usage). Usage of FOR/WHILE/DO..WHILE in problems like sum /maximum/ deviation of N numbers, Illustration of loops for solving computation of sin of a number **(no. of lectures- 7)**

Unit III-Problem Solving: Sorting an array consisting of zeros and ones, Partitioning an array, merging two sorted arrays, computation of square root of a number Recurrence through Factorial problem, binary search to illustrate divide and conquer approach, Fibonacci through recursion and problems with this approach, Fibonaaci through storing previous values – introduction to dynamic programming, Nested loops through sorting methods; use of break and continue
Bit vector implementation of set and usage of bitwise operators for testing membership (with in g set), union and intersection of two sets Macro & Preprocessor in C **(no. of lectures- 6)**

Unit IV- Structures in C: struct and typedef through implementation of complex numbers Functions: Passing arguments in main() function, Call by value, Call by reference. Function for implementing raising a number to large power (logarithmic complexity) Multi-dimensional array (example problem can be matrix transpose/ addition) Command line arguments in C Passing variable number of arguments **(no. of lectures- 5)**

Unit V: Pointers: Introduction to pointers, pointer arithmetic, void *, pointers v/s array, malloc() – case study linked list. Pointer to array versus array of pointers, pointers to structures, array of pointers, Pointer to functions. Enum operator. File Handling in C: Basics of working with text files, File read, write, append and other similar operations. **(no. of lectures- 7)**

Note:
Students should be encouraged to develop a mini-project such as (1) editor, (2) tabulation of student records and analysis (sorting as per student names/CGPA, etc.), (3) small suite of numerical analysis solutions, (4) computation of very large numbers

TEXT BOOKS/ REFERENCE BOOKS:-

1. Education Solutions Limited, I. T. L. (2004). Introduction to Computer Science. India: Pearson Education.
2. How to Solve it by Computer, RG Dromey, PHI
3. The C Programming Language, Brian W. Kernighan and Dennis Ritchie, Latest Edition, Prentice Hall.
4. Programming in ANSI C, E. Balagurusamy, Latest Edition, McGraw Hill
5. Let us C, Yashavant Kanetkar, Latest Edition, BPB Publication

ONLINE/E RESOURCES

1. NPTEL Course: Problem Solving Through Programming In C Instructor: Prof. Anupam Basu (IIT Kharagpur)- **https://onlinecourses.nptel.ac.in/noc22_cs45/preview**

LECTURE PLAN

Lecture No.	Topics to be covered
1	Introduction to Computers, Basic Computer Organization, Computational Thinking and problem solving, Planning the Computer Program - Debugging, Types of errors, Techniques of Problem.
2	Aspects of programming language: Syntax, semantics. System Software, Application Software. Compiler - Compilation process - Compiler and interpreter.
3	C language introduction, C language Standards, Data Types and Storage Classes: Different data types, Storage Classes – auto, static, extern, register
4	Reserved words, operators, constants in C, identifiers
5	printf/scanf (formatted printf/scanf), assignment statement, built-in data types – int, char, float, double
6	usage of sizeof(), integer arithmetic, typecasting.
7	IF/IF..ELSE control construct through maximum of two numbers, ternary operator for maximum of three numbers
8	SWITCH statement through figure to words problem, Swapping of variables
9	Solving problem of gcd of two numbers
10	Introduction to 1D arrays in C, implementation of strings as char array,
11	String function implementation: example problem could be palindrome, Loop constructs: significance of initialization, terminating condition and increment/decrement (pre/post increment/decrement operator usage)
12	Usage of FOR/WHILE/DO..WHILE
13	Problems like sum /maximum/ deviation of N numbers, Illustration of loops for

	solving computation of sin of a number
14	Problem Solving: Sorting an array consisting of zeros and ones, Partitioning an array.
15	merging two sorted arrays, computation of square root of a number,
16	Recurrence through Factorial problem, binary search to illustrate divide and conquer approach
17	Fibonacci through recursion and problems with this approach, Fibonaaci through storing previous values – introduction to dynamic programming
18	Nested loops through sorting methods; use of break and continue
19	Bit vector implementation of set and usage of bitwise operators for testing membership (withing set), union and intersection of two sets Macro & Preprocessor in C
20	Structures in C: struct and typedef through implementation of complex numbers
21	Functions: Passing arguments in main() function, Call by value
22	Call by reference. Function for implementing raising a number to large power (logarithmic complexity)
23	Multi-dimensional array (example problem can be matrix transpose/ addition)
24	Command line arguments in C, Passing variable number of arguments
25	Pointers: Introduction to pointers
26	Pointer arithmetic, void *, pointers v/s array, malloc() – case study linked list.
27	Pointer to array versus array of pointers, pointers to structures,
28	Array of pointers, Pointer to functions.
29	Enum operator.
30	File Handling in C: Basics of working with text files
31	File read, write, append and other similar operations.

DEPARTMENT OF COMPUTER ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Computer Science & Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CST104	**Discrete Mathematics**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

- Develop clear thinking and creative problem-solving skills.
- Train thoroughly in the construction and understanding of mathematical proofs.
- Develop familiarity and ease with mathematical notation and discrete mathematics concepts.
- Thoroughly prepare students for the mathematical aspects of other computer science courses including data structures, algorithms, and database management systems.

COURSE OUTCOMES

CO1	Understand and practically apply concepts of mathematical logic.
CO2	Development of in-depth understanding of sets, functions and relations and abstract algebra.
CO3	Analyze the properties of the various number theoretic algorithms.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Quiz, Assignments	20%

COURSE CONTENTS

Unit I- Logic: Truth Tables, Conditionals ($P \Rightarrow Q$), and Bi-conditionals ($P \Leftrightarrow Q$), Negation, Converse, and Contrapositive, Existential and Universal Quantifiers ($\forall, \exists, \exists!$), Proof Techniques (Contrapositive, Contradiction, Induction), Counterexamples, and Proving Statements with Quantifiers, Predicate logic, first order logic, Logical Inferences.

(no. of lectures- 4)

Unit II- Set Theory: Sets and Set Notation, the Empty Set, the Power Set, Cardinality rules and infinite sets, Union, Intersection, Complement, Subsets , Proving sets are equal, Axioms of Naïve Set Theory.

(no. of lectures- 3)

Unit III- Relations: Cartesian Products and Relations, Equivalence Relations and Partitions, Partial Orderings, Lattices.

(no. of lectures- 4)

Unit IV- Functions: Definition of a Function, Domains and Co-domains, Composition and Inverses, Well-Defined, Injective, Surjective, and Bijective Functions, Recurrence Relations, Generating functions.

(no. of lectures- 4)

Unit V- Abstract Algebra: Groups-Binary operation, and its properties, Definition of a group, Groups as symmetries, cyclic, dihedral, symmetric, matrix groups, Subgroups, Cosets, normal subgroups and quotient groups, Conjugacy classes, Lagrange's theorem, Monoid.

(no. of lectures- 8)

Unit VI- Number Theory: Prime Numbers, Euclid's Algorithm for GCD, The GCD-LCM product theorem, Extended Euclid's Algorithm, Linear Diophantine Equations, Modular Arithmetic, Chinese Reminder Theorem, Fast Modular Exponentiation, Fermat's little theorem, Euler's totient theorem, Euler's theorem.

(no. of lectures- 5)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Ronald L. Graham, Donald E. Knuth, Oren Patashnik ,Concrete Mathematics: A Foundation for Computer Science (2nd Edition)
2. K. Rosen, Discrete Mathematics and Its Applications, 7th edition, McGraw-Hill, 2011.
3. M. Lipson, Schaum's Outline of Discrete Mathematics, revised 3rd edition, 2009.
4. D. Velleman, How to Prove it: A Structured Approach. Cambridge University Press, 1994

ONLINE/E RESOURCES

1. NPTEL Course: Discrete Mathematics By Prof. Sudarshan Iyengar, Prof. Neeldhara | IIT Ropar, IIT Gandhinagar (https://onlinecourses.nptel.ac.in/noc20_cs82/preview

LECTURE PLAN

Lecture No.	Topics to be covered
1	Truth Tables, Conditionals ($P \Rightarrow Q$), and Bi-conditionals ($P \Leftrightarrow Q$), Negation, Converse, and Contrapositive.
2	Existential and Universal Quantifiers ($\forall, \exists, \exists!$)
3	Proof Techniques (Contrapositive, Contradiction)
4	Counterexamples, and Proving Statements with Quantifiers
5	Induction
6	Predicate logic
7	First order logic
8	Logical Inferences.

9	Sets and Set Notation, the Empty Set, the Power Set, Cardinality rules and infinite sets
10	Union, Intersection, Complement, Subsets
11	Proving sets are equal, Axioms of Naïve Set Theory.
12	Cartesian Products and Relations
13	Equivalence Relations and Partitions
14	Partial Orderings
15	Lattices
16	Definition of a Function, Domains and Co-domains, Composition and Inverses
17	Well-Defined, Injective, Surjective, and Bijective Functions
18	Recurrence Relations
19	Generating functions
20	Groups-Binary operation, and its properties, Definition of a group
21	Groups as symmetries, cyclic, dihedral, symmetric
22	Dihedral, symmetric, matrix groups
23	Subgroups, Cosets
24	Normal subgroups and quotient groups
25	Conjugacy classes
26	Lagrange's theorem
27	Monoid
28	Euclid’s Algorithm for GCD, The GCD-LCM product theorem, Extended Euclid’s Algorithm
29	Linear Diophantine Equations
30	Modular Arithmetic, Chinese Reminder Theorem
31	Fast Modular Exponentiation, Fermat’s little theorem
32	Prime Numbers, Euler’s totient theorem, Euler’s theorem.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Computer Science and Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CSP105	Problem solving using C Lab	1	0	0	2	0

PREREQUISITE

Not applicable

COURSE OBJECTIVE(s)

- Develop understanding of problem-solving skills.
- Provide in-depth understanding and training for design and development of C programs.
- Demonstrate real world problem solving using C.

COURSE OUTCOMES

CO1	Illustrate and explain the basic computer concepts and programming principles.
CO2	Learn problem-solving through Computer programming.
CO3	Formulate a solution for a given problem as a well-defined sequence of actions.
CO4	Translate the sequence of steps (Algorithms) to C programs.
CO5	Design solutions to simple engineering problems by applying the basic programming principles of C language.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-Term examination	20%
b)	End Semester Examination	20%
c)	Continuous lab evaluation	60%

COURSE CONTENTS

The following proposed coverage are broad guiding areas lab. The programs mentioned here just sample programs and they are just for reference purpose. The instructor offering the course in consultation with the theory offered can adopt further variations in tune with concerned theory course.

Basic C commands and First C program-printing hello world on the screen, programs related to basic arithmetic operations, swapping of numbers etc. (2 lab)

C Expressions: Programs involving concepts of C expressions like finding roots of quadratic equation, area of circle and simple interest calculation. (1 lab)

C operators: Programs requiring in-depth knowledge of various C operators (especially conditional operator, bitwise operators and sizeof operator). (1 lab)

Conditional statements: Programs with applications of c conditional statements: if, if else, nested if else, switch-case (1 lab)

Arrays and Loops: C programs for performing various operations (finding maximum, second-maximum, minimum, reversing an array etc) on 1-D arrays and Applications of concepts of loops (leap year, palindrome, displaying prime numbers etc). (2 lab)

Functions and Recursions: Programs demonstrating use of functions (like adding N numbers, calculator etc) and Recursion (factorial, Fibonacci, GCD, binary search etc). (1 lab)

Strings, Pointers and Structures: Programs related to the following concepts: String manipulations, pointer to arrays, and pointer to functions and Structures (3 lab)

File Management: Programs related to file handling (Finding the number of characters, words and lines of given text file and File handling programs) (1 lab)

TEXT BOOKS/ REFERENCE BOOKS:-

1. Education Solutions Limited, I. T. L. (2004). Introduction to Computer Science. India: Pearson Education.
2. How to Solve it by Computer, RG Dromey, PHI
3. The C Programming Language, Brian W. Kernighan and Dennis Ritchie, Latest Edition, Prentice Hall.
4. Programming in ANSI C, E. Balagurusamy, Latest Edition, McGraw Hill
5. Let us C, Yashavant Kanetkar, Latest Edition, BPB Publication

ONLINE/E RESOURCES

1. NPTEL Course: Problem Solving Through Programming In C Instructor: Prof. Anupam Basu (IIT Kharagpur)- **https://onlinecourses.nptel.ac.in/noc22_cs45/preview**

LAB PLAN

Week	Experiments in the problem solving with C lab
1	Basic C commands and First C program-printing hello world on the screen
2	Programs related to basic arithmetic operations, swapping of numbers etc.
3	C Expressions: Programs involving concepts of C expressions like finding roots of quadratic equation, area of circle and simple interest calculation.
4	C operators: Programs requiring in-depth knowledge of various C operators (especially conditional operator, bitwise operators and sizeof operator).
5	Conditional statements: Programs with applications of c conditional statements: if, if else, nested if else, switch-case
6	Arrays : C programs for performing various operations (finding maximum, second-maximum, minimum, reversing an array etc) on 1-D arrays
7	Applications of concepts of loops (leap year, palindrome, displaying

	prime numbers etc).
8	Functions and Recursions: Programs demonstrating use of functions (like adding N numbers, calculator etc) and Recursion: factorial, Fibonacci, GCD, binary search.
9	Programs related to String manipulations
10	Programs related to pointer to arrays, pointer to functions
11	C programs demonstrating usage of Structures
12	File Management: Programs related to file handling (Finding the number of characters, words and lines of given text file and File handling programs)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Computer Science and Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CST106	Data Structures	3	3	0	0	0

PREREQUISITE

Problem solving with C

COURSE OBJECTIVE(s)

1. To understand and familiar with basic data structure techniques and analyze various linear data structures like Stack, Queues and linked lists.
2. Design, understand and familiar with several sorting algorithms that includes selection, insertion, quick sort, merge sort, heap sort, etc.
3. To familiar with writing recursive/iterative methods and implementation of linked data structures such as linked lists and binary trees
4. Understand and familiar to implement advanced data structures like non-linear data structures such as hash tables, balanced search trees, AVL trees, priority queues, etc.
5. Understand and design different graph algorithms such as shortest path, minimum spanning tree, etc.

COURSE OUTCOMES

CO1	Explain abstract data types, memory allocation schemes and use big O, omega, and theta notation to characterize asymptotic upper, lower, and tighter bounds on time and space complexity of algorithms.
CO2	Demonstrate knowledge of fundamental data structures, their uses, and tradeoffs among them and solve problems using library functions for standard data structures (linked lists, sorted arrays, trees, and hash tables) including insertion, deletion, searching and sorting.

CO3	Demonstrate the use of high quality programs for building and searching data structures.
CO4	Demonstrate and implement operations such as search, traverse, insertion, deletion, etc. on different non-linear data structures.
CO5	Explain what a binary search tree is and why maintaining balance has impact on algorithm performance and Apply appropriate data structure to design an efficient solution for given and identified problem.
CO6	Describe the concept of recursion with the examples of its use and explain the relationship between iteration and recursion.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	10%
b)	Mid-term examination	30%
c)	End Semester Examination	50%
d)	Quiz 1	5%
e)	Quiz 2	5%

COURSE CONTENTS

Unit I- Fundamentals of Data Structures, Memory Allocation, Abstract Data Types, Arrays, Lists Stack Implementation, Stack applications. Queue Implementation, Sequential, Circular, and De-queue representation, Dynamic Queue implementation, Queue applications. **(no. of lectures- 6)**

Unit II- Searching and Sorting: Linear and Binary search, Bubble Sort, Selection Sort, Insertion Sort, Merge sort, Quick sort, Counting sort, Bucket sort, Radix sort, Heap sort, comparisons of sorting algorithms. **(no. of lectures-8)**

Unit III- Hashing and Hash Tables: Hash functions, Open and closed hashing, Dynamic and extendible hashing, Hash collision, chaining, Hash Tables and Probing Techniques **(no. of lectures- 6)**

Unit IV- Trees: Binary Tree and its representations, Tree traversal, Binary Search Tree, Threaded binary trees, Representing list as binary trees, Dynamic implementation of Binary tree and AVL tree, Tree applications, Interval tree, M-way search Tree, B-Tree and its variants , B+ Tree , Heaps and its applications. **(no. of lectures- 10)**

Unit V- Graphs: Fundamentals of Graph, Adjacency Matrix and List; Graph Traversal using DFS and BFS, Spanning trees, Dijkstra and Prims algorithms. **(no. of lectures- 8)**

TEXT BOOKS/ REFERENCE BOOKS:-

1. Introductions to Algorithms, T.Cormen, C.Lieserson, R.Rivest, and C.Stein,,Prentice-Hall/India, 3rd edition, 2009.
2. Introduction to Algorithms, , Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press, 3rd Edition, 2009
3. Fundamentals of Data Structures in C++, Ellis Horowitz, SartajSahni and Dinesh P. Mehta, Galgotia Press, 2009
4. Data Structures & Algorithm Analysis in C++, 4th edition, by Mark Allen Weiss

ONLINE/E RESOURCES

1. NPTEL – Introduction to data structures and algorithms - https://nptel.ac.in/courses/106102064
2. MIT - Introduction to Algorithms - https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/

Lecture Plan

Lecture No.	Topics to be covered
1	Fundamentals of Data Structures, Memory Allocation.
2	Abstract Data Types, Arrays
3	Lists Stack Implementation, Stack applications
4	Queue Implementation, Sequential, Circular,.
5	and De-queue representation, Dynamic Queue implementation
6	Queue applications
7-8	Searching and Sorting: Linear and Binary search, comparisons of sorting algorithms.
9	Bubble Sort, Selection Sort,
10	Insertion Sort,
11-12	Quick sort, Merge sort,
13	Counting sort, Bucket sort,
14	Radix sort, Heap sort
15-16	**Hashing** and Hash Tables: Hash functions, Open and closed hashing,
17-18	Dynamic and extendible hashing, Hash collision, chaining
19-20	Hash Tables and Probing Techniques
21-22	Trees: Binary Tree and its representations, Tree traversal
23	Binary Search Tree
24	Threaded binary trees, Representing list as binary trees,
25-26	Dynamic implementation of Binary tree and AVL tree, Tree applications,
27	Interval tree, M-way search Tree
28	B-Tree and its variants ,
29	B+ Tree
30	Heaps and its applications
31-32	Graphs: Fundamentals of Graph Adjacency Matrix and List
33-34	Graph Traversal using DFS and BFS.
35	Spanning trees
37-38	Dijkstra and Prims algorithms.
39	Advanced topics in data structures
40	Advanced topics in data structures

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Computer Science and Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CST107	Logic System Design	2	2	0	0	0

PREREQUISITE

None

COURSE OBJECTIVE(s)

1. Understand and able to perform the conversion among different number systems.
2. Understand and familiar with digital logic gates such as AND, OR & NOT, XOR, XNOR.
3. Understand and familiar to Boolean algebra and its properties. To simplify simple Boolean expressions with the help of Boolean algebra properties.
4. Understand and develop combinational circuits using basic logic gates
5. Design and able to simplify the logic using Karnaugh maps, and understand "don't care" conditions.
6. Understand and familiar with combinational circuits to develop adders, subtractors, multiplexers, etc.
7. Understand, analyze and familiar with sequential circuits and its logic components such as SR Latch, D Flip-Flop, etc.
8. Understand, design and familiar with sequential circuits and its operations – registers, shift registers, counters, etc.

COURSE OUTCOMES

CO1	Understand various types of number systems and their conversions.
CO2	Write and simplify Boolean expressions by applying appropriate laws and theorems and other techniques (e.g., Karnaugh maps).
CO3	Describe and design the structure/operation of arithmetic building blocks such adders (ripple-carry), subtractor, shifters, and comparators. *f*
CO4	Describe and design structures for improving adder performance such as carry lookahead and carry select
CO5	Explain the structure/operation of basic latches (D, SR) and flip-flops (D, JK, T).
CO6	Describe and design the structure/operation of sequential building blocks such as registers, counters, and shift registers

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Quiz, Assignments	20%

COURSE CONTENTS

Unit I- Number Systems and Codes: Representation of Negative Numbers; 1's Complement and 2's Complement, Complement Arithmetic, BCD Arithmetic, Digital Codes -Excess-3 code, Gray code, Binary to Excess- code conversion and vice versa, ASCII code, EBCIDIC code, Error Detection Codes. **(No. of lectures- 7)**

Unit II- Logic Gates, Universal Gates and their characteristic: K-Map, SOP, POS

(No. of lectures- 4)

Unit III- Combinational circuits: Adders, Subtractors, Binary Parallel Adder – Carry look ahead Adder, BCD Adder, Multiplexer, Demultiplexer, Comparator, Decoder and Encoder.

(No. of lectures- 4)

Unit IV- Sequential Circuits: Latches, Flip-Flops: RS, D Type, JK, and T Type and their conversion, Master-Salve Flip and Race Conditions. **(no. of lectures- 5)**

Unit V- Registers: Design of shift registers and their operations.

(no. of lectures- 3)

Unit VI- Counters: Asynchronous and Synchronous counters, Applications of counters.

(no. of lectures- 4)

TEXT BOOKS/ REFERENCE BOOKS :-

1. Herbert Taub, Donald L. Schilling, Digital Integrated Electronics, McGraw-Hill.
2. Fredrick J. Hill, Gerald R. Peterson, Computer aided logical design with emphasis on VLSI, Wiley
3. M. Morris Mano, Digital Logic and Computer Design, Person Education.
4. Malvino & Leach, Digital Principles and Applications
5. R P Jain, Modern Digital Electronics

ONLINE/E RESOURCES

1. NPTEL course: NOC: Digital System Design, IIT Ropar Prof. Neeraj Goel https://nptel.ac.in/courses/108106177

2. MIT - https://ocw.mit.edu/courses/6-111-introductory-digital-systems-laboratory-spring-2006/

LECTURE PLAN

Lecture No.	Topics to be covered
1	Representation of Negative Numbers; 1's Complement
2	2's Complement and Complement Arithmetic.
3	BCD Arithmetic.
4	Digital Codes -Excess-3 code, Gray code.
5	Binary to Excess- code conversion and vice versa
6	ASCII code, EBCIDIC code.

7	Error Detection Codes.
8	Logic Gates
9	Universal Gates and their characteristic
10	K-Map
11	SOP, POS.
12	Adders, Subtractors
13	Binary Parallel Adder – Carry look ahead Adder, BCD Adder
14	Multiplexer, Demultiplexer, Comparator
15	Decoder and Encoder.
16	RS flipflop
17	D and JK flipflop
18	T type and flipflop conversions
19	Master-Salve Flip flop
20	Race Conditions
21	Motivation: Shift registers
22	Design of shift registers
23	Shift registers operations
24	Motivation: Counters
25	Asynchronous counters
26	Synchronous counters
27	Applications of counters

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Computer Science and Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CSP108	**Data Structures Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

Basic Programming

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of data structures and algorithm concepts for developing coding skills and implementing real life engineering problems.

COURSE OUTCOMES

CO1	Explain abstract data types, memory allocation schemes and need of linear and non-linear data structures.
CO2	Apply concepts to implement various linear data structures, searching, and sorting.
CO3	Analyze the performance of various sorting and searching techniques
CO4	Demonstrate and implement various operations like search, traverse, insertion, deletion, etc. on different non-linear data structures.
CO5	Apply appropriate data structure to design an efficient solution for given and identified problem.
CO5	Design solutions to simple engineering problems by applying the basic programming principlesof C language.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Continuous lab evaluation	20%

COURSE CONTENTS

The following proposed coverage are broad guiding areas lab. The programs mentioned here just sample programs and they are just for reference purpose. The instructor offering the course in consultation with the theory offered can adopt further variations in tune with concerned theory course.

Arrays and Linked List: Programs involving creation of arrays, singly, double and circular linked list and performing various operations on them (updating/adding/deletion an element in the begin/middle/end of the list and linear search) (2 labs)

Stack and Queue: Programs involving implementationsand applications of stacks and queues (array and linked list implementations, Dynamic Queue implementation, applications like balanced brackets problem, infix to postfix conversion)

(2 labs)

Comparison based sorting algorithms: Programs requiring in-depth knowledge of various comparison based sorting algorithms (bubble, insertion, merge, quick etc). (1 lab)

Linear time sorting algorithms: Programs with applications of linear time sorting algorithms (counting sort, radix sort, bucket sort) (1 lab)

Heaps: Programs involving creation of heap from the given list of elements, conversion of min heap to max heap (and vice versa), heap-sort (1 lab)

Hashing: Programs demonstrating applicationsof hashing and hash functions (like phonebook problem) (1 lab)

Tree traversals and binary search tree: Programs related to in order, pre order and post order traversals, creation of binary search tree, searching/inserting/deletion in binary search tree.

(1 lab)

AVL trees and B+ Trees: Programs in which efficient implementation of various key operations (insertion/deletion/updation/searching) on AVL trees and B+ Trees are required. (1 lab)
Graphs: Programs demonstrating implementations and applications of graph traversal methods (BFS, DFS) and minimum spanning tree problem (Dijkstra and Prims algorithms) (2 labs)

TEXT BOOKS/ REFERENCE BOOKS :-

1. Introductions to Algorithms, T.Cormen, C.Lieserson, R.Rivest, and C.Stein,, Prentice-Hall/India, 3rd edition, 2009.
2. Introduction to Algorithms, , Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, MIT Press, 3rd Edition, 2009
3. Fundamentals of Data Structures in C++, Ellis Horowitz, Sartaj Sahni and Dinesh P. Mehta, Galgotia Press, 2009

ONLINE/ E RESOURCES

1. NPTEL – Introduction to data structures and algorithms - https://nptel.ac.in/courses/106102064
2. MIT - Introduction to Algorithms - https://ocw.mit.edu/courses/6-006-introduction-to-algorithms-spring-2020/

LAB PLAN

Week	Experiments in the data structures lab
1	Programs involving creation of arrays and performing various operations on them
2	Programs involving creation of singly, double and circular linked list and performing various operations on them (updating/adding/deletion an element in the begin/middle/end of the list and linear search)
3	Programs involving implementations and applications of stacks
4	Programs involving implementations and applications of queues
5	Programs requiring in-depth knowledge of various comparison based sorting algorithms (bubble, insertion, merge, quick etc).

6	Programs with applications of linear time sorting algorithms (counting sort, radix sort, bucket sort)
7	Programs involving creation of heap from the given list of elements, conversion of min heap to max heap (and vice versa), heap-sort
8	Programs demonstrating applications of hashing and hash functions (like phonebook problem)
9	Programs related to in order, pre order and post order traversals, creation of binary search tree, searching/inserting/deletion in binary search tree
10	Programs in which efficient implementation of various key operations (insertion/deletion/updation/searching) on AVL trees and B+ Trees are required.
11	Programs demonstrating implementations and applications of graph traversal methods (BFS, DFS)
12	Programs for implementing Dijkstra and Prims algorithms.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Computer Science and Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22CSP109	**Logic System Design Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

1. Introduce, understand and familiar with the basic digital system components.
2. Introduce and analyze the hardware tool to basic digital systems.
3. To build and test the combinational circuits.
4. Understand and familiar with sequential circuits.
5. To understand and familiar with the latches, flip-flops, registers and counters.

COURSE OUTCOMES

CO1	Demonstrate and use the basic logic system components such as breadboard, logic probe, wire strippers and digital switch/light board.
CO2	Lab experiments involves the design of combinational circuits and illustrate the key engineering concepts such as incremental design, Optimal design, etc.
CO3	Design and develop sequential circuits

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	20%
b)	End Semester Examination	20%
c)	Continuous lab evaluation	60%

COURSE CONTENTS

The following proposed coverage are broad guiding areas lab. The instructor offering the course in consultation with the theory offered can adopt further variations in tune with concerned theory courses.

Lab 1. Design and test a 2-bit and 4-bit half adder. (1 lab)

Lab 2. Design and test a 2-bit and 4-bit adder (ripple, carry look ahead). (1 lab)

Lab 3. Design and test of encoder/decoder (binary-gray, self-complementing). (1 lab)

Lab 4. Design and test of parity generator and detector. (1 lab)

Lab 5. Design and test of one bit error detecting and correcting circuit. (1 lab)

Lab 6. Design and test of a 2-bit multiplier. (1 lab)

Lab 7. Design and test of n -bit comparator. (1 lab)

Lab 8. Design and test of flip flops – RS/JK/D/T. (1 lab)

Lab 9. Design and test of SISO and PIPO shift registers. (1 lab)

Lab 10. Design and test of counters. (1 lab)

Lab 11. Implementation and simplification of k -map (upto 3 variables) (1 lab)

Lab 12. Implementation of Quine-Mckluskey's method. (1 lab)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1) Herbert Taub, Donald L. Schilling, Digital Integrated Electronics, McGraw-Hill.
2) Fredrick J. Hill, Gerald R. Peterson, Computer aided logical design with emphasis on VLSI, Wiley.
3) M. Morris Mano, Digital Logic and Computer Design, Person Education.
4) Malvino & Leach, Digital Principles and Applications
5) R P Jain, Modern Digital Electronics

ONLINE/E RESOURCES

1. NPTEL course: NOC:Digital System Design, IIT Ropar Prof. Neeraj Goel https://nptel.ac.in/courses/108106177

LAB PLAN

Week	Experiments in the digital systems lab
1	Design and test a 2-bit and 4-bit half adder.
2	Design and test a 2-bit and 4-bit adder (ripple, carry look ahead).
3	Design and test of encoder/decoder (binary-gray, self-complementing).
4	Design and test of parity generator and detector.
5	Design and test of one bit error detecting and correcting circuit.
6	Design and test of a 2-bit multiplier.
7	Design and test of n -bit comparator.
8	Design and test of flip flops – RS/JK/D/T.
9	Design and test of SISO and PIPO shift registers.
10	Design and test of counters
11	Implementation and simplification of k -map (upto 3 variables)
12	Implementation of Quine-Mckluskey's method.

Program Core Courses

and

Syllabus

for

I Year B.Tech.

(Electrical Engineering)

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I	22EET103	Power Station Practices	PC	Theory	4	3	1	0
2	II	22EET104	Network Theory	PC	Theory	4	3	1	0
3	II	22EET105	Electrical Measurement & Instrumentation	PC	Theory	4	3	1	0
4	II	22EEP106	Measurement & Instrumentation Lab	PC	Practical	1	0	0	2
					Total Credits	**13**			

DEPARTMENT OF ELECTRICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22EET103	**Power Station Practices**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE

Basic physics up to class 12th

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of electrical engineering and develop skills for generation of electrical energy by various conventional and non-conventional fuel sources.

COURSE OUTCOMES:

CO1	Be able to understand and explain bulk energy generation by various fuels and various techniques using basic science.
CO2	Be able to understand and explain solar power, solar photo voltaic energy of the photo, its conversion, performance, manufacturing and various application.
CO3	Be able to understand and explain various renewable power sources like power in wind, energy from biomass, biogas, bio-ethanol, bio-diesel, wave energy, tidal and OTEC
CO4	Be able to understand and explain energy economics by studying various curves, load forecasting, electricity tariffs and power factor improvement.
CO5	Be able to understand and explain power station and grid substation equipment, their general arrangements, and a general idea about power generation scenario.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components:

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Module 1 [Lectures: 07]

Bulk energy generation – conventional generation of electrical energy using thermal, hydro, nuclear and diesel/gas-based power plant

Module 2 [Lectures: 07]

Renewable energy sources- solar photovoltaic. Solar photovoltaic conversion, description and principle, performance characteristics, maximum conversion efficiency, manufacturing and applications

Module 3 [Lectures: 08]

Renewable energy sources- wind energy. Nature of wind, history, recent development, classification, wind data, energy in the wind. Energy from the biomass, gasification, bio-gas, bio-ethanol, bio-diesel, wave energy, tidal, ocean thermal energy conversion (OTEC).

Module 4 [Lectures: 07]

Energy economics – load and load curves, load forecasting, electricity tariffs and power factor improvement

Module 5 [Lectures: 07]

Electrical equipment of power stations and sub-stations and their general arrangement, Standards of supply systems, power generation scenario in India

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. S P Sukhatme, J K Nayak, Solar Energy: Principles of Thermal Collection and Storage, Third Edition, McGraw Hill Education
2. Gupta B. R., Generation of Electrical Energy, Fourth Edition, S. Chand & Company Ltd.
3. M. V. Deshpande, Elements of Electrical Power station Design, PHI India
4. Wadhwa C. L., Generation, Distribution and Utilization of Electrical Energy, Wiley Eastern Ltd.
5. Nagrath & Kothari, Power System Engineering, PHI India

ONLINE/E RESOURCES

1. NPTEL lecture

Lecture Plan

Lecture No.	Topics to be covered
1	Introduction of conventional generation of electrical energy
2	Conventional generation of electrical energy using thermal power plant (Part I)
3	Conventional generation of electrical energy using thermal power plant (Part II)
4	Conventional generation of electrical energy using hydro based power plant (Part I)
5	Conventional generation of electrical energy using hydro based power plant (Part II)
6	Conventional generation of electrical energy using nuclear power plant
7	Conventional generation of electrical energy using diesel/gas based power plant
8	Introduction of solar photovoltaic and solar photovoltaic conversion
9	Description of solar photovoltaic
10	Principle of solar photovoltaic
11	Performance characteristics of solar photovoltaic
12	Maximum conversion efficiency of solar photovoltaic
13	Manufacturing of solar photovoltaic
14	Applications of solar photovoltaic
15	Introduction to wind energy, nature of wind and history
16	Recent development and classification of wind energy
17	Wind data and energy in the wind
18	Energy from biomass
19	Gasification
20	Bio-gas
21	Bio-ethanol and bio-diesel
22	Wave energy, tidal, and Ocean Thermal Energy Conversion(OTEC)
23	Load and load curves (Part I)
24	Load and load curves (Part II)
25	Load forecasting
26	Electricity tariffs (Part I)
27	Electricity tariffs (Part II)
28	Power factor improvement (Part I)
29	Power factor improvement (Part II)
30	Electrical equipment of power stations
31	Electrical equipment of sub-stations
32	General arrangement of electrical equipment of power station and sub-station
33	Standards of supply systems (Part I)
34	Standards of supply systems (Part II)
35	Power generation scenario in India (Part I)
36	Power generation scenario in India (Part II)

DEPARTMENT OF ELECTRICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22EET104	Network Theory	4	3	1	0	0

PREREQUISITE

Basic Electrical and Electronics Engineering

COURSE OBJECTIVE(s)

After the completion of the subject, students should be able to perform the following tasks:

COURSE OUTCOMES:

CO1	To make the student understand the basic concepts of network elements, characteristics, operation and use for various types of application.
CO2	To develop the ability in the student to apply knowledge of mathematics and physics specially the electrical engineering concepts and principles to analyze a given DC and AC circuits.
CO3	To make the students understand the different techniques of network solutions and theorems used for DC and AC network analysis.
CO4	Be able to understand and solve problem of transient analysis in time and frequency domains.
CO5	Be able to understand and solve problem of Special signal waveforms. Network graph, duality. Resonance.
CO6	Be able to understand and solve problem of generalized two port networks, two port parameters, interconnection, and image impedance.
CO7	To enable the students to use their knowledge of mathematics through differential and integral calculus, differential equations, matrices and determinants, Fourier transform, Laplace transform and basic optimization techniques necessary to analyze the electrical devise, circuits and systems.
CO8	To provide a platform through this course, which enables them to understand the other major courses and apply their knowledge to solve problems pertaining to electrical power systems, electrical machines and electronic circuits

COURSE ASSESSMENT:
The Course Assessment (culminating to the final grade), will be made up of the following three components:

S. No.	Component	Weightage
a)	Submissions/assignments/attendance	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS:

Unit I: Node and mesh analysis. Network theorems. Analysis of three-phase circuits. (No. of Lectures: 6)

Unit II: Transient analysis in time and frequency domains. Special signal waveforms. (No. of Lectures: 6)

Unit III: Non-sinusoidal periodic waves. Trigonometric and exponential forms of Fourier series, waveform symmetry, response to linear networks. (No. of Lectures: 6)

Unit IV: Generalized two port networks, two port parameters, interconnection, and image impedance. (No. of Lectures: 6)

Unit V: Analysis and design of magnetically coupled circuits. (No. of Lectures: 4)

Unit VI: Resonance in series, parallel and series-parallel circuits. Frequency response, concept of bandwidth, selectivity, and Q-factor. (No. of Lectures: 6)

Unit VII: Fundamentals of graph theory, Network graph, duality. No. of Lectures: 8)

TEXT BOOKS/ REFERENCE BOOKS:

1. M. E. Van Valkenburg: Network Analysis, III Ed.., Prentice Hall of India.
2. W. H. Hayt, J. E. Kemmerly and S. M. Durbin: Engineering Circuit Analysis, VII Ed., McGraw Hill.
3. Joseph Edminister: Electrical Circuits, III Ed., Schaum's Outline, Tata McGraw Hill.
4. Lawrence P. Huelsma: Basic Circuit Theory, III Ed., Prentice Hall of India.
5. D. Roy Choudhury: Network & Systems, Wiley Eastern Ltd.
6. De Carlo and Lin, Linear Circuit Analysis, Oxford Press

DEPARTMENT OF ELECTRICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B. Tech. (Electrical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22EET105	**Electrical Measurement & Instrumentation**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE
None

COURSE OBJECTIVE(s)
To familiarize the students with basic knowledge of various electrical measuring instruments for measurement of electrical and physical quantities and to develop skills for selection of instrument for measurement of specific parameter.

COURSE OUTCOMES

CO1	To **recall & classify** various errors present in measuring instruments and be able to **understand** the theoretical knowledge and mathematical principles of electrical measuring instruments.
CO2	Be able to **understand** the construction and working principle of various electrical measuring instruments to **carry out** measurement of power, energy, power factor, frequency and magnetic parameters etc.
CO3	Be able to **understand & analyze** the DC and AC bridges for measurement of resistance, capacitance, inductance and frequency
CO4	Be able to **understand** the fundamentals of instrument transformers and to **carry out** measurement of high voltages and currents
CO5	To **explain** the basic concept of transducers, their characteristics, construction and operation
CO6	To **demonstrate & evaluate** the measurement of physical quantities and their conversion into electrical or other forms using different transducers

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following components:

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	10%
b)	Mid-term examination	30%
c)	Quizzes	10%
d)	End Semester Examination	50%

COURSE CONTENTS

Unit I- Theory and types of errors, measurement of error combinations, basics of statistical analysis, Analog Instruments: Classification, principles of operation, operating forces (Deflection, controlling and damping torques), construction (Moving system, control system and damping system); D'Arsonval Galvanometer: Construction, Torque equation, dynamic behavior and sensitivity; Analog ammeter and voltmeter: Types, operating principle, construction, torque equation and errors of PMMC, Moving iron and Dynamometer type instruments, their advantages & disadvantages; Shunts and multipliers for analog instruments.

(No. of lectures- 10)

Unit II- Measurement of power: Electrodynamometer type wattmeter, their construction and principle of operation, errors in electrodynamometer wattmeter, power measurement in three phase circuit using single, two & three wattmeter methods, three phase wattmeter; Measurement of energy: Basic concept of induction type energy meter, construction and principle of operation of single phase induction type energy meter, various compensations, creep, errors and adjustments in single phase energy meters; Measurement of power factor: Construction and principle of operation of single & three phase electrodynamometer type power factor meter; Measurement of frequency using Electrodynamometer type frequency meter; Magnetic measurement: Measurement of flux density, magnetic potential difference and magnetizing force, determination of BH curve and hysteresis loop; Q-meter; Cathode ray oscilloscope: Construction and operating principle, basic CRO circuits, measurement of voltage, current, phase and frequency using CRO.

(No. of lectures- 14)

Unit III- Resistance Measurement: Low, medium and high resistance measurement methods, measurement of earth resistance, Sensitivity of Wheatstone bridge, Applications of DC and AC potentiometers; Impedance Measurement: Principle of AC Bridges, measurement of inductance, capacitance and frequency using AC bridges, universal impedance bridge, causes of errors and their reduction methods in AC bridges.

(No. of lectures- 08)

Unit IV- Instrument transformers: current & voltage transformers and their advantages, different ratios of instrument transformers, characteristics, causes of error and their reduction methods in instrument transformers.

(No. of lectures- 07)

Unit V- Transducers: Introduction, classification, electrical transducers: their advantages and types (resistive, capacitive & inductive), characteristics and choice of transducers; primary sensing elements; measurement of physical quantities: temperature, pressure, flow, strain and displacement etc.; commonly used transducers: strain gauges, thermistors, thermocouples, linear & rotary variable differential transformer, capacitive & inductive transducers, piezo-electric transducers etc.

(No. of lectures- 09)

TEXT BOOKS/ REFERENCE BOOKS

1. Electronic Instrumentation and Measurements: David A. Bell, Oxford University Press, Third Edition
2. Modern Electronic Instrumentation and Measurement Techniques: Albert D. Helfrick and William D. Cooper, Pearson / Prentice Hall of India.
3. Measurement Systems- Applications and Design: Ernest O. Doebelin, Tata McGraw Hill, New York.
4. A course in Electrical and Electronic Measurements and Instrumentation: A. K. Sawhney, Dhanpat Rai & Sons.
5. Electrical Measurements and Measuring Instruments: E.W Golding, F.C Widdis, A.H. Wheeler & Co. Pvt. Ltd. India.
6. Basic Electrical Measurement: M.B. Stout, Prentice Hall of India
7. Electrical Measurement Analysis: Frank E, Mc-Graw Hill
8. Electrical Measurement: Forest K. Harries, Wiley Eastern Pvt. Ltd. India
9. Electronic Measurements and Instrumentation: Oliver and Cage, TMH.
10. Digital Instrumentation: A. J. Bouwens, Tata McGraw Hill.
11. Instrumentation Measurement and Analysis: B. C. Nakra and K. K. Chaudhry, Mc-Graw Hill Education

ONLINE/E RESOURCES

R1. NPTEL Lectures/ Coursera or Udemy Courses

R2: Class Notes

Lecture Plan

Lecture No.	Topics to be covered
1-4	Theory and types of errors, measurement of error combinations, basics of statistical analysis, Analog Instruments: Classification, principles of operation, operating forces (Deflection, controlling and damping torques), construction (Moving system, control system and damping system)
5-10	D'Arsonval Galvanometer: Construction, Torque equation, dynamic behavior and sensitivity; Analog ammeter and voltmeter: Types, operating principle, construction, torque equation and errors of PMMC, Moving iron and Dynamometer type instruments, their advantages & disadvantages; Shunts and multipliers for analog instruments.
11-14	Measurement of power: Electrodynamometer type wattmeter, their construction and principle of operation, errors in electrodynamometer wattmeter, power measurement in three phase circuit using single, two & three wattmeter methods, three phase wattmeter; Measurement of energy: Basic concept of induction type energy meter, construction and principle of operation of single phase induction type energy meter, various compensations, creep, errors and adjustments in single phase energy meters
15-24	Measurement of power factor: Construction and principle of operation of single & three phase electrodynamometer type power factor meter; Measurement of frequency using Electrodynamometer type frequency meter; Magnetic measurement: Measurement of flux density, magnetic potential difference and magnetizing force, determination of BH curve and hysteresis loop; Q-meter; Cathode ray oscilloscope: Construction and operating principle, basic CRO circuits, measurement of voltage, current, phase and frequency using CRO
25-28	Resistance Measurement: Low, medium and high resistance measurement methods, measurement of earth resistance, Sensitivity of Wheatstone bridge, Applications of DC and AC potentiometers
29-32	Impedance Measurement: Principle of AC Bridges, measurement of inductance, capacitance and frequency using AC bridges, universal impedance bridge, causes of errors and their reduction methods in AC bridges.
33-39	Instrument transformers: current & voltage transformers and their advantages, different ratios of instrument transformers, characteristics, causes of error and their reduction methods in instrument transformers.
40-42	Transducers: Introduction, classification, electrical transducers: their advantages and types (resistive, capacitive & inductive), characteristics and choice of transducers;

	primary sensing elements.
43-48	Measurement of physical quantities: temperature, pressure, flow, strain and displacement etc.; commonly used transducers: strain gauges, thermistors, thermocouples, linear & rotary variable differential transformer, capacitive & inductive transducers, piezo-electric transducers etc.

DEPARTMENT OF ELECTRICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Electrical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22EEP106	**Measurement and Instrumentation Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

1. The knowledge of basic concepts of Electrical Science.
2. The knowledge of the electric supply distribution system.
3. The knowledge of basic measuring instruments.
4. The knowledge of the behavior of the basic circuit elements R, L and C.
5. The knowledge of basic concepts of A.C & D.C. circuit analysis.
6. The knowledge of basic concepts of electrical measurement theory.

COURSE OBJECTIVE(s)

To familiarize the students with basic knowledge of various electrical measuring instruments for measurement of electrical and physical quantities and to perform their measurements.

COURSE OUTCOMES

CO1	To develop understanding for measurement of active and reactive power of unbalanced and balanced loads using single and two Wattmeter methods.
CO2	To be able to understand and analyze various AC bridges for inductance and capacitance measurement.
CO3	To be able to understand and analyze operational amplifier for various applications.
CO4	To be able to understand the principle and functioning of various transducers for measurement of various physical quantities.
CO5	To be able to test a single-phase energy meter at unity power factor using direct loading and phantom loading arrangements
CO6	To be able to interpret the results & draw meaningful conclusions
CO7	To be able to coordinate & function in multi-disciplinary team and to write clearly & document own work.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	PRM (Mid-semester evaluation) including lab performance, quiz and viva	20%
b)	PRS (Continuous lab-based evaluation) including lab performance, file work and attendance	60%
c)	PRE (End-semester evaluation) including lab performance, quiz and viva	20 %
Total		100 %

LIST OF EXPERIMENTS:

1. To determine the active power of unbalanced load by two-wattmeter method and the reactive power of balanced load by one-wattmeter method
2. To measure inductance, resistance and Q-factor of choke coil using AC Bridge
3. To measure capacitance and leakage resistance of unknown capacitances using AC bridge
4. To demonstrate the Hall effect sensor based on AC/DC Current and DC Voltage measurement experimental setup trainer
5. To test the given single phase energy meter at unity power factor by using direct loading and phantom loading arrangements
6. To demonstrate the flow/level process trainer with variable speed pump and pneumatic control valve
7. To measure pressure using Piezo Resistive Transducer (PZT) trainer
8. To demonstrate op-amp as instrumentation amplifier
9. To measure speed using speed sensing transducer trainer
10. To measure liquid level using level measurement transducer by measuring the water column height

11. To investigate the behavior of linear variable differential transformer (LVDT)

12. To measure ground resistance and leakage current using the Earth Tester

TEXT BOOKS/ REFERENCE BOOKS

1. Electronic Instrumentation and Measurements: David A. Bell, Oxford University Press, Third Edition
2. Modern Electronic Instrumentation and Measurement Techniques: Albert D. Helfrick and William D. Cooper, Pearson / Prentice Hall of India.
3. Measurement Systems- Applications and Design: Ernest O. Doebelin, Tata McGraw Hill, New York.
4. A course in Electrical and Electronic Measurements and Instrumentation: A. K. Sawhney, Dhanpat Rai & Sons.
5. Electrical Measurements and Measuring Instruments: E.W Golding, F.C Widdis, A.H. Wheeler & Co. Pvt. Ltd. India.
6. Basic Electrical Measurement: M.B. Stout, Prentice Hall of India
7. Electrical Measurement Analysis: Frank E, Mc-Graw Hill
8. Electrical Measurement: Forest K. Harries, Wiley Eastern Pvt. Ltd. India
9. Electronic Measurements and Instrumentation: Oliver and Cage, TMH.
10. Digital Instrumentation: A. J. Bouwens, Tata McGraw Hill.
11. Instrumentation Measurement and Analysis: B. C. Nakra and K. K. Chaudhry, Mc-Graw Hill Education

ONLINE/E RESOURCES

R1. NPTEL Lectures/ Coursera or Udemy Courses

R2: Lab Notes

Program Core Courses

and

Syllabus

for

I Year B.Tech.

(Electronics & Communication Engineering)

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I	22ECT102	Electronic Measurement & Instrumentation	PC	Theory	3	3	0	0
2	I	22ECT103	Network Theory	PC	Theory	3	3	0	0
3	II	22ECT104	Electronics Devices and Circuits	PC	Theory	3	3	0	0
4	II	22ECT105	Probabilistic Methods in Signals and Systems	PC	Theory	3	3	0	0
5	II	22ECP106	Electronics Devices and Circuits Lab	PC	Practical	1	0	0	2
6	II	22ECP107	Probabilistic Methods in Signals and Systems Lab	PC	Practical	1	0	0	2
					Total Credits	**14**			

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Electronics & Communication Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22ECT102	**Electronic Measurement and Instrumentation**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

- To understand the basic principle of MC, MI and Dynamometer types of measuring instruments, Watt-meters and Energy-meters.
- To learn the concepts of AC and DC bridges to determine value of components
- To learn the basics of transformers and transducers for the measurement of temperature, strain and speed.

COURSE OUTCOMES :

CO1	To be able to understand the working principle of different measuring instruments.
CO2	To be able to analyse the MC, MI and Dynamometer types of measuring instruments, Watt-meters and Energy-meters
CO3	To be able to determine the values of components of circuits using AC and DC bridges
CO4	To be able to know about transformers and transducers for the measurement of temperature, strain and speed

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Submissions/assignments/Quizzes	20%

COURSE CONTENTS

Measurements: Errors & classification.

Analog Ammeters and Voltmeters: PMMC and MI Instruments, Construction, Torque Equation, Range Extension, Effect of temperature,

Analog Wattmeters and Power Factor Meters: Electrodynamometer type wattmeter, power factor meter, Construction, torque equation, active and reactive power measurement in single phase and in three phase.

Analog Energy Meter: Single phase induction type energy meters, construction, Operation, lag adjustments, Max Demand meters/indicators, Measurement of VAH and VARh.

DC and AC Bridges: Measurement of resistance (Wheatstone Bridge, Kelvin's Bridge, Kelvin's Double Bridge), Measurement of inductance, Capacitance (Maxwell's Bridge, Desauty Bridge, Anderson Bridge, Schering Bridge, Wien Bridge).

Instrument Transformers: Current Transformer and Potential Transformer - construction, operation, phasor diagram, errors, testing and applications.

Transducers: Measurement of Temperature, RTD, Thermistors, LVDT, Strain Gauge, Piezoelectric Transducers, Tachometer.

Electronic Instruments: Electronic Display Device, Digital Voltmeters, CRO, measurement of voltage and frequency, Wave Analyzers, Harmonic Distortion Analyzer.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. David A. Bell, Electronic Instrumentation and Measurements, Prentice Hall of India Pvt. Ltd, 2003.
2. U. A. Bakshi, A. V. Bakshi: Electrical Measurements and Instrumentation, Technical Publications, 2009.
3. A. K. Sawhney: A course in Electrical Measurements Electronic Measurements Instrumentation, Edition 11, Dhanpat Rai and Sons, 1996.
4. W.D. Coopers and Helfrick, Modern Electronic instrumentation and Measurements Techniques, Prentice Hall of India Pvt. Ltd, 2002.

5. E.W. Gowlding and F.C.Widdis, Electrical Measurements and Measuring Instruments 5/e, Wheeler Publications 1998.

LECTURE PLAN

Sl. No.	Lectures	Content
1	1-3	**Measurements:** Errors & classification**.**
2	4-9	**Analog Ammeters and Voltmeters:** PMMC and MI Instruments, Construction, Torque Equation, Range Extension, Effect of temperature,
3	10-14	**Analog Wattmeters and Power Factor Meters:** Electrodynamometer type wattmeter, power factor meter, Construction, torque equation, active and reactive power measurement in single phase and in three phase.
4	**Assignment 1**	
5	15-18	**Analog Energy Meter:** Single phase induction type energy meters, construction, Operation, lag adjustments, Max Demand meters/indicators, Measurement of VAH and VARh**.**
6	**Mid-Term Examination**	
7	19-26	**DC and AC Bridges:** Measurement of resistance (Wheatstone Bridge, Kelvin's Bridge, Kelvin's Double Bridge), Measurement of inductance, Capacitance (Maxwell's Bridge, Desauty Bridge, Anderson Bridge, Schering Bridge, Wien Bridge).
8	27-30	**Instrument Transformers:** Current Transformer and Potential Transformer - construction, operation, phasor diagram, errors, testing and applications.
9	**Quiz1**	
10	31-33	**Transducers:** Measurement of Temperature, RTD, Thermistors, LVDT, Strain Gauge, Piezoelectric Transducers, Tachometer.
11	**Assignment 2**	
12	34-36	**Electronic Instruments:** Electronic Display Device, Digital Voltmeters, CRO, measurement of voltage and frequency, Wave Analyzers, Harmonic Distortion Analyzer.
13	**End-Term Examination**	

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Electronics & Communication Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22ECT103	**Network Theory**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

- Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency.
- Provide working knowledge for the analysis of basic DC and AC circuits.
- To understand the various theorems and two port networks in circuit analysis.
- Gain knowledge of transient and steady state analysis of circuits.
- To understand the design of various types of passive filters and its frequency domain analysis.

COURSE OUTCOMES:

CO1	Is able to apply different networking theorems to solve network problems.
CO2	Is able to compute methods of network matrixes, Incidence and reduced incidence matrix, loop matrix etc.
CO3	Is able to perform two port networks as Z parameter, ABCD parameter, T parameter, Y parameter etc.
CO4	Is able to analyses transient & steady states, formulate state equations and find solutions of state equations.
CO5	Is able to analyses networks in frequency domain, pole-zero plots, amplitude and phase response
CO6	Is able to design basic passive filters

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Assignments/Quizzes	20%

COURSE CONTENTS

Methods of Network Analysis: Mesh and node variable analysis; Star Delta transformation; Steady state analysis of AC circuits, Characteristics of the sinusoid: Average, peak and effective values, Impedance concept, Active, reactive and complex power, Power factor, Q of coils and capacitors, Series and parallel resonances, Series Parallel reduction of AC/DC circuits, Network Theorems. **[08 Lectures]**

Two Port Networks: Parameters: open circuit impedance Z parameters, short circuit admittance Y parameters, Hybrid h parameters, Chain parameters ABCD and g parameters, Image Impedances, T and pie network, Relationship between different two port network, Interconnection of two-port network: cascade, series, parallel, series-parallel and parallel-series connections, Indefinite admittance matrix and applications. [**08 Lectures**]

Network Graphs: Network Matrices, Incidence and Reduced Incidence matrix, Loop Matrix, Fundamental loop matrix, Cut set and cut set matrix, Fundamental cut set matrix, Relationship between network Matrices, Formulation of network equations, Fundamental loop equations and nodal admittance matrix. [**06 Lectures**]

Steady State & Transient Analysis: DC and sinusoidal response of R-L-C circuits, Laplace transforms and its properties, inverse transforms, initial and final value theorems, use of transfer function in network analysis. State Equations for Networks: Basic consideration in writing state equations, order of complexity, Formulation of state equations, Solutions of state equations, State transition matrix. Frequency domain analysis of RLC circuits, Poles & Zeros, Driving Point Function, Amplitude & Phase Response. [**08 Lectures**]

Passive Filters: Classification, Constant-K filters, m-Derived T-Section, Band pass filter, Band elimination filter, Tunable filter realization. [**06 Lectures**]

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

T1. Circuit Theory: Analysis and Synthesis, Abhijit Chakrabarti

T2. Circuit and Networks: Analysis and Synthesis , A Sudhakar and Shyammohan S Palli

T3: S. Ghosh, Network Theory: Analysis and Synthesis, PHI, 2005

T4: M. E. Valkenburg, Network Analysis, PHI, 1995

T5: T. S. K. Iyear, Circuit Theory, TMG Hill, 1985

Other References:

R1. NPTEL :: Electrical Engineering - NOC:Network Analysis

R2: T. S. K. Iyear, Circuit Theory, TMG Hill, 1985

LECTURE PLAN

S. No.	Topic to be Covered	Number of Lectures
1	Star Delta transformation	01
2	Mesh and node variable analysis	02
3	Characteristics of the sinusoid: Average, peak and effective values,	01
4	Impedance concept, Active, reactive and complex power, Power factor	01
5	Series and parallel resonances, Series Parallel reduction of AC/DC circuits	01
6	Network Theorems	02
7	Open circuit impedance Z parameters, short circuit admittance Y parameters, Hybrid h parameters, Chain parameters ABCD and g parameters	04
8	**Assignment 1**	
9	Relationship between different two port network	02
10	Indefinite admittance matrix and applications	02
11	Incidence and Reduced Incidence matrix	02
12	**Mid-Term Examination**	
13	Cut set and cut set matrix, Fundamental cut set matrix	02
14	Relationship between network Matrices, Formulation of network equations	02
15	DC and sinusoidal response of R-L-C circuits	03
16	Laplace transforms and its properties, inverse transforms, initial and final value theorems, use of transfer function in network analysis	01
	Quiz1	
17	Formulation of state equations, Solutions of state equations, State transition matrix. Frequency domain analysis of RLC circuits, Poles & Zeros	02
18	Driving Point Function, Amplitude and Phase Response	02
19	**Assignment 2**	

20	Classification, Constant-K filters, m-Derived T-Section	03
21	Band pass filter, Band elimination filter, Tunable filter realization	03
22	**End-Term Examination**	

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Electronics & Communication Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22ECT104	**Electronics Devices and Circuits**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

Basics of Electronics and Electrical Engg. And Network Theory

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of Amplifiers and Oscillators

COURSE OUTCOMES :

CO1	Understand the modelling of bipolar junction transistors (BJTs), analyse the different amplifier configurations using these transistors models, learn to simplify these models and analyse the different transistor configurations.
CO2	Acquire the basic understanding of the Field effect transistor (FET) and its small signal model, analyse the low frequency configurations of the amplifier using FET. (I/3)
CO3	Understand the high frequency model of the bipolar junction transistors (BJTs) for the different configurations.
CO4	Learn the concept of feedback to stabilize the amplifiers, analyse the different topologies and synthesise the same using BJTs and FETs (II/3)
CO5	Learn the principles of sinusoidal oscillators, wave generator. (III/3)

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	10%
b)	Mid-term examination	30%

c)	End Semester Examination	50%
d)	Quiz	10%

COURSE CONTENTS

Unit I- Transistor at low frequencies: Graphical Analysis of the CE configuration, Two-Port devices and the hybrid Model, Transistor hybrid model, The h-parameter, Conversion formulas for the parameters of the three transistor Configuration, Analysis of a transistor Amplifier Circuit using h parameters, The Emitter follower, Comparison of transistor amplifier configurations, Linear Analysis of a Transistor Circuit

(No. of lectures- 10)

Unit II- Cascade Amplifiers: Cascading Transistor Amplifiers, Simplified Common-Emitter Hybrid Model, Simplified calculations for the Common Collector Configuration, The Common-Emitter Amplifier with an emitter resistance, High input resistance transistor circuits, multistage amplifier analysis.

(No. of lectures- 6)

Unit III- High frequency model of BJT: High frequency hybrid-π model of BJT, Common emitter and common collector configurations, Cascade configuration.

(No. of lectures- 3)

Unit IV- Field Effect Transistors: The FET and MOSFET Small-Signal model, The Low-Frequency Common-Source and Common-Drain Amplifiers, The FET as a Voltage-variable Resistor (VVR).

(No. of lectures- 6)

Unit V- Feedback Amplifiers: General Feedback structure, Properties of negative Feedback, Four basic Feedback Topologies, Voltage series, Voltage shunt, Current series, Current Shunt, Effect of Feedback connection on various parameters. Analysis of above topology for BJT and FET.

(No. of lectures- 5)

Unit VI- Oscillators: Basic principle of sinusoidal oscillator (phase shift, wein bridge), Hartley & Colpitts, Crystal Oscillator, nonlinear/pulse oscillator.

(No. of lectures- 5)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Electronic principles, Bolysted.
2. Millman, Halkias, Integrated Electronics- Analog & digital circuits, TMH.
3. Millman, Halkias& S. Jit. Electronics Devices & Circuits, TMH, 2009.
4. Microelectronic Circuits, Sedra Smith, Oxford press, India.
5. Electronic Devices and Circuits, David-A-Bell, Oxford Univ. Press 2008.

ONLINE/E RESOURCES

1. NPTEL courses
2. MOOC courses

Lecture Plan

S.No.	Lecture No.	Topic
1.	Lecture 1	Introduction to BJTs
2.	Lecture 2	Transistor current components
3.	Lecture 3	Transistor as an amplifier
4.	Lecture 4	Transistor construction
5.	Lecture 5	Configuration of BJTs • CB Configuration and its characteristics • CC Configuration and its characteristics
6.	Lecture 6	CE configuration and its characteristics • CE cut-off region • CE saturation • CE current gain • Numerical problems/ Queries
7.	Lecture 7	Analytical expressions for transistor characteristics
8.	Lecture 8	Transistor at low frequencies • Graphical Analysis of the CE configuration
9.	Lecture 9	Two-Port devices and the hybrid Model
10.	Lecture 10	Transistor hybrid model The h-parameter Conversion formulas for the parameters of the three transistor Configuration
11.	Lecture 11	Analysis of a transistor Amplifier Circuit using h parameters Numerical Problems/ Queries
12.	Lecture 12	• The Emitter follower • Comparison of transistor amplifier configurations
13.	Lecture 13	Linear Analysis of a Transistor Circuit, ,.

14.	Lecture 14	Miller theorem and its dual
15.	Lecture 15	Numerical Problems/ Queries
16.	Lecture 16	Cascading Transistor Amplifiers
17.	Lecture 17	Simplified Common-Emitter Hybrid Model
18.	Lecture 18	Simplified calculations for the Common Collector Configuration
19.	Lecture 19	The Common-Emitter Amplifier with an emitter resistance
20.	Lecture 20	High input resistance transistor circuits Numerical problems/ Queries
21.	Lecture 21	Multistage amplifier analysis
22.	Lecture 22	High frequency model of BJT • High frequency hybrid-π model of BJT
23.	Lecture 23	Cascode configuration
24.	Lecture 24	Numerical problems/Queries/ Quiz
25.	Lecture 25	Field Effect Transistors: • The FET and MOSFET Small-Signal model
26.	Lecture 26	The Low-Frequency Common-Source Amplifiers
27.	Lecture 27	The Low-Frequency Common-drain Amplifiers Numerical problems/ Queries
28.	Lecture 28	The FET as a Voltage-variable Resistor (VVR)
29.	Lecture 29	Feedback Amplifiers: General Feedback structure
30.	Lecture 30	Properties of negative Feedback
31.	Lecture 31	Four basic Feedback Topologies • Voltage series • Voltage shunt • Analysis of above topology for BJT and FET
32.	Lecture 32	Four basic Feedback Topologies • Current series

		• Current Shunt • Analysis of above topology for BJT and FET
33.	Lecture 33	Effect of Feedback connection on various parameters Numerical problems/ Queries
34.	Lecture 34	Oscillators • Basic principle of sinusoidal oscillator ✓ RC phase shift ✓ Wein bridge
35.	Lecture 35	Oscillators • Basic principle of sinusoidal oscillator ✓ Hartley ✓ Colpitts Oscillator ✓ Crystal Oscillator
36.	Lecture 36	Numerical problems/ Queries
37.	Lecture 37	Revision
38.	Lecture 38	Revision
39.	Lecture 39	Gate questions
40.	Lecture 40	Quiz of whole syllabus

DEPARTMENT OF CIVIL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (ECE)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22ECT105	**Probabilistic Methods in Signal and Systems**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

Calculus, Ordinary Differential Equations

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of the transformation of deterministic and random signals through discrete and continuous systems.

COURSE OUTCOMES:

CO1	Understand the handling of signals in different domains- time and frequency - through Fourier transforms.
CO2	Analysis and synthesis of different basic signals to be used in the communication systems.
CO3	Analyze the different type of signals and noises in communication systems.
CO4	Acquire the basic mathematical understanding of the probability theory

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Unit I- Representation of Signals and Systems: Continuous & discrete time signals, LTI systems and their classification, System modeling using differential and difference equations.

(no. of lectures- 8)

Unit II- Analysis of signals: Fourier series, Fourier transforms and their properties, Convolution, Transmission of signals through linear systems

(no. of lectures- 10)

Unit III- Fourier Analysis for DTS: Discrete time Fourier series, Discrete time Fourier transform and their properties, DFT and its properties, Fast Fourier Transform Z-transforms & its properties, ROC, Inversion of Z-transform, Application to System Analysis.

(no. of lectures- 14)

Unit IV- Probability Theory & Random Variables : Introduction to theory of probability, Self, joint & conditional probabilities, Statistically dependent & independent events, Discrete and continuous Random Variables (RV's) , their CDF's and pdf's

(no. of lectures- 4)

Unit V- Functions of random variable: Case of one/two random variables, Joint RVs, Mean values and moments of some pdf's (Binomial, Poisson, Gaussian, Rayleigh, Maxwell, Gaussian), Correlation function and their properties, Basic concept of Random processes

(no. of lectures- 4)

TEXT BOOKS/ REFERENCE BOOKS:-

1. Cooper, McGillem: Probabilistic Methods of Signal and System Analysis, 3/e, OUP, 1999.
2. Oppenheim A.V., Willsky A.S. and Nawab S.H..: Signals and Systems, 2/e, Prentice Hall of India, 1997
3. B.P. Lathi, Modern Digital and Analog. Communication Systems, 3rd ed., Oxford. University Press, 1998

ONLINE/E RESOURCES

1. MIT Open Course Ware: RES.6-007 Signal and Systems by Prof. Alan V. Oppenheim
2. NPTEL: Signals and Systems by Prof. Kushal K. Shah | IISER Bhopal

Lecture Plan

Lecture No.	Topics to be covered
1	Mathematical representation of discrete and continuous time signals
2	Signal Energy and Power
3	Even and odd signals and the periodicity of the signal
4	Transformation of the independent variables
5	Continuous and discrete time unit impulse and unit step functions
6	Continuous and discrete time systems
7	Basic properties of the system: Causality, Stability, Time Invariance, Linearity
8	The representation of discrete time signals in terms of impulse function
9	Convolution sum representation of LTI System
10	Properties of Linear Time Invariant Systems
11	The unit step response of an LTI System
12	Linear constant-coefficient differential equations
13	Linear constant-coefficient difference equations
14	Block diagram representation of first-order systems by differential equations
15	Block diagram representation of first-order systems by difference equations
16	Determination of the Fourier series representation of a continuous time periodic signal
17	Properties of continuous time Fourier series
18	Determination of the Fourier series representation of a discrete time periodic signals
19	Properties of discrete time Fourier series
20	Determination of the Fourier transform representation of a continuous time aperiodic signal
21	Properties of continuous-time Fourier Transform (CTFT)
22	Convolution and Multiplication of CTFT
23	Determination of the Fourier transform representation of a discrete time aperiodic signal
24	Properties of discrete-time Fourier Transform (DTFT)
25	Convolution and Multiplication of DTFT
26	Z transform of discrete time signal and relationship with Fourier Transform
27	ROC of the Z transform
28	Inverse Z transform
29	Pole Zero plot
30	Properties of Z transform
31	Analysis of LTI System using Z transform
32	System function algebra and block diagram representation
33	Introduction to theory of probability: Self, Joint and Conditional Probability

34	Statistically dependent & independent events,
35	Discrete and continuous Random Variables (RV) ,
36	CDF and PDF
37	Joint Random Variables
38	Mean values and moments of some PDF (Binomial, Poisson, Gaussian, Rayleigh, Maxwell)
39	Correlation function and their properties,
40	Basic concept of Random processes

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Electronics & Communication Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22ECP106	**Electronics Devices and Circuits Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

- To know about the working and operation of various diode circuits.
- To experimentally verify the oscillators and amplifiers characteristics
- To analyze various transistor related circuits.

COURSE OUTCOMES :

CO1	To be able to know about diode circuits like clipper, clamper, rectifier etc.
CO2	To be able to understand and analyze the various oscillators
CO3	To be able to understand and analyze amplifier characteristics
CO4	To be able to analyze transistor characteristics and H parameters

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Continuous lab-based evaluation	50%
b)	Mid-semester evaluation	20%
c)	End-semester evaluation	30%

LIST OF EXPERIMENTS

1. To observe and draw the Forward and Reverse bias V-I Characteristics of a P-N Junction diode.

2. Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.

3. Application of Diode as clipper and clamper.

4. Study half wave rectifier and effect of filters on wave. Also calculate theoretical &practical ripple factor, with Filter and without Filter

5. Study centre tap rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

6. Study bridge rectifier and measure the effect of filter network on D.C. voltage output & ripple factor.

7. To study Wein Bridge Oscillator and observe the frequency effect of Variation in R and C.

8. Study of R.C. phase shift oscillator and observe the effect in R and C oscillator frequency and obtain theoretical and practical value.

9. To draw the input and output characteristics of transistor connected in CE configuration and find h-parameters.

10. Plot frequency response of single stage amplifier and to determine gain bandwidth product.

11. To study the effect of voltage series feedback on the Gain of the Amplifier.

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Electronics & Communication Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22ECP107	**Probabilistic Methods in Signals & System Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

- To know the programming skills in MATLAB
- To plot and understand various characteristics of signals.
- To analyze various pdfs and plot them.

COURSE OUTCOMES :

CO1	To do fundamental programming in MATLAB
CO2	To do plot of various pdf
CO3	To do plot of various mathematical functions
CO4	To do plot of Fourier Series and Fourier Transform

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Continuous lab-based evaluation	50%
b)	Mid-semester evaluation	20%
c)	End-semester evaluation	30%

LIST OF EXPERIMENTS

1. Introduction to MATLAB working environment and language fundamentals. To create matrices and do basic mathematical operations.
2. Program to convert Celsius into Fahrenheit and vice versa.
3. Program to calculate simple probability and express it in fraction.
4. Plotting of sine, cosine and exponential function using their series expansion.
5. Plotting sine, cosine using inbuilt functions on a single plot and using plot function properties to make changes in plot.
6. To plot uniform pdf by
   a) Concatenation
   b) Using loop
   c) Using inbuilt function of CRV X.
7. Generation of square waveform of different periods and duty cycles using inbuilt function.
8. To make a function for Fourier series of square wave and using it to form and plot a square wave.
9. To make a function for Impulse signal and calling it to plot different shifted Impulses.
10. To plot pdf of binomial distribution and hence calculate the probability of binomial distribution of RV.
11. To plot Gaussian pdfby
    a)Mathematical formula
    b)Generating normally distributed random number and plotting their histogram.
12. Introduction to symbolic math Toolbox, use of special functions for the purpose of performing mathematical operations such as an integration, differentiation, Fourier Series and Laplace Transform.

Program Core Courses

and

Syllabus

for

I Year B.Tech.

(Mechanical Engineering)

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I	22MET103	Applied Probability and Statistics	PC	Theory	3	2	1	0
2	I	22MET104	Casting Welding and Forming	PC	Theory	3	3	0	0
3	I	22MEP105	Casting Welding and Forming Lab	PC	Practical	1	0	0	2
4	II	22MET106	Engineering Thermodynamics	PC	Theory	4	3	1	0
5	II	22MET107	Engineering Mechanics	PC	Theory	3	2	1	0
					Total Credits	**14**			

DEPARTMENT OF MECHANICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Mechanical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MET103	**Applied Probability and Statistics**	**3**	**2**	**1**	**0**	**0**

PREREQUISITE

Basic fundamentals of mathematics

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of probability and linked statistical concepts, to enable them for applying the same to solve engineering and societal problems.

COURSE OUTCOMES (Please delete the extra numbers of COs):

CO1	Acquiring a basic knowledge about application of probability theory, useful for modeling uncertain phenomena in engineering
CO2	Learning the general methods of estimating statistical parameters using data and thereby establishing their values with hypothesis testing
CO3	Learning standard statistical methods useful for everyday routine elementary applications

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	20%
b)	Mid-term examination	25%
c)	End Semester Examination	40%
d)	Tutorials	15%

COURSE CONTENTS

Unit I- Introduction to the role of probability and statistics in engineering: Why study statistics, role of science and engineer in quality improvement, a case study: Visually inspecting data to improve product quality, concept of population and sample.

(**no. of lectures** -4)

Unit- II- Descriptive statistics and treatment of data: Measures of central tendency, Pareto diagram, frequency distribution, box plots, pair plots, scatter plots

(**no. of lectures** - 3)

Unit III - Probability concepts: Conditional probability, Bayes' theorem, random variables, types of probability distribution, binomial distribution, mean and variance of probability distribution, Chebyshev's theorem, Poisson distribution, normal distribution, uniform distribution, sampling distribution of mean and variance

(**no. of lectures** - 7)

Unit IV- Inferential statistics: Point estimation, interval estimation, inferences concerning means, variance and proportions with hypothesis testing

(**no. of lectures** - 7)

Unit V- Curve fitting: Correlation, Method of least squares, linear regression, residual analysis, auto-correlation

(**no. of lectures** -7)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Probability and Statistics for Engineers, Richard A. J., Miller, I. and Freund J., 8th ed., Pearson, 2015.
2. Data Analysis and Decision Making, Albright, S.C., Winston, W.L. and Zappe, C.J Cengage, 2015.

ONLINE/E RESOURCES

1. https://www.youtube.com/c/joshstarmer
2. https://statquest.org/

Lecture Plan

Lecture No.	Topics to be covered
1	Why study statistics, ,.
2	role of science and engineer in quality improvement, a case study: Visually inspecting data to improve product quality
3	Concept of population and sample, Measures of central tendency
4	Pareto diagram, frequency distribution, box plots, pair plots, scatter plots
5-6	Conditional probability, Bayes' theorem
6-8	Random variables, types of probability distribution, binomial distribution, mean and variance of probability distribution
9-13	Chebyshev's theorem, Poisson distribution, normal distribution, uniform

Lecture No.	Topics to be covered
	distribution, sampling distribution of mean and variance
14-18	Point estimation, interval estimation
19-22	Inferences concerning means, variance and proportions with hypothesis testing
23-28	Correlation, Method of least squares, linear regression, residual analysis, auto-correlation

DEPARTMENT OF MECHANICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Mechanical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MET104	**Casting Welding and Forming**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of manufacturing process of mechanical products and develop skills for testing of process and product

COURSE OUTCOMES:

CO1	To provide detailed information about the moulding processes
CO2	Illustrate casting problem (melting, refining & pouring and production of a mould) and explain process capabilities and application of casting processes. Design a "mould ready to pour" solution for a given casting.
CO3	Illustrate capabilities of welding processes and select an appropriate welding process for a given application
CO4	Illustrate capabilities of forming process and hence application of bulk metal forming processes and sheet metal work.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions / assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS (Description type I)

Unit I- Casting: Casting, molding methods and processes-materials, equipment, molding sand ingredients, essential requirements, sand preparation and control, testing, cores and core making. Design considerations in casting, gating and risering, directional solidification in castings. Heat transfer & fuid mechanics aspects in casting, Sand castings-pressure die casting-permanent mould casting-centrifugal casting precision investment casting, shell moulding, CO2 moudling, continuous casting-squeeze casting-electro slag casting, Thixo Molding, Moulding for Magnesium alloys. Gas injection moulding. Fettling, finishing, defects in Castings. Foundry melting furnaces: selection of furnace-crucibles oil fired furnaces, electric furnaces-cupola, hot blast etc. **(No. of lectures- 15)**

Unit II- Welding: Classification of welding processes, gas welding-arc welding-shielded metal arc welding, TAW, GMAW, SAW, ESW-Resistance welding (spot, seam, projection, percussion, flash types)-atomic hydrogen arc, therimit welding soldering, brazing and braze welding. Electron beam and Laser beam welding-plasma arc welding-stud welding-friction welding-explosive welding ultrasonic welding-underwater welding-roll bonding-diffusion bonding-cold welding-welding of plastics, dissimilar metal. Gas welding equipment's-welding power sources and characteristics-safety aspects in welding-automation of welding, seam tracking, vision and arc sensing-welding robots. Defects in welding-causes and remedies-destructive testing methods - NDT of weldments - testing of pipe, plate, boiler, drum, tank-case studies-weld thermal cycle-residual stresses-distortion-relieving of stresses, weld ability of cast iron, steel, stainless steel, aluminium alloys effect of gases in welding, fatigue failure in weldments.

(No. of lectures- 11)

Unit III- Metal Forming Processes- Principle, solid mechanics aspects of forming, classification and equipment for forging, rolling and extrusion processes, Defects and analysis: Rod/wire drawing-tool, equipment and principle of processes defects, Tube drawing and sinking processes. Mannessmann processes of seamless pipe manufacturing. Classification conventional and HERF processes, Presses-types and selection of presses, formability of sheet metals, Principle, process parameters, equipment and application of the following processes. Deep drawing, spinning, stretch forming, plate bending, press brake forming, Explosive forming, electro hydraulic forming, magnetic pulse forming. Super plastic forming, electro forming-fine blanking, P/M forging-Isothermal forging-high speed, hot forging high velocity extrusion.

(No. of lectures- 11)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, and Publisher & Year):-

1. Taylor H F, Flemings M C and Wulff J, Foundry Engineering, Wiley Eastern Limited, 1993.
2. Lindberg R.A, Processes and Materials of Manufacture, Prentice Hall of India (P) Limited, 1996.
3. Lancaster J.F., Metallurgy of welding, George Allen and Unwin, 1991.
4. S. K. Hazra Choudhury, A. K. Hajra Choudhury, Nirjhar Roy. Elements of workshop technology Vol I- Manufacturing Processes, MPP.

5. Kalpakjian Serope, Manufacturing engineering and Technology, Wesley Publishing Co., 1995.
6. William F. Hosford & Caddel Robert M., Metal forming (Mechanics & Metallurgy), Prentice Hall Publishing Co., 1990.
7. P. N. Rao, Manufacturing Technology, Volume 1, Tata McGraw-Hill Education, 2013
8. Amitabh Ghosh and Ashok Kumar Mallik, Manufacturing science, East west press private limited 1985.

ONLINE/E RESOURCES

1. SWAYM / NPTEL Portal

Lecture Plan

Lecture No.	Topics to be covered
1	Introduction, Pattern materials, Patternmaking tools, Types of patterns
2	Patternmaking allowances Core prints, Core boxes, Colour coding for patterns and core-boxes
3	Moulding tools and equipment's
4	Types of moulding sands, Grain shape and size of sand, Sand additives,
5	Properties of moulding sands, Sand preparation, Sand testing,
6	Moulding processes, Moulding processes based on sand used, Making a green sand mould
7	Typical moulding problems, Moulding processes based on the methods used, Machine moulding,
8	Cores and core making,
9	CO2 moulding, Ferro silicon moulding, Dicalcium silicate moulding, Cement sand moulding, Shell moulding,
10	Hot and cold box moulding, Investment mould process, Plaster moulding, Ceramic moulding,
11	Permanent mould casting, Slush casting, Die casting, Centrifugal casting, Continuous casting,
12	Gating and risering of casting, Use of padding and chills
13	Melting furnaces of ferrous metals; cupola
14	Melting furnaces of non-ferrous metals, Ladles, Pouring of metals, Cleaning of casting,
15	Defects in casting, Inspection and quality control, Modernization and mechanization of foundries, Design of casting.
16	Introduction, Weldability, Types of welding, Metallurgy of weld,
17	Gas welding, Oxy-acetylene welding, Oxy-hydrogen welding,
18	Arc welding, Metal transfer in arc welding, Arc welding equipment
19	Arc welding methods,
20	Resistance welding, Resistance welding methods
21	Thermit welding, Solid state welding,
22	Newer welding methods and their types (Electron beam welding, Laser beam welding),

23	Related processes, Oxygen cutting, Hard facing,
24	Bronze welding, Soldering, Brazing,
25	Welding of various metals, Inspection and testing of welds,
26	Welded joints and edge preparation,
27	Metal Forming Processes-nature of plastic deformation,
28	Rolling, Thread rolling.
29	forging,
30	Extrusion
31	wire drawing rod and tube drawing, swaging, tube making
32	explosive forming,
33	Sheet metal operations-press tool operation, shearing action, shearing operation,
34	drawing, draw die design,
35	spinning, bending, stretch forming, embossing and coining,
36	Sheet metal die design.
37	specifications of press, capabilities of press

DEPARTMENT OF MECHANICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Mechanical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MEP105	**Casting Welding and Forming Lab**	**1**	**0**	**0**	**2**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of manufacturing process of mechanical products and develop skills for testing of process and product

COURSE OUTCOMES:

CO1	To provide detailed information about the moulding processes
CO2	Illustrate casting problem (melting, refining & pouring and production of a mould) and explain process capabilities and application of casting processes. Design a "mould ready to pour" solution for a given casting.
CO3	Illustrate capabilities of welding processes and select an appropriate welding process for a given application
CO4	Illustrate capabilities of forming process and hence application of bulk metal forming processes and sheet metal work.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions / assignments	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

List of Experiments:

1. Testing of green sand properties. (No. of lab hours- 2)
2. Green sand mould design & making process with complete gating system including its testing through a CAE software for thermal aspects. (No. of lab hours- 2)
3. Making of a shell using shell moulding machine. (No. of lab hours- 2)
4. Study of defects in castings. (No. of lab hours- 2)
5. Making of lap joint by the resistance welding process and its strength evaluation (No. of lab hours- 2)
6. Study of bead geometry in arc welding process for its strength & micro-structure. (No. of lab hours- 2)
7. Determination of weld characteristics using DC and AC power sources. (No. of lab hours- 2)
8. Study of butt joint strength evaluation by GMAW process. (No. of lab hours- 2)
9. Welding of Aluminium with GTAW process. (No. of lab hours- 2)
10. Preparation of moulds of simple objects like flange, gear V- grooved pulley etc. (No. of lab hours- 2)
11. Process parameters of gas welding, TIG, MIG & Spot welding Jobs. (No. of lab hours- 2)
12. Use of Die and Mould for Sheet Metal Fabrication. (No. of lab hours- 2)

DEPARTMENT OF MECHANICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

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DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MET106	**Engineering Thermodynamics**	**4**	**3**	**1**	**0**	**0**

PREREQUISITE

Nil

COURSE OBJECTIVE(s)

To familiarize and equip the students with basic knowledge of engineering thermodynamics and use the Law of Thermodynamics to estimate the potential for thermo-mechanical energy conversion in propulsion systems.

COURSE OUTCOMES:

CO1	To understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.
CO2	To solve common engineering problems in the thermal sciences field, including problems involving application of the first and second laws of thermodynamics.
CO3	To apply learned knowledge and skills of this course in order to understand, analyze, and design different thermal components, processes and systems.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments/quiz	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS (Description type I)

Unit I- Introduction and Basic Concepts: Thermodynamics and Energy, Application Areas of Thermodynamics, Systems and Control Volumes, Properties of a System, Density and Specific Gravity, State and Equilibrium, Processes and Cycles, The Steady-Flow Process, Temperature and the Zeroth Law of Thermodynamics

(no. of lectures- 4)

Unit II- Energy Conversion and General Energy Analysis: Introduction, Forms of Energy, Some Physical Insight to Internal Energy, Mechanical Energy, Energy Transfer by Heat, Energy Transfer by Work, Electrical Work, Mechanical Forms of Work, Shaft Work, The First Law of Thermodynamics, Energy Balance, Energy Change of a System, Corollaries of 1st law, Application of first law to closed systems and open systems under steady and unsteady flow condition,

(no. of lectures- 7)

Unit III- Properties of Pure Substances: Pure Substance, Phases of a Pure Substance, Phase-Change Processes of Pure Substances, Compressed Liquid and Saturated Liquid, Saturated Vapor and Superheated Vapor, Saturation Temperature and Saturation Pressure, Property Diagrams for Phase-Change, Processes, The T-v Diagram, The P-v Diagram, Extending the Diagrams to Include the Solid Phase, The P-T Diagram, The P-v-T Surface, Property Tables, Enthalpy, Superheated Vapor, The Ideal-Gas Equation of State

(no. of lectures- 7)

Unit IV- Energy Analysis of Closed Systems: Moving Boundary Work, Polytrophic Process, Energy Balance for Closed Systems, Specific Heats, Internal Energy, Enthalpy, and Specific Heats of Ideal Gases, Specific Heat Relations of Ideal Gases, Internal Energy, Enthalpy, and Specific Heat of Solids and Liquids, Internal Energy Changes, Enthalpy Changes

(no. of lectures- 7)

Unit V- The Second Law of Thermodynamics: Introduction to the Second Law, Thermal Energy Reservoirs, Heat Engines, Thermal Efficiency, Kelvin–Planck Statement, Refrigerators and Heat Pumps, Coefficient of Performance, Heat Pumps, Statement, Equivalence of the Two Statements, Perpetual-Motion Machines, Reversible and Irreversible Processes, Irreversibility,

Internally and Externally Reversible Processes, The Carnot Cycle, The Reversed Carnot Cycle, The Carnot Principles

(no. of lectures- 6)

Unit VI- Entropy: Entropy, Statistical definition of entropy, Reversible and irreversible processes in terms of Entropy, Application Second Law of Thermodynamics to closed systems and open systems under steady and unsteady flow condition,

(no. of lectures- 6)

Unit VII- Miscellaneous: Exergy, Second law efficiency, Maxwell Equations, Zeroth Law of Thermodynamics, Third Law of Thermodynamics, Clapeyron equation, Joule-Thomson effect, P-v-T surfaces for ideal and real gases.

(no. of lectures- 3)

COURSE CONTENTS (Description type II)

Introduction and Basic Concepts: Thermodynamics and Energy, Application Areas of Thermodynamics, Systems and Control Volumes, Properties of a System, Density and Specific Gravity, State and Equilibrium, Processes and Cycles, The Steady-Flow Process, Temperature and the Zeroth Law of Thermodynamics

Energy Conversion and General Energy Analysis: Introduction, Forms of Energy, Some Physical Insight to Internal Energy, Mechanical Energy, Energy Transfer by Heat, Energy Transfer by Work, Electrical Work, Mechanical Forms of Work, Shaft Work, The First Law of Thermodynamics, Energy Balance, Energy Change of a System, Corollaries of 1st law, Application of first law to closed systems and open systems under steady and unsteady flow condition,

Properties of Pure Substances: Pure Substance, Phases of a Pure Substance, Phase-Change Processes of Pure Substances, Compressed Liquid and Saturated Liquid, Saturated Vapor and Superheated Vapor, Saturation Temperature and Saturation Pressure, Property Diagrams for Phase-Change, Processes, The T-v Diagram, The P-v Diagram, Extending the Diagrams to Include the Solid Phase, The P-T Diagram, The P-v-T Surface, Property Tables, Enthalpy, Superheated Vapor, The Ideal-Gas Equation of State

Energy Analysis of Closed Systems: Moving Boundary Work, Polytropic Process, Energy Balance for Closed Systems, Specific Heats, Internal Energy, Enthalpy, and Specific Heats of Ideal Gases, Specific Heat Relations of Ideal Gases, Internal Energy, Enthalpy, and Specific Heat of Solids and Liquids, Internal Energy Changes, Enthalpy Changes

The Second Law of Thermodynamics: Introduction to the Second Law, Thermal Energy Reservoirs, Heat Engines, Thermal Efficiency, Kelvin–Planck Statement, Refrigerators and Heat Pumps, Coefficient of Performance, Heat Pumps, Statement, Equivalence of the Two Statements, Perpetual-Motion Machines, Reversible and Irreversible Processes, Irreversibility, Internally and Externally Reversible Processes, The Carnot Cycle, The Reversed Carnot Cycle, The Carnot Principles

Entropy: Entropy, Statistical definition of entropy, Reversible and irreversible processes in terms of Entropy, Application Second Law of Thermodynamics to closed systems and open systems under steady and unsteady flow condition,

Miscellaneous: Exergy, Second law efficiency, Maxwell Equations, Zeroth Law of Thermodynamics, Third Law of Thermodynamics, Clapeyron equation, Joule-Thomson effect, P-v-T surfaces for ideal and real gases.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Y. A. Cengel & M. A. Boles; Thermodynamics-An Engineering Approach; McGraw-Hill Inc.
2. P. K. Nag; Engineering Thermodynamics; Tata McGraw-Hill, New Delhi.
3. G. Van Wylen, R. Sounting & C Borgnakke; Fundamentals of Classical Thermodynamics; John Wiley & Sons/New Age International, Delhi
4. J. P. Holman; Thermodynamics; McGraw-Hill Book Co. New Delhi.

ONLINE/E RESOURCES

1. https://nptel.ac.in/courses/101104063

Lecture Plan

Lecture No.	Topics to be covered
1	Introduction, Need, Motivation, Thermodynamics and Energy, Application Areas of Thermodynamics
2	Systems and Control Volumes, Properties of a System
3	Density and Specific Gravity, State and Equilibrium, Processes and Cycles
4	The Steady-Flow Process, Temperature and the Zeroth Law of Thermodynamics
5	Energy Conversion and General Energy Analysis: Introduction, Forms of Energy
6	Some Physical Insight to Internal Energy, Mechanical Energy
7	Energy Transfer by Heat, Energy Transfer by Work
8	Electrical Work, Mechanical Forms of Work, Shaft Work
9	The First Law of Thermodynamics, Energy Balance
10	Energy Change of a System, Corollaries of 1st law
11	Application of first law to closed systems and open systems under steady and unsteady flow condition
12	Properties of Pure Substances: Introduction, Pure Substance, Phases of a Pure Substance
13	Phase-Change Processes of Pure Substances, Compressed Liquid and Saturated Liquid
14	Saturated Vapor and Superheated Vapor, Saturation Temperature and Saturation Pressure
15	Property Diagrams for Phase-Change, Processes
16	The T-v Diagram, Extending the Diagrams to Include the Solid Phase
17	The P-T Diagram, The P-v-T Surface, Property Tables
18	Enthalpy, Superheated Vapor, The Ideal-Gas Equation of State
19	Energy Analysis of Closed Systems: Introduction, Moving Boundary Work
20	Polytrophic Process, Energy Balance for Closed Systems
21	Specific Heats, Internal Energy
22	Enthalpy, and Specific Heats of Ideal Gases
23	Specific Heat Relations of Ideal, Gases, Internal Energy
24	Enthalpy, and Specific Heat of Solids and Liquids
25	Internal Energy Changes, Enthalpy Changes
26	The Second Law of Thermodynamics: Introduction to the Second Law, Thermal Energy Reservoirs
27	Heat Engines, Thermal Efficiency, Kelvin–Planck Statement
28	Refrigerators and Heat Pumps, Coefficient of Performance
29	Heat Pumps, Statement, Equivalence of the Two Statements, Perpetual-Motion Machines
30	Reversible and Irreversible Processes, Irreversibility, Internally and Externally Reversible Processes
31	The Carnot Cycle, The Reversed Carnot Cycle, The Carnot Principles

32	Entropy: Introduction
33	Entropy, Statistical definition of entropy,
34	Reversible and irreversible processes in terms of Entropy
35	Reversible and irreversible processes in terms of Entropy
36	Application Second Law of Thermodynamics to closed systems and open systems under steady and unsteady flow condition
37	Application Second Law of Thermodynamics to closed systems and open systems under steady and unsteady flow condition
38	Miscellaneous: Exergy, Second law efficiency, Maxwell Equations, Zeroth Law of Thermodynamics
39	Third Law of Thermodynamics, Clapeyron equation, Joule-Thomson effect,
40	P-v-T surfaces for ideal and real gases.

DEPARTMENT OF MECHANICAL ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Mechanical Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MET107	**Engineering Mechanics**	**3**	**2**	**1**	**0**	**0**

PREREQUISITE

None

COURSE OBJECTIVE(s)

To familiarize the students with basic principles of engineering mechanics with emphasis on the analysis and application to practical engineering problems.

COURSE OUTCOMES:

CO1	Understand the basic principles of engineering mechanics with emphasis on their analysis and application to practical engineering problems
CO2	Analyze planar and spatial systems to determine the forces in members of trusses, frames
CO3	Understand the concept of moment of inertia and apply them to engineering problems
CO4	Apply fundamental ideas of kinematics and dynamics to the analysis of simple practical problems

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments/Quiz	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS (Description type I)

Unit I- Introduction to Mechanics and Laws of Mechanics. Statics of Particles: Forces in a Plane- Force on a Particle, Resultant of Two Forces, Resultant of Several Concurrent Forces, Resolution of a Force into Components Rectangular Components of a Force. Equilibrium of a Particle, Free-Body Diagrams. Forces in Space – Rectangular Components of a Force in Space, Force Defined by Its Magnitude and Two Points on Its Line of Action. Addition of Concurrent Forces in Space, Equilibrium of a Particle in Space. **(no. of lectures- 8)**

Unit II- Rigid Bodies: Equivalent Systems of Forces: Principle of Transmissibility. Equivalent Forces, Moment of a Force about a Point, Varignon's Theorem, Moment of a Force about a Given Axis, Moment of a Couple, Equivalent Couples, Resolution of a Given Force into a Force and a Couple, Reduction of a System of Forces to One Force and one Couple Equivalent Systems of Forces, Reduction of a System of Forces to a Wrench. **(no. of lectures- 6)**

Unit III- Equilibrium of Rigid Bodies: Introduction, Free-Body Diagram, Equilibrium in Two Dimensions, Reactions at Supports and Connections for a Two-Dimensional Structure, Equilibrium of a Rigid Body in Two Dimensions, Statically Indeterminate Reactions. Partial, Constraints, Equilibrium of a Two-Force Body, Equilibrium of a Three-Force Body, Equilibrium in Three Dimensions, Equilibrium of a Rigid Body in Three Dimensions, Reactions at Supports and Connections for a Three-Dimensional Structure. **(no. of lectures-6)**

Unit IV- Force Analysis of Rigid bodies Structures: Plane Trusses, Methods of Joints, Method of Section, Space Trusses, Frames and Machines, Internal Forces Developed in various Structural Members (such as rod, beam, shaft), Shear and Moment Equations and Diagrams (SFD and BMD), Relations between Distributed Load, Shear, and Moment. **(no. of lectures- 6)**

Unit V- Distributed Forces: Centroids and Center of Gravity: Moments of Inertia of Areas, Second Moment, or Moment of Inertia, of an Area, Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Product of Inertia, Principal Axes and Principal Moments of Inertia, Mohr's Circle for Moments and Products of Inertia, Moments of Inertia of a Mass Moment of Inertia of a Mass, Parallel-Axis Theorem, Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration, Moments of Inertia of Composite Bodies, Moment of Inertia of a Body with Respect to an Arbitrary Axis through O, Mass Products of Inertia. **(no. of lectures- 8)**

Unit VI-: Methods of Virtual Work and Total Potential Energy: Work- Work of a Force and Couple, Virtual Work- Principle of Virtual Work for a Particle and Rigid

Bodies, Potential Energy and Stability- Elastic **Kinematics and Dynamics of Rigid Bodies:** General plane motion. **(no. of lectures- 6)**

COURSE CONTENTS (Description type II)

Introduction to Mechanics and Laws of Mechanics.

Statics of Particles: Forces in a Plane- Force on a Particle, Resultant of Two Forces, Resultant of Several Concurrent Forces, Resolution of a Force into Components Rectangular Components of a Force. Equilibrium of a Particle, Free-Body Diagrams. Forces in Space – Rectangular Components of a Force in Space, Force Defined by Its Magnitude and Two Points on Its Line of Action. Addition of Concurrent Forces in Space, Equilibrium of a Particle in Space.

Rigid Bodies: Equivalent Systems of Forces: Principle of Transmissibility. Equivalent Forces, Moment of a Force about a Point, Varignon's Theorem, Moment of a Force about a Given Axis, Moment of a Couple, Equivalent Couples, Resolution of a Given Force into a Force and a Couple, Reduction of a System of Forces to One Force and one Couple Equivalent Systems of Forces, Reduction of a System of Forces to a Wrench.

Equilibrium of Rigid Bodies: Introduction, Free-Body Diagram, Equilibrium in Two Dimensions, Reactions at Supports and Connections for a Two-Dimensional Structure, Equilibrium of a Rigid Body in Two Dimensions, Statically Indeterminate Reactions. Partial, Constraints, Equilibrium of a Two-Force Body, Equilibrium of a Three-Force Body, Equilibrium in Three Dimensions, Equilibrium of a Rigid Body in Three Dimensions, Reactions at Supports and Connections for a Three-Dimensional Structure.

Force Analysis of Rigid bodies Structures: Plane Trusses, Methods of Joints, Method of Section, Space Trusses, Frames and Machines, Internal Forces Developed in various Structural Members (such as rod, beam, shaft), Shear and Moment Equations and Diagrams (SFD and BMD), Relations between Distributed Load, Shear, and Moment.

Distributed Forces: Centroids and Center of Gravity: Moments of Inertia of Areas, Second Moment, or Moment of Inertia, of an Area, Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas, Product of Inertia, Principal Axes and Principal Moments of Inertia, Mohr's Circle for Moments and Products of Inertia, Moments of Inertia of a Mass Moment of Inertia of a Mass, Parallel-Axis Theorem, Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration, Moments of Inertia of Composite Bodies, Moment of Inertia of a Body with Respect to an Arbitrary Axis through O, Mass Products of Inertia.

Methods of Virtual Work and Total Potential Energy: Work- Work of a Force and Couple, Virtual Work- Principle of Virtual Work for a Particle and Rigid Bodies, Potential Energy and Stability- Elastic

Kinematics and Dynamics of Rigid Bodies: General plane motion.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Vector Mechanics for Engineers, Beer, F.P and Johnson Jr. E.R. Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, (1997).
2. Engineering Mechanics, Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., (2000).
3. Engineering Mechanics – Statics and Dynamics, Irving H. Shames, IV Edition – Pearson Education Asia Pvt. Ltd., (2003).
4. Engineering Mechanics, Merian J.L. and Kraige L.G., Vol. 1 Statics and Vol. 2 Dynamics, Wiley-India, 5 Edition, (2006).

ONLINE/E RESOURCES

1. Engineering Mechanics : https://nptel.ac.in/courses/112106286

Lecture Plan

Lecture No.	Topics to be covered
1	Forces in a Plane- Force on a Particle,
2	Resultant of Two Forces, Resultant of Several Concurrent Forces,
3	Resolution of a Force into Components Rectangular Components of a Force.
4	Equilibrium of a Particle, Free-Body Diagrams.
5	Forces in Space – Rectangular Components of a Force in Space.
6	Force Defined by Its Magnitude and Two Points on Its Line of Action.
7	Addition of Concurrent Forces in Space,
8	Equilibrium of a Particle in Space.
9	Principle of Transmissibility. Equivalent Forces,
10	Moment of a Force about a Point, Varignon's Theorem,
11	Moment of a Force about a Given Axis, Moment of a Couple,
12	Equivalent Couples, Resolution of a Given Force into a Force and a Couple,
13	Reduction of a System of Forces to One Force and one Couple Equivalent Systems of Forces
14	Reduction of a System of Forces to a Wrench.

15	Introduction, Free-Body Diagram, Equilibrium in Two Dimensions,
16	Reactions at Supports and Connections for a Two-Dimensional Structure, Equilibrium of a Rigid Body in Two Dimensions
17	Statically Indeterminate Reactions. Partial, Constraints, Equilibrium of a Two-Force Body,
18	Equilibrium of a Three-Force Body, Equilibrium in Three Dimensions,
19	Equilibrium of a Rigid Body in Three Dimensions,
20	Reactions at Supports and Connections for a Three-Dimensional Structure.
21	Plane Trusses, Methods of Joints,
22	Method of Section, Space Trusses,
23	Frames and Machines, Internal Forces Developed in various, Structural Members (such as rod, beam, shaft),
24	Shear and Moment Equations and Diagrams (SFD and BMD),
25	Shear and Moment Equations and Diagrams (SFD and BMD), (Continue)
26	Relations between Distributed Load, Shear, and Moment.
27	Centroids and Center of Gravity: Moments of Inertia of Areas, Second Moment, or Moment of Inertia, of an Area, Determination of the Moment of Inertia of an Area by Integration
28	Polar Moment of Inertia, Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas,
29	Product of Inertia, Principal Axes and Principal Moments of Inertia,
30	Mohr's Circle for Moments and Products of Inertia,
31	Moments of Inertia of a Mass Moment of Inertia of a Mass, Parallel-Axis Theorem,
32	Moments of Inertia of Thin Plates, Determination of the Moment of Inertia of a Three-Dimensional Body by Integration,
33	Moments of Inertia of Composite Bodies,
34	Moment of Inertia of a Body with Respect to an Arbitrary Axis through O, Mass Products of Inertia.
35	Work- Work of a Force and Couple,
36	Virtual Work- Principle of Virtual Work for a Particle and Rigid Bodies,
37	Virtual Work- Principle of Virtual Work for a Particle and Rigid Bodies, (Continue)
38	Potential Energy and Stability Elastic
39	**Kinematics and Dynamics of Rigid Bodies**: General plane motion
40	**Kinematics and Dynamics of Rigid Bodies**: General plane motion (Continue)

Program Core Courses

and

Syllabus

for

I Year B.Tech.

(Metallurgical and Materials Engineering)

S. No.	Semester	New Course Code	Course Title	Elective Type	Course Type (T/P/S/D)	Credit	L	T	P
1	I	22MTT101	Introduction to Engineering Materials	PC	Theory	3	3	0	0
2	I	22MTT102	Fuels, Furnaces and Refractories	PC	Theory	4	3	1	0
3	II	22MTT103	Introduction to Physical Metallurgy	PC	Theory	4	3	1	0
4	II	22MTT104	Mineral Processing	PC	Theory	3	3	0	0
					Total Credits	**14**			

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

Scheme/Specialization: B. Tech. (Metallurgical and Materials Engineering)

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MTT101	**Introduction to Engineering Materials**	**3**	**3**	**0**	**0**	**0**

PREREQUISITES: Basic Knowledge of Physics, Chemistry & Mathematics

COURSE OBJECTIVE

To acquire knowledge of engineering materials from metals to polymers and ceramics and about their engineering applications in detail.

COURSE OUTCOMES

CO1	Students will develop an understanding of different classes of materials.
CO2	Students will develop the knowledge of fundamental principles related to materials structure, properties and applications.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	10%
b)	Mid-term examination	30%
c)	End Semester Examination	50%
d)	Quiz	10%

COURSE CONTENTS

Syllabus:

UNIT I: Engineering Materials: Introduction, Classification of engineering materials, salient features of each class of engineering materials.

UNIT II: Properties of Engineering Materials: Physical, chemical and mechanical properties. Factor controlling properties of engineering materials.

UNIT III: Applications of metals and alloys, polymers, ceramics and composites.

UNIT IV: Materials with Specific Properties: Electrical conductors, Electrical resisters, Magnetic materials, Structural materials, Refractory materials.

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year)

1. Engineering Materials-Properties and applications of Metal and Alloys, C. P. Sharma, PHI, New Delhi
2. Engineering Materials, A. K. Bhargava, PHI, New Delhi
3. Introduction to Materials Science, V. Raghvan, PHI Learning Pvt. Ltd.
4. Materials Science and Engineering, An introduction, W.D. Callister, D.G. Rethwisch, Wiley
5. Introduction to Physical Metallurgy, Sidney H. Avener, Mc Graw Hill Book Co.
6. Engineering Physical Metallurgy, Y. Lakhtin, Mir Pub., Moscow, CBS Publisher

LECTURE PLAN

Topics to be covered	No. of lectures
History and Introduction of Materials	1-2
Atomic Structure, Atomic Bonding, Crystal Structure, Miller Indices	5-6
Classification of Engineering Materials and their Salient Features	3-4
Imperfections in Solids and Mechanical Properties	8-9
Factor Controlling Properties of Engineering Materials	6-7
Applications of Metals and Alloys, Polymers, Ceramics and Composites	7-8
Electrical, Magnetic and Thermal Properties of Materials	3-4

DEPARTMENT OF METALLURGICAL & MATERIALS ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

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DETAILS OF THE COURSE:-

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MTT102	Fuels, Furnaces & Refractories	4	3	1	0	0

PREREQUISITE:-

Basic Chemistry (10+2 level)

COURSE OBJECTIVE:-

To familiarize and equip the students with basic knowledge about different types of fuels, furnaces, and refractories used in metallurgical industries

COURSE OUTCOMES:-

CO1	To impart knowledge to the students about various solid, liquid, and gaseous fuels and their importance in metallurgical industries.
CO2	To acquire ideas about the manufacturing process of various fuels having industrial significance.
CO3	To acquire knowledge to use stoichiometry for evaluating combustion performances.
CO4	To acquire fundamental ideas about refractories and metallurgical furnaces.
CO5	To understand constructional and working principles of different types of furnaces and refractories.

COURSE ASSESSMENT:-

The Course Assessment (culminating to the final grade), will be made up of the following four components;

S. No.	Component	Weightage
a)	Mid-term examination	30%
b)	End Semester Examination	50%
c)	Weekly Submissions/assignment	10%
d)	Quiz/Class Test	10%

COURSE CONTENTS:-

Unit I- *Fuels*: Definition, their importance in human life (historical background). Comparative study of solid, liquid, and gaseous fuels. Primary and Secondary fuels. Constitution, classification and grading of coal. Characterization of Coal: Proximate analysis, Ultimate analysis, Calorific value. Coal washing. Coal blending and its importance in metallurgical industries.

(no. of lectures- 7)

Unit II- *Carbonization of coal*: Caking, Coking and Non-coking Coals. Metallurgical coke preparation, Testing and properties of coke. Formed coke, Dry quenching of coke. Manufacture, properties and uses of Producer gas and Water gas. Properties and uses of Blast furnace gas and Coke oven gas.

(no. of lectures- 7)

Unit III- *Combustion Stoichiometry*: Estimation of minimum amount of air required for a fuel of known composition, theoretical and actual combustion processes - Air fuel ratio, estimation of dry flue gases for known fuel composition, calculation of the composition of fuel and excess air supplied from exhaust gas analysis,

(no. of lectures- 6)

Unit IV- *Furnaces*: Definition and Classification of Furnaces, Major furnace components. Furnace atmosphere. Natural, forced, induced, and balanced draft. Chimney height. Heat losses in furnaces and minimization. Waste heat recovery. Various types of heating elements and Electric Furnaces viz. Resistance, Arc, and Induction furnaces

(no. of lectures- 10)

Unit V- *Refractories*: Desirable properties of refractories. Methods of classification. Modes of failure of refractories in service and their prevention. Manufacturing methods and properties of Fireclay, Silica, Magnesite, and Chrome-Refractories. Testing of Refractories. Applications of refractories in the metallurgical industries.

(no. of lectures- 10)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year) :-

1. Elements of fuels, furnaces & refractories O.P. Gupta, Khanna Publishers.
2. Fuels, furnaces and refractories, R. C. Gupta, PHI Learning Pvt. Ltd. Delhi, (2016).
3. Fuels, furnaces and refractories, J. D. Gilchrist, Pergamon Press, (1977)
4. Fuels, furnaces, refractories and pyrometry, A.V.K. Suryanarayana, B. S. Publication. (2015)
5. Elements of Refractory Technology, Khanna Publishing House, (2017)
6. Industrial Furnaces, W. Trinks, et al., John Wiley and Sons, (2003)

ONLINE/E RESOURCES :-

1. https://nptel.ac.in

DEPARTMENT OF METALLURGICAL & MATERIALS ENGINEERING

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Metallurgical & Materials Engineering**)**

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MTT103	**Introduction to Physical Metallurgy**	**4**	**3**	**1**	**0**	**0**

PREREQUISITES: Basic Sciences (10+2 level)

COURSE OBJECTIVES

- The course seeks to engage participants in critical thinking and understanding regarding the field of physical metallurgy.

- Students will be able to have a critical awareness of how these principles relate to current issues in exploiting structural alloys in engineering applications.

COURSE OUTCOMES:

CO1	Show a systematic understanding of the role that crystal structures play in material properties.
CO2	Evaluate critically the relevance of phase diagrams, isothermal transformation diagrams to understand real alloys and their microstructure.
CO3	Provide opportunities for students to expand their know-how in areas such as compositions, microstructures, and various technical metals properties and processing methods.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	10%
b)	Mid-term examination	30%
c)	End Semester Examination	50%
d)	Quizzes	10%

COURSE CONTENTS

UNIT I An Introduction: Atomic bonding & crystal structure: metallic bond, unit cell, atomic, packing, interstitial sites, Miller indices (No of Lecture: 3-4)

UNIT II Experimental tools & techniques: metallography (Optical TEM, SEM), X-ray diffraction, mechanical properties, thermal analysis basic concepts (No of Lecture: 3-4)

UNIT III Solidification of pure metal: phase rule, concept of free energy, entropy, surface energy (grain boundary) & under cooling, nucleation & growth, homogeneous & heterogeneous nucleation, directional solidification, structure of cast metal, segregation & porosity. (No of Lecture: 3-4)

UNIT IV Crystal defects in metals: vacancy, interstitial & substitutional atoms, free energy of mixing, dislocation (elementary concepts only), edge / screw dislocation, partial dislocation, stacking fault.
(No of Lecture: 6-7)

UNIT V Diffusion: elementary concepts of phenomenological & atomistic approaches.
(No of Lecture: 3-4)

UNIT VI Principles of alloys formation: Primary and intermediate phases and their formation, solid solution, Hume-Rothery rules, electron compounds, normal valency compounds, Interstitial compounds.
(No of Lecture: 3-4)

UNIT VII Phase Diagrams: concepts of alloys system and explanation of terms like system, component, phase, micro constituent and degree of freedom, structural constituents of an alloy, phase equilibria, equlibirium diagrams and their classification based on solubility of components in liquid and solid states, cooling curves, morphology and distribution of phase, effect of non-equilibrium cooling on morphology. Eutectic, peritectic, monotectic, eutectoid and peritectoid reactions, binary equilibrium diagrams involving isomorphous systems and various reactions, common binary systems.
(No of Lecture: 10-12)

UNIT VIII Fe-Fe_3C phase diagrams: Allotropic changes, construction of Fe-Fe_3C phase diagrams, Phase, critical temperatures and invariant reactions.
(No of Lecture: 4-5)

TEXT BOOKS/ REFERENCE BOOKS (Title, Authors, Publisher & Year):-

1. Reed-Hill, Robert E., Reza Abbaschian, and Lara Abbaschian. *Physical Metallurgy Principles*. 4th ed. Stamford.
2. Introduction to Physical Metallurgy - Sidney H. Avner, McGraw Hill Education (India) Private Limited
3. Materials Science and Engineering (5th Edition) by V. Raghavan, Prentice-Hall of India Pvt. Ltd., 2004.
4. Callister's Materials Science and Engienering, William D Callister, Wiley Inida (P) Ltd., 2007.
5. The Science and Engineering of Materials, Donald. R. Askeland & Pradeep Phulé, Cengage Learning, 2006.
6. Y Lakhtin, Engineering Physical Metallurgy, Mir Publishers Moscow.
7. Physical Metallurgy by Vijendra Singh

ONLINE/E RESOURCES

1. Materials Science & Engineering (NPTEL Course) by Ranjit Bauri (IITM)
2. Principles of Physical Metallurgy (NPTEL Course) by Prof. R.N. Ghosh, IIT Kharagpur

Department of Metallurgical & Materials Engineering

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Scheme/Specialization: B.Tech. (Metallurgical & Materials Engineering**)**

DETAILS OF THE COURSE

Course Code	Course Title	Credits	Lecture	Tutorial	Practical	Studio
22MTT104	**Mineral Processing**	**3**	**3**	**0**	**0**	**0**

PREREQUISITE – Basic sciences (10+2 level)

COURSE OBJECTIVES

- To engage students in critical thinking and understanding regarding the field of mineral and coal processing.
- To take the tools that students have learned and apply them to their respective processes.

COURSE OUTCOMES:

CO1	Ability to serve as a bridge between the study of basic principles of ore processing and their applications in industry.
CO2	Ability to use ore processing techniques for a particular ore and mineral which is profitable and hygienic for the environment.
CO3	Ability to use the energy optimization, equipment selection, performance enhancement and reagent selection in Mineral Processing.

COURSE ASSESSMENT

The Course Assessment (culminating to the final grade), will be made up of the following three components;

S. No.	Component	Weightage
a)	Weekly Submissions/assignments	10%
b)	Mid-term examination	30%
c)	End Semester Examination	50%
d)	Quizes	10%

Course Content

UNIT I: Comminution and liberation. Jaw crushers, Gyratry crushers, Cone crushers. Roll crushers. Ball Mill, rod mill, tube mill. Sizing and classification: Laboratory methods of sizing and interpretation.

UNIT II: Laws of settling of solids in fluids. Type of classifiers. Gravity concentration by Wilfley table, spiral shaking tables, Jigging. Heavy mediaseparation. Froth flotation, Function of various reagents.

UNIT III: Filtration.Electromagnetic, electrostatic, amalgamation techniques of cancentration.Separation of solids from fluids: Thickning: Filtration, dust elemination, drying.

UNIT IV: Coal washing: Washability curves, curshing, screening and cleaning of coal by gravity concentration and flotation methods. Dewatering and drying of coal. Simple flow sheet for the beneficiation of coal.

Books:

1. Principles of Mineral processing by A.M. Gaudin
2. Mineral Processing by S.K.Jain.

Lecture Plan

Topics to be covered	No. of lectures
Comminution and liberation:- Jaw crushers, Gyratry crushers, Cone crushers. Roll crushers. Ball Mill, rod mill, tube mill. Sizing and classification: Laboratory methods of sizing and interpretation.	8-9
Laws of settling of solids in fluids. Type of classifiers. Gravity concentration by Wilfley table, spiral shaking tables, Jigging. Heavy media separation	8-9
Froth flotation, Function of various reagents.	4-5
Filtration, Electromagnetic, electrostatic, amalgamation techniques of concentration.	3-4
Separation of solids from fluids: Thickning: Filtration, dust elemination, drying.	3-4
Coal washing: Washability curves, curshing, screening and cleaning of coal by gravity concentration and flotation methods. Dewatering and drying of coal. Simple flow sheet for the beneficiation of coal.	3-4

MNIT Jaipur

Teaching Scheme

for

B. Tech.

(Provisional)

MNIT Jaipur

Scheme

for

B. Tech. – Chemical Engineering

ANNEXURE-II

Malaviya National Institute of Technology Jaipur
Scheme of B. Tech. Chemical Engineering

I Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Institute Core			18			
2.		Introduction to Chemical Engineering	PC	Theory	3	3	0	0
3.		Chemical Engineering Thermodynamics-I	PC	Theory	4	3	1	0
Total					**25**			

II Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Institute Core			18			
2.		Chemical Process Calculations	PC	Theory	4	3	1	0
3.		Process Instrumentation	PC	Theory	3	3	0	0
Total					**25**			

III Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Chemical Reaction Engineering-I	PC	Theory	4	3	1	0
2.		Momentum Transfer Operations	PC	Theory	4	3	1	0
3.		Heat Transfer	PC	Theory	4	3	1	0
4.		Chemical Engineering Thermodynamics-II	PC	Theory	4	3	1	0
5.		Bio-Process Engineering	PC	Theory	3	3	0	0
6.		Material Science & Engineering	PL/EAS	Theory	3	3	0	0
7.		Momentum Transfer Operations Lab	PC	Lab	2	0	0	3
8.		Heat Transfer Lab	PC	Lab	2	0	0	3
Total					**26**	**15**	**3**	**6**

IV Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Chemical Reaction Engineering-II	PC	Theory	4	3	1	0
2.		Fluid Particle Mechanics	PC	Theory	4	3	1	0
3.		Mass Transfer-I	PC	Theory	4	3	1	0
4.		Industrial Pollution Abatement	PC	Theory	3	3	0	0
5.		Energy Storage Technology	PL/EAS	Theory	3	3	0	0
6.		Chemical Reaction Engineering Lab	PC	Lab	2	0	0	3
7.		Fluid Particle Mechanics Lab	PC	Lab	2	0	0	3
8.		Industrial Pollution Abatement Lab	PC	Lab	2	0	0	3
Total					**24**	**15**	**4**	**9**

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V Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Mass Transfer-II	PC	Theory	4	3	1	0
2.		Chemical Technology	PC	Theory	3	3	0	0
3.		Process Dynamics and Control	PC	Theory	4	3	1	0
4.		Process Safety and Hazards	PC	Theory	3	3	0	0
5.		Numerical Methods in Chemical Engineering	PC	Theory	3	3	0	0
6.		Process Dynamics and Control Lab	PC	Lab	1	0	0	2
7.		Mass Transfer Lab	PC	Lab	2	0	0	3
8.		Numerical Methods in Chemical Engineering Lab	PC	Lab	1	0	0	2
Total					**21**	**15**	**2**	**7**

VI Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Process Engineering and Plant Design	PC	Theory	3	3	0	0
2.		Mathematical Methods in Chemical Engineering	PC	Theory	3	3	0	0
3.		Transport Phenomena	PC	Theory	4	3	1	0
4.		Petroleum Refining and Petrochemicals	PC	Theory	3	3	0	0
5.		Process Equipment Design	PC	Theory	3	3	0	0
6.		Petroleum Lab	PC	Lab	1	0	0	2
7.		Process Equipment Design Lab	PC	Lab	2	0	0	3
8.		Process Engineering and Plant Design Lab	PC	Lab	2	0	0	3
Total					**21**	**15**	**1**	**8**

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VII Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Training Seminar	PC	Theory	2	0	0	2
2.		Minor Project	Project	Theory	3	0	0	3
3.		Management	PC	Theory	3	3	0	0
4.		Program Elective-I	PE	Theory	3	3	0	0
5.		Program Elective-II	PE	Theory	4	3	1	0
6.		Open Elective-I	OE	Theory	3	3	0	0
Total					**18**	**12**	**1**	**5**

Program Elective-I		**Program Elective-II**	
	Conventional & Alternate Energy Resources		Optimization of Chemical Processes
	Fuel Cell		Polymer Science and Technology
	Waste to Energy Conversion		CFD Analysis in Chemical Engineering

VIII Semester:

S. No.	Course Code	Course Title	Category	Type	Credit	L	T	P
1.		Major Project (in Lieu of project the courses listed below must be completed)	Project	Practical/ Theory	6	0	0	6
		Advanced Separation Processes			3	3	0	0
		Modelling and Simulation			3	3	0	0
2.		Advanced Elective-I	PE	Theory	3	3	0	0
3.		Advanced Elective-II	PE	Theory	3	3	0	0
4.		Advanced Elective-III	PE	Theory	3	3	0	0
5.		Open Elective - II	OE	Theory	3	3	0	0
Total					**18**	**12/ 18**	**0**	**6**

Advanced Elective-I		**Advanced Elective-II**	
	Solid & Hazard Waste Management		Process Piping and Design
	Nano Technology		Process Integration
	Polymer Process Modelling		Multiphase Reactors

Advanced Elective-III	
	Advanced Mass Transfer
	Mechanical Design of Process Equipment
	Applied Statistics for Chemical Engineers
	Advanced Process Control

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MNIT Jaipur

Scheme

for

B. Tech. – Civil Engineering

New UG Scheme in CIVIL ENGINEERING as per NEP 2020

FIRST YEAR

	Course Name	Credits	L-T-P	Notes
SEM I	Mathematics I	4	3-1-0	Institute Core Courses
	Physics	3	2-1-0	
	Physics Lab	1	0-0-2	
	English & Communication	2	1-1-0	
	Language Lab	1	0-0-2	
	Engineering Sketching and Drawing	2	1-0-2	
	Environmental Science for Engineers	2	2-0-0	
	Comp Science & Programming	2	1-1-0	
	Programming Lab	1	0-0-2	
	Surveying	3	3-0-0	
	Surveying Lab	1	0-0-2	
	Introduction to Civil Engg	1	0-0-2	
	TOTAL	23	13-4-12	

	Course Name	Credits	L-T-P	Notes
SEM II	Mathematics II	4	3-1-0	Institute Core Courses
	Chemistry	3	2-1-0	
	Chemistry Lab	1	0-0-2	
	Economics	2	2-0-0	
	Basics of Electronics & Electrical Engg	3	3-0-0	
	Electronics Engineering Lab	1	0-0-2	
	Electrical Engineering Lab	1	0-0-2	
	Introduction to Mechanical Engineering	2	2-0-0	
	Product Realization Thru Manufacturing	1	0-0-2	
	Mechanics of Solids	4	3-1-0	
	Engineering Geology	3	3-0-0	
	Engineering Geology Lab	1	0-0-2	
	TOTAL	26	18-3-10	

SECOND YEAR

	Course Name	Credits	L-T-P	Notes
SEM III	Structural Analysis	4	3-1-0	
	Structural Analysis Lab	1	0-0-2	
	Fluid Mechanics	4	3-1-0	
	Fluid Mechanics Lab	1	0-0-2	
	Construction Materials	3	3-0-0	
	Construction Materials Lab	1	0-0-2	
	Building Technology	2	2-0-0	
	Building Drawing	1	0-0-2	PL-EAS Courses
	Introduction to Machine Learning	3	2-1-0	
	Machine Learning Lab	1	0-0-2	
	Numerical Methods & Optimization	3	2-1-0	
	Soft Skills and Personality Development	2	2-0-0	
	Soft Skills Lab	1	0-0-2	
	TOTAL	27	17-4-12	

	Course Name	Credits	L-T-P	Notes
SEM IV	Design of RC Structures	3	3-0-0	
	RC Design & Drawing	1	0-0-2	
	Hydraulic Engineering	4	3-1-0	
	Hydraulics Lab	1	0-0-2	
	Geotechnical Engineering I	4	3-1-0	
	Soil Mechanics Lab	1	0-0-2	
	Environmental Engineering I	3	3-0-0	
	Public Health Engineering Lab	1	0-0-2	
	Transportation Engineering I	3	3-0-0	
	Road Material Testing Lab	1	0-0-2	
	Advanced Surveying	2	2-0-0	
	Global Navigation & Satellite Systems	2	2-0-0	
	GNSS Lab	1	0-0-2	
	TOTAL	27	19-2-12	

THIRD YEAR

	Course Name	Credits	L-T-P	Notes
SEM V	Design of RC Systems	4	3-1-0	
	Structural Design & Drawing	1	0-0-2	
	Hydrology	4	3-1-0	
	Geotechnical Engg II	4	3-1-0	
	Geotechnical Engg Lab	1	0-0-2	
	Environmental Engg II	3	3-0-0	
	Estimation and Costing	3	2-1-0	
	TOTAL	20	16-5-4	
	MINOR / HONOURS COURSE 1	3	3-0-0	Minor / Honours
	MINOR / HONOURS COURSE 2	3	3-0-0	

	Course Name	Credits	L-T-P	Notes
SEM VI	Design of Steel Structures	4	3-1-0	
	Water Resources Engg	4	3-1-0	
	Environmental System Design	1	0-1-0	
	Construction Project Mgmt	3	3-0-0	
	Construction Project Mgmt Lab	1	0-0-2	
	Civil Engg Practical Applications	1	0-0-2	
	Transportaion Engg II	3	2-1-0	
	DEPARTMENT ELECTIVE (CEPE01)	3	3-0-0	
	TOTAL	20	15-3-4	
	MINOR / HONOURS COURSE 3	3	3-0-0	Minor / Honours
	MINOR / HONOURS COURSE 4	3	3-0-0	

FOURTH YEAR

	Course Name	Credits	L-T-P	Notes
SEM VII	Basic Management	3	3-0-0	
	Industrial Training	3	0-0-6	
	DEPARTMENT ELECTIVE (CEPE02)	3	3-0-0	
	DEPARTMENT ELECTIVE (CEPE03)	3	3-0-0	
	Open Elective	3	3-0-0	
	Minor Project	3	0-0-6	
	TOTAL	18	12-0-12	
	MINOR / HONOURS COURSE 5	3	3-0-0	M / H

	Course Name	Credits	L-T-P	Notes
SEM VIII	ADVANCED ELECTIVE (CEAE01)	3	3-0-0	
	ADVANCED ELECTIVE (CEAE02)	3	3-0-0	
	Open Elective	3	3-0-0	
	1 Major Project OR 3 EL	9	0-0-18 OR 9-0-0	
	TOTAL	18	9-0-18	
	MINOR / HONOURS COURSE 6	3	3-0-0	M / H

New UG Scheme in CIVIL ENGINEERING as per NEP 2020

FIRST YEAR

	Course Name	Credits	L-T-P	Notes
SEM I	Mathematics I	4	3-1-0	Institute Core Courses
	Physics	3	2-1-0	
	Physics Lab	1	0-0-2	
	English & Communication	2	1-1-0	
	Language Lab	1	0-0-2	
	Engineering Sketching and Drawing	2	1-0-2	
	Environmental Science for Engineers	2	2-0-0	
	Comp Science & Programming	2	1-1-0	
	Programming Lab	1	0-0-2	
	Surveying	3	3-0-0	
	Surveying Lab	1	0-0-2	
	Introduction to Civil Engg	1	0-0-2	
	TOTAL	**23**	**13-4-12**	

	Course Name	Credits	L-T-P	Notes
SEM II	Mathematics II	4	3-1-0	Institute Core Courses
	Chemistry	3	2-1-0	
	Chemistry Lab	1	0-0-2	
	Economics	2	2-0-0	
	Basics of Electronics & Electrical Engg	3	3-0-0	
	Electronics Engineering Lab	1	0-0-2	
	Electrical Engineering Lab	1	0-0-2	
	Introduction to Mechanical Engineeing	2	2-0-0	
	Product Realization Thru Manufacturing	1	0-0-2	
	Mechanics of Solids	4	3-1-0	
	Engineering Geology	3	3-0-0	
	Engineering Geology Lab	1	0-0-2	
	TOTAL	**26**	**18-3-10**	

SECOND YEAR

	Course Name	Credits	L-T-P	Notes
SEM III	Structural Analysis	4	3-1-0	
	Structural Analysis Lab	1	0-0-2	
	Fluid Mechanics	4	3-1-0	
	Fluid Mechanics Lab	1	0-0-2	
	Construction Materials	3	3-0-0	
	Construction Materials Lab	1	0-0-2	
	Building Technology	2	2-0-0	
	Building Drawing	1	0-0-2	PL-EAS Courses
	Introduction to Machine Learning	3	2-1-0	
	Machine Learning Lab	1	0-0-2	
	Numerical Methods & Optimization	3	2-1-0	
	Soft Skills and Personality Development	2	2-0-0	
	Soft Skills Lab	1	0-0-2	
	TOTAL	**27**	**17-4-12**	

	Course Name	Credits	L-T-P	Notes
SEM IV	Design of RC Structures	3	3-0-0	
	RC Design & Drawing	1	0-0-2	
	Hydraulic Engineering	4	3-1-0	
	Hydraulics Lab	1	0-0-2	
	Geotechnical Engineering I	4	3-1-0	
	Soil Mechanics Lab	1	0-0-2	
	Environmental Engineering I	3	3-0-0	
	Public Health Engineering Lab	1	0-0-2	
	Transportation Engineering I	3	3-0-0	
	Road Material Testing Lab	1	0-0-2	
	Advanced Surveying	2	2-0-0	
	Global Navigation & Satellite Systems	2	2-0-0	
	GNSS Lab	1	0-0-2	
	TOTAL	**27**	**19-2-12**	

New UG Scheme in CIVIL ENGINEERING as per NEP 2020

THIRD YEAR

	Course Name	Credits	L-T-P	Notes
SEM V	Design of RC Systems	4	3-1-0	
	Structural Design & Drawing	1	0-0-2	
	Hydrology	4	3-1-0	
	Geotechnical Engg II	4	3-1-0	
	Geotechnical Engg Lab	1	0-0-2	
	Environmental Engg II	3	3-0-0	
	Estimation and Costing	3	2-1-0	
	TOTAL	**20**	**16-5-4**	
	MINOR / HONOURS COURSE 1	3	3-0-0	Minor / Honours
	MINOR / HONOURS COURSE 2	3	3-0-0	

	Course Name	Credits	L-T-P	Notes
SEM VI	Design of Steel Structures	4	3-1-0	
	Water Resources Engg	4	3-1-0	
	Environmental System Design	1	0-1-0	
	Construction Project Mgmt	3	3-0-0	
	Construction Project Mgmt Lab	1	0-0-2	
	Civil Engg Practical Applications	1	0-0-2	
	Transportaion Engg II	3	2-1-0	
	DEPARTMENT ELECTIVE (CEPE01)	3	3-0-0	
	TOTAL	**20**	**15-3-4**	
	MINOR / HONOURS COURSE 3	3	3-0-0	Minor / Honours
	MINOR / HONOURS COURSE 4	3	3-0-0	

FOURTH YEAR

	Course Name	Credits	L-T-P	Notes
SEM VII	Basic Management	3	3-0-0	
	Industrial Training	3	0-0-6	
	DEPARTMENT ELECTIVE (CEPE02)	3	3-0-0	
	DEPARTMENT ELECTIVE (CEPE03)	3	3-0-0	
	Open Elective	3	3-0-0	
	Minor Project	3	0-0-6	
	TOTAL	**18**	**12-0-12**	
	MINOR / HONOURS COURSE 5	3	3-0-0	M / H

	Course Name	Credits	L-T-P	Notes
SEM VIII	ADVANCED ELECTIVE (CEAE01)	3	3-0-0	
	ADVANCED ELECTIVE (CEAE02)	3	3-0-0	
	Open Elective	3	3-0-0	
	1 Major Project OR 3 EL	9	0-0-18 OR 9-0-0	
	TOTAL	**18**	**9-0-18**	
	MINOR / HONOURS COURSE 6	3	3-0-0	M / H

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New UG Scheme in CIVIL ENGINEERING as per NEP 2020

DETAILS OF HONOURS PROGRAMS PROPOSED IN CIVIL ENGINEERING

	Honours A: Tier 1 Courses*,**	Honours B: Tier 2 Courses*,**	Honours C: Tier 3 Courses*,**
COURSE 1	Concrete Technology	Construction Information System	TO BE OFFERED BY THE DEPARTMENT OF MANAGEMENT STUDIES
COURSE 2	Prestressed Concrete	Earthquake Disaster Mitigation	
COURSE 3	Air & Noise Pollution	Urban Water Conveyance System Design	
COURSE 4	Design of Hydraulic Structures	Sustainable Building Project Delivery	
COURSE 5	Railway and Airport Engineering	Finite Element Method	
COURSE 6	Solid Waste Management	Design of Steel Structural Systems	

* New courses for B.Tech students may be introduced or some M.Tech courses may be opened.
** New Honours streams may be introduced based on the demand and the performance of students

LIST OF ELECTIVE COURSES IN CIVIL ENGINEERING

	Elective Courses (CEPE)*	Elective Courses (CEAE)*
OPTION 1	Numerical Methods	Introduction to Remote Sensing & GIS
OPTION 2	Advanced Foundation Design	Structural Dynamics
OPTION 3	Intro to Spatial Data Collectn & Analysis	Industrial Waste Treatment
OPTION 4	Water Conservation Techniques	Ground Improvement Techniques

* New courses for B.Tech students may be introduced or some M.Tech courses may be opened.

19/09/22

MNIT Jaipur

Scheme

for

B. Tech. – Computer Science & Engineering

Department of Computer Science and Engineering
Malaviya National Institute of Technology Jaipur

UG(CSE) Scheme for 2022-23

First Semester					
S. No	**Code**	**Subject**	**L-T-P**	**Credit**	**Type**
		Programming with Python	***2-0-0***	***2***	***IC***
		Programming with Python lab	***0-0-2***	***1***	***IC***
		Other Institute Core Subjects		***15***	***IC***
	CST1xx	Problem Solving using C	2-0-0	2	DC
	CST1xx	Discrete Mathematics	3-0-0	3	DC
	CSP1xx	Problem Solving using C Lab	0-0-2	1	DC
				24	

Second Semester					
S. No	**Code**	**Subject**	**L-T-P**	**Credit**	**Type**
		Programming with Python	***2-0-0***	***2***	***IC***
		Programming with Python lab	***0-0-2***	***1***	***IC***
		Other Institute Core Subjects		***15***	***IC***
	CST1xx	Data Structures	3-0-0	3	DC
	CST1xx	Logic System Design	2-0-0	2	DC
	CSP1xx	Data Structures Lab	0-0-2	1	DC
	CSP1xx	Logic System Design Lab	0-0-2	1	DC
				25	

Third Semester					
S. No	**Code**	**Subject**	**L-T-P**	**Credits**	**Type**
	CST2xx	Digital Circuits and Microprocessors	3-0-0	3	DC
	CST2xx	Design and Analysis of Algorithms	3-0-0	3	DC
	CST2xx	Object Oriented Analysis and Design	3-0-0	3	DC
	CST2xx	Data Communications	3-0-0	3	DC
	CST2xx	Foundation of Learning	3-0-0	3	DC
	MMT2xx	Social Sciences and Professional Ethics	3-0-0	3	MM
	CSP2xx	Digital Circuits and Microprocessors Lab	0-0-3	2	DC
	CSP2xx	Design and Analysis of Algorithms Lab	0-0-3	2	DC
	CSP2xx	Object Oriented Analysis and Design Lab	0-0-3	2	DC
	CST2xx	Technical Writing	1-0-2	2	DC
				26	

06/09/2023
(DUGC - CSE)

(HOD)

Department of Computer Science and Engineering
Malaviya National Institute of Technology Jaipur

Fourth Semester					
S. No	Code	Subject	L-T-P	Credits	Type
	CST2xx	Computer Organization and Architecture	3-0-0	3	DC
	CST2xx	Computer Networks	3-0-0	3	DC
	CST2xx	Theory of Computation	3-1-0.	4	DC
	CST2xx	Machine Learning	3-0-0	3	DC
	CST2xx	Database Information Systems	3-0-0	3	DC
	MMT2xx	Industrial Management	3-0-0	3	MM
	CSP2xx	Machine Learning Lab	0-0-3	2	DC
	CSP2xx	Computer Networks Lab	0-0-3	2	DC
	CSP2xx	Database Information Systems Lab	0-0-3	2	DC
				25	

Fifth Semester					
S. No	Code	Subject	L-T-P	Credits	Type
	CST3xx	Operating System	3-0-0	3	DC
	CST3xx	Software Engineering	3-0-0	3	DC
	CST3xx	Compiler Design	3-0-0	3	DC
	CST3xx	Information Security	3-0-0	3	DC
	CST3xx	Program Elective-1	3-0-0	3	PE
	CSP3xx	Operating System Lab	0-0-3	2	DC
	CSP3xx	Compiler Design Lab	0-0-3	2	DC
	CSP3xx	Information Security Lab	0-0-3	2	DC
				21	

Honors					
	CSTxxx	Advance Data Structures and Algorithms		3	
	CSTxxx	Computer and Network Security		3	
				6	

Minor CSE					
	CSTxxx	Data Structures		3	OE
	CSTxxx	Operating System		3	DC
				6	

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(DUGC CSE)

(HOD)

Sixth Semester					
S. No	Code	Subject	L-T-P	Credits	Type
	CST3xx	Digital Image Processing	3-0-0	3	DC
	CST3xx	Parallel and Distributed Computing	3-0-0	3	DC
	CST3xx	Artificial Intelligence	3-0-0	3	DC
	CST3xx	Program Elective-2	3-0-0	3	PE
	MExxx	Industry 4.0	3-0-0	3	EAS
	CSP3xx	Digital Image Processing Lab	0-0-3	2	DC
	CSP3xx	Parallel and Distributed Computing Lab	0-0-3	2	DC
	CSP3xx	Design Lab	0-0-3	2	DC
				21	

Honors					
	CSTxxx	Honors Elective-1		3	
	CSTxxx	Honors Elective-2		3	
				6	

Minor CSE					
	CSTxxx	Computer Networks		3	DC
	CSTxxx	Database Information Systems		3	DC
				6	

Seventh Semester					
S. No	Code	Subject	L-T-P	Credits	Type
1		Open Elective - 1		3	OE
2		Minor Project		3	DC
	CSTxxx	Advance Elective-1	3-0-3	5	AE
	CSTxxx	Advance Elective-2	3-0-3	5	AE
	CSP7xx	Training Seminar	0-0-3	2	DC
				18	

Honors					
	CSTxxx	Honors Elective-3		3	
				3	

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(HOD)

Minor CSE					
	CSTxxx	Software Engineering		3	DC
				3	

Eighth Semester					
S. No	**Code**	**Subject**	**L-T-P**	**Credits**	**Type**
1		Open Elective - 2	3-0-0	3	OE
2		Major Project	0-0-12	6	
	CSTxxx	Advance Elective-3	3-0-3	5	AE
	CSTxxx	Advance Elective-4	3-0-3	5	AE
				19	

Honors					
	CSTxxx	Honors Elective-4		3	
				3	

Minor CSE					
	CSTxxx	Artificial Intelligence		3	DC
				3	

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MNIT Jaipur

Scheme

for

B. Tech. – Electrical Engineering

B. Tech. Ist year

S. No.	Course-Code	Course Title	Semester	Credits (L T P)
1.	EET-209	Power Station Practices	I	4 (3 1 0)
2.	EET-201	Network Theory	II	4 (3 1 0)
3.	EET-203	Electrical Measurement & Instrumentation	II	4 (3 1 0)
4.	EEP-211	Measurement and Instrumentation Lab	II	1 (0 0 2)
Total Credits				36 (Fixed)+13 = 49

As suggested by the DFB of the department (minutes enclosed), the fundamental engineering courses; (i) **Basics of Electronics and Electrical Engg.** and (ii) **Electrical Engineering Lab** must be taught to all the students of Ist year B. Tech. (Electrical Engg) in the **Ist Semester** as these are the pre-requisite for other courses of Electrical Engg. Department to be taught in the IInd semester.

Moreover, the course '**Basics of Electronics and Electrical Engineering**' must be of 4 Credits (3-1-0) as the tutorial is essentially required to understand the subject.

B. Tech. III Sem

S. No.	Course-Code	Course Title	Credits (L T P)
1.	EET-205	Electrical Machines-I	4 (3 1 0)
2.	EET-207	Electronic Devices and Circuits + Integrated Electronics	4 (3 1 0)
3.		Renewable Energy systems (CEE)	4 (3 1 0)
4.	EET-202	Analysis & Design of Digital Logic Circuits	4 (3 1 0)
5.	EET-208	Network, Systems and Signals	4 (3 1 0)
6.		Advanced Computer Programming	2 (2 0 0)
7.	EEP215	ESS Lab (Including ACP course related coding)	1 (0 0 2)
8.	EEP-213	Electronic Devices and Circuit Lab	1 (0 0 2)
9.	EEP-214	Electrical Machines-I Lab	2 (0 0 3)
Total Credits			26

B. Tech. IV Sem

S. No.	Course-Code	Course Title	Credits (L T P)
1.	EET-305	Microprocessors	4 (3 1 0)
2.	EET-206	Electrical Machines-II	4 (3 1 0)
3.	EET-212	Electrical Power Transmission Systems	4 (3 1 0)
4.	EET-303	Power Electronics-I	4 (3 1 0)
5.	EET-307	Control System Engineering	4 (3 1 0)
6.	EES404	Seminar	1(0 0 2)
7.	EEP-315	Digital Electronics and Microprocessor Lab	1 (0 0 2)
8.	EEP-311	Electrical Machine Lab - II	2 (0 0 3)
9.	EEP-316	Control System Lab	1 (0 0 2)
Total Credits			25

B. Tech. V Sem

S. No.	Course-Code	Course Title	Credits (L T P)
1.	EET-301	Power System Switchgear and Protection	4 (3 1 0)
2.	EET-309	Principles of Communication Engineering	4 (3 1 0)
3.	EET-409	Computer Architecture and Organization	4 (3 1 0)
4.	EET-308	Modern Control Theory and Design Technique	4 (3 1 0)
5.		Power Electronics-II	4 (3 1 0)
6.	EEP-313	Power System Lab	1 (0 0 2)
7.	EEP-312	Power Electronics Lab	1 (0 0 2)
Total Credits			22

B. Tech. VI Sem

S. No.	Course-Code	Course Title	Credits (L T P)
1.	EET-302	Operation and Control of Power Systems	4 (3 1 0)
2.	EET-304	Electric Drives & Control	4 (3 1 0)
3.	EET-306	Digital Signal Processing	4 (3 1 0)
4.	EET-310	Power System Restructuring, Deregulation and Economics	4 (3 1 0)
5.		Machine learning in Electrical Engineering	4 (3 1 0)
6.	EEP-314	Power System and Electrical Design Lab	1 (0 0 2)
7.	EEP-	Electrical Drives Lab	1 (0 0 2)
Total Credits			22

B. Tech. VII Sem

S. No.	Course-Code	Course Title	Credits (L T P)
1.	EES401	Training Seminar	2(0 0 3)
2. (PE 1)	EET-419	Computer Aided Power System Analysis	4 (3 1 0)
	EET-429	Optimal Control Theory and Applications	
3. (PE 2)	EET-431	Electric Vehicle Technologies	4 (3 1 0)
	EET-404	Advanced Power Transmission	
4. OE			3 (0 0 3)
5. OE			3 (0 0 3)
6.		Minor Project	3 (0 0 3)
Total Credits			19

B. Tech. VIII Sem

S. No.	Course-Code	Course Title	Credits (L T P)
1.	EED-402	Major Project	6 (0 0 6)
	EET-420	Modelling and Analysis of Electrical Machines	3 (3 0 0)
	EET-417	Power System Planning and Reliability	3 (3 0 0)
2. AE 1	EET-406	Advance Power System Dynamics	4 (3 1 0)
	EET-414	Power System Stability	
3. AE 2	EET-416	Applications of Power Electronics in Power Systems	4 (3 1 0)
	EET-410	Advanced Control Systems	
4.	BMT 499	Basic Management	3 (3 0 0)
Total Credits			17

Total Credits = 180

MNIT Jaipur

Scheme

for

B. Tech. – Electronics & Communication Engineering

Vision of the Institution:

To create a centre for imparting technical education of international standards and conduct research at the cutting edge of technology to meet the current and future challenges of technological development.

Mission of the Institution:

To create technical manpower for meeting the current and future demands of industry: To recognize education and research in close interaction with industry with emphasis on the development of leadership qualities in the young men and women entering the portals of the Institute with sensitivity to social development and eye for opportunities for growth in the international perspective.

Vision (Department of ECE)

To create a centre for imparting technical education of international standards and conduct research at the cutting edge of Electronics & Communication technology to meet the current and future challenges of technological development.

Mission (Department of ECE)

To create technical manpower for meeting the current and future demands of industry and academia: to recognize education and research in close interaction with electronics & communication & related industry with emphasis on the development of leadership qualities in the young men and women entering the portals of the institute with sensitivity to social development and eye for opportunities for growth in the international perspective.

SJ Nanda 23/09/2022

Dr. Satyasai Jagannath Nanda
DUGC Convener, DEPT OF ECE

Mehrohi 23/9/22

Prof. M. M. Sharma,
HOD-Incharge , DEPT of ECE

Program Outcomes

1) **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2) **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3) **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 the public health and safety, and the cultural, societal, and environmental considerations.
4) **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.
5) **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.
6) **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.
7) **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.
8) **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9) **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10) **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11) **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.
12) **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.

Program Specific Outcomes

1) Capability to analyse and design emerging electronic devices, circuits, and subsystems.
2) Ability to apply knowledge of modern and advanced tools to design hardware/software solutions.
3) Capability to analyse and design advanced wired and wireless communication systems.

SJNanda 23/09/2022

Dr. Satyasai Jagannath Nanda
DUGC Convener, DEPT OF ECE

Mehendra 23/9/22

Prof. M. M. Sharma,
HOD-Incharge , DEPT of ECE

CURRICULUM FIRST YEAR

First Semester COMMON to ALL Branches

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	I		Technical Communication (Basic/ Advanced)	PC	Theory	2	2-0-0
2	I		Mathematics I	PC	Theory	4	3-1-0
3	I		Physics	PC	Theory	3	2-1-0
4	I		Computer Science and Programming	PC	Theory	2	2-0-0
5	I		Basics of Electronics and Electrical Engg.	PC	Theory	3	3-0-0
6	I		Language lab (Basic/ Advanced)	PC	Lab	1	0-0-2
7	I		Electrical Engineering Lab	PC	Lab	1	0-0-2
8	I		Electronics Engineering Lab	PC	Lab	1	0-0-2
9	I		Programming Lab	PC	Lab	1	0-0-2
10	I		Physics Lab	PC	Lab	1	0-0-2
					Total	19	

First Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	I		Network Theory	PC	Theory	3	3-0-0
2	I		Electronic Measurement and Instrumentation	PC	Theory	3	3-0-0
					Total	6	

SJNanda 23/09/2022

Dr. Satyasai Jagannath Nanda
DUGC Convener, DEPT OF ECE

Prof. M. M. Sharma, 23/9/22
HOD-Incharge , DEPT of ECE

Second Semester COMMON to ALL Branches

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	II		Basic Economics	PC	Theory	2	2-0-0
2	II		Mathematics II	PC	Theory	4	3-1-0
3	II		Chemistry	PC	Theory	3	2-1-0
4	II		Engineering Drawing and Sketching	PC	Theory	2	1-1-1
5	II		Environmental Science and Ecology	PC	Theory	2	2-0-0
6	II		Introduction to Mechanical systems	PC	Theory	2	2-0-0
7	II		Product Realization through Manufacturing	PC	Lab	1	0-0-2
8	II		Chemistry Lab	PC	Lab	1	0-0-2
					Total	17	

Second Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	II		Probabilistic Methods in Signal and Systems	PC	Theory	3	3-0-0
2	II		Electronics Devices and Circuits	PC	Theory	3	3-0-0
3	II		Probabilistic Methods in Signal and Systems Lab	PC	Lab	1	0-0-2
4	II		Electronics Devices and Circuits Lab	PC	Lab	1	0-0-2
					Total	8	

SJNanda 23/09/2022

Dr. Satyasai Jagannath Nanda
DUGC Convener, DEPT OF ECE

Mehendra 23/9/22

Prof. M. M. Sharma,
HOD-Incharge , DEPT of ECE

CURRICULUM SECOND YEAR

Third Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	III		Analog communication	PC	Theory	3	3-0-0
2	III		Digital electronics	PC	Theory	3	3-0-0
3	III		Applied electronics	PC	Theory	3	3-0-0
4	III		Data structures	PC	Theory	3	3-0-0
5	III		Operating systems	PC	Theory	3	3-0-0
6	III		Control systems	PC	Theory	3	3-0-0
7	III		Analog Communication lab	PC	Lab	2	0-0-3
8	III		Digital electronics lab	PC	Lab	2	0-0-3
9	III		Applied electronics lab	PC	Lab	2	0-0-3
10	III		Data structures lab	PC	Lab	1	0-0-2
11	III		Operating system lab	PC	Lab	1	0-0-2
					Total	26	

Fourth Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	IV		Digital Communication System	PC	Theory	3	3-0-0
2	IV		Computer Architecture	PC	Theory	3	3-0-0
3	IV		Microprocessors	PC	Theory	3	3-0-0
4	IV		Electro-magnetic Field Theory	PC	Theory	3	3-0-0
5	IV		Embedded Systems	PC	Theory	3	3-0-0
6	IV		Digital Signal Processing	PC	Theory	3	3-0-0
7	IV		Digital Communication Lab	PC	Lab	2	0-0-3
8	IV		Microprocessor Lab	PC	Lab	2	0-0-3
9	IV		Embedded Systems Lab	PC	Lab	2	0-0-3
10	IV		Digital Signal Processing Lab	PC	Lab	2	0-0-3
					Total	26	

SJNanda 23/09/2022

Dr. Satyasai Jagannath Nanda
DUGC Convener, DEPT OF ECE

23/09/2022

Prof. M. M. Sharma,
HOD-Incharge , DEPT of ECE

CURRICULUM THIRD YEAR

Fifth Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	V		Microwave Engg	PC	Theory	3	3-0-0
2	V		Wireless and Mobile Communication	PC	Theory	3	3-0-0
3	V		VLSI Testing & Testability	PC	Theory	3	3-0-0
4	V		Digital CMOS IC	PC	Theory	3	3-0-0
5	V		Antenna & Wave Propagation	PC	Theory	3	3-0-0
6	V		Microwave Lab	PC	Lab	2	0-0-3
7	V		Antenna Lab	PC	Lab	2	0-0-3
8	V		Digital CMOS IC Lab	PC	Lab	2	0-0-3
					Total	21	
9	V		HONS 1:	PE	Theory	3	3-0-0
10	V		HONS 2:	PE	Theory	3	3-0-0
11	V		OTH SP.1:	PE	Theory	3	3-0-0
12	V		OTH SP.2:	PE	Theory	3	3-0-0
			Earn 6 Credits HONS/OTH SP.		Total	27	

Sixth Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	VI		Management	PC	Theory	3	3-0-0
2	VI		Optical Communication Systems	PC	Theory	3	3-0-0
3	VI		Analog CMOS IC	PC	Theory	3	3-0-0
4	VI		Neural Networks & Fuzzy Logic	PC	Theory	3	3-0-0
5	VI		Satellite & Radar Engg	PC	Theory	3	3-0-0
6	VI		Optical Communication Lab	PC	Lab	2	0-0-3
7	VI		Analog CMOS IC Lab	PC	Lab	2	0-0-3
8	VI		Neural Networks and Fuzzy Logic Lab	PC	Lab	2	0-0-3
9	VI		Technical Seminar	PC	Lab	1	0-0-2
					Total	22	
10	VI		HONS 3:	PE	Theory	3	3-0-0
11	VI		HONS 4:	PE	Theory	3	3-0-0
12	VI		OTH SP.3:	PE	Theory	3	3-0-0
13	VI		OTH SP.4:	PE	Theory	3	3-0-0
			Earn 6 Credits HONS/OTH SP.		Total	28	

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DUGC Convener, DEPT OF ECE

Mehndra 23/09/22

Prof. M. M. Sharma,
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CURRICULUM FOURTH YEAR

Seventh Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	VII		Dept. Elective 1	PE	Theory	3	3-0-0
2	VII		Dept. Elective 2	PE	Theory	3	3-0-0
4	VII		Open Elect 1:*	OE	Theory	3	3-0-0
5	VII		Open Elect 2:*	OE	Theory	3	3-0-0
6	VII		Minor Project	PC	Lab	3	0-0-3
7	VII		Training Seminar	PC	Lab	2	0-0-3
					Total	17	
10	VII		HONS 5:*	PE	Theory	3	3-0-0
11	VII		HONS 6:*	PE	Theory	3	3-0-0
12	VII		OTH SP.5:*	PE	Theory	3	3-0-0
13	VII		OTH SP.6:*	PE	Theory	3	3-0-0
			Earn 6 Credits HONS/OTH SP.		Total	23	

Eighth Semester Dept. of ECE

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	VIII		Dept. Elective 3	PE	Theory	3	3-0-0
2	VIII		Dept. Elective 4	PE	Theory	3	3-0-0
4	VIII		Major Project	PC	Lab	6	0-0-6
5	VIII		Open Elect 1:*	OE	Theory	3	3-0-0
6	VIII		Open Elect 2:*	OE	Theory	3	3-0-0
					Total	18	
7	VIII		HONS 5:*	PE	Theory	3	3-0-0
8	VIII		HONS 6:*	PE	Theory	3	3-0-0
9	VIII		OTH SP.5:*	PE	Theory	3	3-0-0
10	VIII		OTH SP.6:*	PE	Theory	3	3-0-0
			Earn 6 Credits HONS/OTH SP.		Total	24	

Important Instructions

1) (*) Indicated subject can be taken in either VII/VIII Semester.
2) The department elective list is attached as a separate sheet.
3) One Semester Industrial Internship is permitted for students either in VII/VIII Semester.
4) Waiver in internship will be given only for departmental program electives and open electives for maximum 16 credits.
5) One Credit Courses will be offered by the department in addition to above credits.

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Seventh and Eighth Semester Program Elective List, Dept. of ECE

Each subject is 3 Credit (L-T-P as 3-0-0)

Sl. No.	Course Code	Course Name
1		GRAPH THEORY
2		ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM
3		ADVANCED ERROR CONTROL CODES
4		IMAGE PROCESSING
5		CAD ALGORITHMS FOR VLSI PHYSICAL DESIGN
6		CAD ALGORITHMS FOR SYNTHESIS OF DIGITAL SYSTEMS
7		SYSTEM LEVEL DESIGN & MODELLING
8		ADVANCED MICROPROCESSORS & MICRO-CONTROLLERS
9		COMPUTER NETWORKS
10		ADV. MICROWAVE ENGG
11		DESIGN OF MICROSTRIP ANTENNA
12		ADVANCED ANTENNA SYSTEMS
13		MICROWAVE INTEGRATED CIRCUITS
14		POWER ELECTRONICS
15		SEMICONDUCTOR OPTO-ELECTRONICS
16		MEMORY DESIGN & TESTING
17		ELECTRONIC MANUFACTURING TECHNOLOGY
18		FORMAL VERIFICATION OF DIGITAL HARDWARE & EMBEDDED SOFTWARE
19		PARALLEL COMPUTING ARCH
20		BIO-MEDICAL ENGINEERING
21		CURRENT-MODE ANALOG SIGNAL PROCESSING
22		OPTICAL CODES AND APPLICATIONS
23		ADAPTIVE SIGNAL PROCESSING
24		VLSI SIGNAL PROCESSING ARCHITECTURES
25		FPGA PHYSICAL DESIGN
26		VLSI TECHNOLOGY
27		INFORMATION THEORY & CODING
28		SYSTEM DESIGN USING FPGAS
29		INSTRUMENTATION & CONTROL
30		WIRELESS AND MOBILE ADHOC NETWORKING
31		CRYPTOGRAPHY
32		DESIGN OF MIC AND MMIC'S
33		ADVANCED MOBILE SYSTEMS
34		SMART AND PHASED ARRAY ANTENNA DESIGN
35		ADVANCED TOPICS IN COMMUNICATION
36		PHOTONIC INTEGRATED DEVICES AND SYSTEMS
37		EMI/EMC
38		WIRELESS SENSOR NETWORK
39		COMPUTATIONAL ELECTROMAGNETIC
40		ADVANCED PHOTONIC DEVICES AND COMPONENTS
41		TELECOMMUNICATION TECHNOLOGY AND

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		MANAGEMENT
42		ADVANCED NETWORKING ANALYSIS
43		ADVANCED DIGITAL SIGNAL & IMAGE PROCESSING
44		MICROELECTRONIC DEVICES AND CIRCUIT
45		ADVANCED COMPUTER ARCHITECTURE
46		MICRO AND NANO ELECTRO MECHANICAL SYSTEMS
47		DESIGN OF ASYNCHRONOUS SEQUENTIAL CIRCUITS
48		ESTIMATION AND DETECTION
49		RF INTEGRATED CIRCUITS
50		PATTERN RECOGNITION AND MACHINE LEARNING
51		QUANTUM COMPUTING

HONORS AND MINOR SPECIALIZATION

A. The students will have the option to choose from a basket of multiple sub-domains within the parent department (through Honors) or sub-domains of departments other than the parent department (Minor Specialization).

B. Requirements for Honors and Minor Specialization programs

i. Honors and Minor programs start from V Semester.

ii. Minimum CGPA requirements for registration shall be 7.50 at the end of IV semester. Students of a department will be allowed to register for Honors program offered by their parent department, while students of a department will be allowed to register for Minor program offered by any other department.

iii. Number of additional credits shall be 18 with 6 courses (or 5 courses + 1 mini project of 3 credits) as prescribed by the department offering Honors/Minor program.

iv. The student is required to plan registration for Honors/Minor program courses, in order to complete all the six courses by the end of VIII semester.

v. Maximum number of students enrolled in any course of a Minor program shall be 30. The allotment of students in the minor program shall be on the basis of CGPA.

vi. The student will not be allowed to continue/register for Honors/ Minor specialization if his/her CGPA falls below 7.50. In case, his/her CGPA improves to 7.50 or higher in subsequent semester(s), he/she may be allowed to continue.

vii. Students should be prepared to write more than one exam in a day.

C. After successful completion of the requirements of the Honors program, the student will be awarded a degree in "name of the discipline" with "Honors" (e.g. Bachelor of Technology in Civil Engineering with Honors or Bachelor of Technology in Mechanical Engineering with Honors etc.).

D. After successful completion of the requirements of the Minor program, the student will be awarded a degree in "name of the discipline" with minor specialization in "name of the minor specialization" (e.g. Bachelor of Technology in Electrical Engineering with Minor Specialization in Environmental Engineering or Bachelor of Technology in Computer Science and Engineering with Minor Specialization in Quantum Mechanics etc.).

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DUGC Convener, DEPT OF ECE

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MINOR in Electronics and Communication Engineering

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	V		Analog Communication	PC	Theory	3	3-0-0
2	V		Digital Electronics	PC	Theory	3	3-0-0
3	VI		Probabilistic Method in Signal and Systems	PC	Theory	3	3-0-0
4	VI		Electronics Devices and Circuits	PC	Theory	3	3-0-0
5	VII*		Applied Electronics	PC	Theory	3	3-0-0
6	VII*		Wireless and Mobile Communication	PC	Theory	3	3-0-0
7	VIII*		Digital Communication	PC	Theory	3	3-0-0
8	VIII*		Embedded Systems	PC	Theory	3	3-0-0

1) The student has to do 6 courses. The (*) indicated two subjects can be taken in either VII/VIII semester considering the provision for one semester industrial internship.

Honors offered by Department of Electronics and Communication Engineering

Honors in Machine Learning and Signal Processing

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	V		Modeling, Optimization and Transforms	PC	Theory	3	3-0-0
2	V		Multirate Signal Processing	PC	Theory	3	3-0-0
3	VI		Biomedical Engineering	PC	Theory	3	3-0-0
4	VI		Computer Vision	PC	Theory	3	3-0-0
5	VII*		Reduced order modeling, Optimization and Machine Intelligence	PC	Theory	3	3-0-0
6	VII*		VLSI Signal Processing Architecture	PC	Theory	3	3-0-0
7	VII*		Mini Project on Machine Learning and Signal Processing	PC	Practical	3	0-0-6
8	VIII*		Adaptive Signal Processing	PC	Theory	3	3-0-0
9	VIII*		Advanced Digital Signal and Image Processing	PC	Theory	3	3-0-0
10	VIII*		Pattern Recognition and Machine Learning	PC	Theory	3	3-0-0
11	VIII*		Mini Project on Machine Learning and Signal Processing	PC	Practical	3	0-0-6

1) The student has to do 6 courses. The (*) indicated two subjects can be taken in either VII/VIII semester considering the provision for one semester industrial internship.

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Honors in VLSI and Embedded Systems

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	V		CAD Algorithms for Synthesis of VLSI Systems	PC	Theory	3	3-0-0
2	V		Digital System Design & FPGA	PC	Theory	3	3-0-0
3	VI		System Level Design & Modeling	PC	Theory	3	3-0-0
4	VI		Micro-& Nano- electro-mechanical Systems (MEMS & NEMS)	PC	Theory	3	3-0-0
5	VII*		VLSI Technology	PC	Theory	3	3-0-0
6	VII*		Nanotechnology & Emerging Applications	PC	Theory	3	3-0-0
7	VII*		Mini Project on VLSI and Embedded Systems	PC	Practical	3	0-0-6
8	VIII*		Formal Verification of Digital Hardware & Embedded Software	PC	Theory	3	3-0-0
9	VIII*		Mixed Signal Circuits	PC	Theory	3	3-0-0
10	VIII*		Mini Project on VLSI and Embedded Systems	PC	Practical	3	0-0-6

2) The student has to do 6 courses. The (*) indicated two subjects can be taken in either VII/VIII semester considering the provision for one semester industrial internship.

Honors in Communication Engineering

S.No.	Semester	Course Code	Course Name	Category	Type	Credit	L-T-P
1	V		Mathematical Modeling and Simulation for Communication Engineering Systems	PC	Theory	3	3-0-0
2	V		Advanced Digital Communication Systems	PC	Theory	3	3-0-0
3	VI		Advanced Antenna Engineering	PC	Theory	3	3-0-0
4	VI		Advanced Mobile and Wireless Networking	PC	Theory	3	3-0-0
5	VII*		Advanced Microwave Engineering	PC	Theory	3	3-0-0
6	VII*		Advanced Optical Communication Systems	PC	Theory	3	3-0-0
7	VII*		Mini Project on Communication Engineering	PC	Practical	3	0-0-6
8	VIII*		Advanced Error Control Codes	PC	Theory	3	3-0-0
9	VIII*		Computational Electromagnetics	PC	Theory	3	3-0-0
10	VIII*		Mini Project on Communication Engineering	PC	Practical	3	0-0-6

1) The student has to do 6 courses. The (*) indicated two subjects can be taken in either VII/VIII semester considering the provision for one semester industrial internship.

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Exit Options

A. Students will have following exit options:

Table 1: Exit options and eligibility condition

S. No.	Exit option with	Eligibility Condition
1	Diploma Certificate	After successfully completing all courses of I to IV semesters or The student has earned 100 credits through graded courses
2	B.Sc. (engg.) Degree	After successfully completing all courses of I to VI semesters or The student has earned 142 credits through graded courses
3	B.Tech. Degree	After successfully completing all courses of I to VIII semesters

B. Maximum duration of completing a UG program shall be 6 years (12 semesters) from initial registration excluding semester withdrawals, if the student has not exercised any exit option and has completed his registration in every semester.

C. Maximum duration of completing a UG program shall be 8 years (16 semesters) from initial registration excluding semester withdrawals, for students who have exercised any exit option given in Table 1 above.

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MNIT Jaipur

Scheme

for

B. Tech. – Mechanical Engineering

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

Department of Mechanical Engineering

New UG ME (B. Tech Only) Scheme from 2022-23 Batch based on the Scheme Approved in 46th Meeting of Senate and DFB Meetings on 1st and 5th Aug 2022

First Year (I and II Semester)

S. No	Course Code	Course Title	Cate-gory	L	T	P	Credi ts	No of Hrs	Total Credit	Remarks
1		Chemistry	BS	2	1	0	3	3		
2		Chemistry Lab	BS	0	0	2	1	2		
3		Physics	BS	2	1	0	3	3		
4		Physics Lab	BS	0	0	2	1	2		
5		Mathematics I	BS	3	1	0	4	4		
6		Mathematics II	BS	3	1	0	4	4		
7		Basics of Electronics and Electrical Eng.	EAS	3	0	0	3	3		
8		Electrical Engineering Lab	EAS	0	0	2	1	2		
9		Electronics Engineering Lab	EAS	0	0	2	1	2		
10		Engineering Drawing and Sketching	EAS	1	1	1	2	3		
11		Computer Science and Programming	EAS	2	0	0	2	2		
12		Programming Lab	EAS	0	0	2	1	2		
13		Environmental Science and Ecology	EAS	2	0	0	2	2		
14		Introduction to Mechanical Systems	EAS	2	0	0	2	2		
15		Product Realization through Manufacturing	EAS	0	0	2	1	2		
16		Basic Economics	HSS	2	0	0	2	2		
17		Technical Communication	HSS	2	0	0	2	2		
18		Language Lab	HSS	0	0	2	1	2		
							36	44	36	
19		Applied Probability and Statistics	PC	2	1	0	3	3		Sem-1
20		Casting Welding and Forming	PC	3	0	0	3	3		Sem-1
21		Casting Welding and Forming Lab	PC	0	0	2	1	2		Sem-1
23		Engineering Thermodynamics	PC	3	1	0	4	4		Sem-2
22		Engineering Mechanics	PC	2	1	0	3	3		Sem-2
							14	15	14	
							50			

III Semester										
S. No	Course Code	Course Title	Cate-gory	L	T	P	Credits	No of Hrs	Total Credit	Remarks
1		Materials Science and Engineering	PC	3	0	0	3	3		
2		Fluid Mechanics	PC	3	1	0	4	4		
3		Solid Mechnics	PC	3	1	0	4	4		
4		Kinematics of Machines	PC	2	1	0	3	3		
6		Mechanical Measurement and Metrology	PC	3	0	0	3	3		
7		Industrial Engineering	PC	2	0	0	2	2		
		Computer-Aided Machine Drawing	PC	0	0	4	2	4		
8		Material Science and Engineering Lab	PC	0	0	2	1	2		
9		Fluid Mechanics Lab	PC	0	0	2	1	2		
10		Mechanical Measurement and Metrology Lab	PC	0	0	2	1	2		
11		Industrial Engineering Lab	PC	0	0	2	1	2		
							25	31	25	
IV Semester										
1		I C Engines	PC	3	0	0	3	3		
2		Operations Planning and Control	PC	2	1	0	3	3		
3		Machining Science and Machine Tools	PC	3	1	0	4	4		
4		Dynamics of Machines	PC	3	1	0	4	4		
5		Heat Transfer	PC	3	1	0	4	4		
6		I C Engines Lab	PC	0	0	2	1	2		
7		Machinining Science and Machine Tools Lab	PC	0	0	2	1	2		
8		Dynamics of Machines Lab	PC	0	0	2	1	2		
9		Heat Transfer Lab	PC	0	0	2	1	2		
10		Program Elective-1	PE				3	3		
							25	29	25	

V Semester										
S. No	Course Code	Course Title	Cate-gory	L	T	P	Credits	No of Hrs	Total Credit	Remarks
1		Design of Machine Elements	PC	3	1	0	4	4		
2		Operations Research	PC	2	1	0	3	3		
3		Fluid and Turbo Machines	PC	3	1	0	4	4		
4		CAD & CAM	PC	3	0	0	3	3		
5		CAD & CAM Lab	PC	0	0	2	1	2		
7		Program Eelctive-2	PE				3	3		
8		Program Elective-3	PE				3	3		
							21	22	21	
VI Semester										
1		Refrigeration and Air Conditioning	PC	2	1	0	3	3		
2		Design of Mechanical Systems	PC	3	1	0	4	4		
3		Non Conventional Manufacturing Processes	PC	3	0	0	3	3		
4		Non Conventional Manufacturing Processes Lab	PC	0	0	2	1	2		
5		Refrigeration and Airconditioning Lab	PC	0	0	2	1	2		
6		CAE Lab	PC	0	0	2	1	2		
7		Program Elective-4	PE				3	3		
8		Program Elective-5	PE				3	3		
9		Program Elective-6	PE				2	3		
							21	25	21	

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VII Semester										
S. No	Course Code	Course Title	Cate-gory	L	T	P	Credits	No of Hrs	Total Credit	Remarks
1		Basics of Management	Mgt.	3	0	0	3	3		
2		Training and Seminar	PC	0	0	2	2	2		
3		Program Elective-7	PE				2	2		
4		Program Elective-8	PE				2	2		
5		Open Elective -I	OE				3	3		
6		Mini Project	Proj.	0	0	2	3	4		
7		Program liked EAS/BS	P-EAS				3	3		
							18	19	18	
VIII Semester										
1		Major Project	Proj.	0	0	4	9	9		
2		Adcance Elective-1	AE				3	3		
3		Adcance Elective-2	AE				3	3		
4		Open Elective -2	OE				3	3		
							18	18	18	
Total Credits in B Tech (Only)									178	

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List of Program Electives / Advanced Electives (Track Wise)				
Semester	**PE/ AE**	**Academic Track**	**Industry Track**	**Credits**
4th	PE1	• Work Study and Ergonomics • Energy Conversion Technologies	• Design Thinking for Innovations	3
5th	PE2 & PE3	• Project Management • Automobile Engineering • Design of Mechanisms • Heat Exchangers	• Robotics Engineering • Product Design and Development	6
6th	PE4, PE5 and PE6	• Finite Element Methods • Metal Forming •Mechanical Vibration & Control •Tool Engineering	• Supply Chain Management • Energy Management • Lean Six Sigma • Power Plant Engineering • Machine Learning	8
7th	PE7 & PE8	• Mechanics of Composites • Air Conditioning System Design • Material Selection in Mechanical Design • Mechatronic for Intelligent Manufacturing	• Quality System Engineering • Additive Manufacturing in Operations • Welding Engineering & Technology	4
8th	AE1 and AE2	• Data Analytics • Fracture Mechanics • Wear Friction and Lubrication • Reliability and Maintainability Engineering • Advance Engineering Materials	• Sustainable Manufacturing and Life Cycle Engineering • Computational Fluid Dynamics • Flexible Manufacturing System • Smart Manufacturing • Machinery Fault Diagnosis • Microfluidics	6
		Total Courses: 19	Total Courses: 16	27

List of Program liked EAS/BS from other Depatrtment

	Course Code	Course Title		L	T	P	Credits	Number of Hours		From the Dept. of
		Data Structure					3	3		CSE

List of Open Electives for Other UG Schemes

	Existing / Proposed Course Code	Course Title		L	T	P	Credits	Number of Hours		
		Automobile Engineering	OE	3	0	0	3	3		
		Power Plant Engineering	OE	3	0	0	3	3		
		Advanced Engineeing Materials	OE	3	0	0	3	3		
		Six-sigma	OE	3	0	0	3	3		
		Total Quality Management	OE	3	0	0	3	3		
		Finite Element Methods	OE	3	0	0	3	3		
		Robotics Engineering	OE	3	0	0	3	3		
		Computational Fluid Dynamics	OE	3	0	0	3	3		
		Product Engineering	OE	3	0	0	3	3		
		Design Thinking for Innovations	OE	2	1	0	3	3		

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Credit Wise Summary wrt Credit Stracture

Course Type	No of Credits	Range
BS	16	16
EAS	15	15
HSS	5	5
IC	**36**	**36**
PC	91	109to 136
PE	21	
AE	6	
Project	12	
Mgt.	3	
DSC	**133**	**121 to 139**
OE	6	6
PL EAS/BS	3	3 to 15
OC	**9**	**9 to 21**
Total	**178**	**178 to 184**

05/08/2022

Convener DUGC (Mech. Engg. Dept.)

5/8/2022

HoD (Mech. Engg. Dept.)

MNIT Jaipur

Scheme

for

B. Tech. – Metallurgical & Materials Engineering

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

DEPARTMENT OF METALLURGICAL AND MATERAILS ENGINEERING

Curriculum structure of B.Tech Programme

Semester I & II

S. N.	Course Code	Course Title	Category	L	T	P	Credits	Contact Hrs	Total Credits
1		Chemistry	BS	2	1	0	3	3	
2		Chemistry Lab	BS	0	0	2	1	2	
3		Physics	BS	2	1	0	3	3	
4		Physics Lab	BS	0	0	2	1	2	
5		Mathematics I	BS	3	1	0	4	4	
6		Mathematics II	BS	3	1	0	4	4	
7		Basics of Electronics and Electrical Eng.	EAS	3	0	0	3	3	
8		Electrical Engineering Lab	EAS	0	0	2	1	2	
9		Electronics Engineering Lab	EAS	0	0	2	1	2	
10		Engineering Drawing and Sketching	EAS	1	1	1	2	3	
11		Computer Science and Programming	EAS	2	0	0	2	2	
12		Programming Lab	EAS	0	0	2	1	2	
13		Environmental Science and Ecology	EAS	2	0	0	2	2	
14		Introduction to Mechanical Systems	EAS	2	0	0	2	2	
15		Product Realization through Manufacturing	EAS	0	0	2	1	2	
16		Basic Economics	HSS	2	0	0	2	2	
17		Technical Communication	HSS	2	0	0	2	2	
18		Language Lab	HSS	0	0	2	1	2	
							36	**44**	**36**
19	SEM-I	Introduction to Engineering Materials	PC	3	0	0	3	3	
20	SEM-I	Fuels, Furnaces and Refractories	PC	3	1	0	4	4	
21	SEM-II	Introduction to Physical Metallurgy	PC	3	1	0	4	4	
22	SEM-II	Mineral Processing	PC	3	0	0	3	3	
							14	**14**	**14**

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06/9/2022
ADUG
UG I/II

New Scheme File.
12/9/22

S Sreekumar

29/07/2022

Semester III

S. N.	Course Code	Course Title	Category	L	T	P	Credits	Contact Hrs	Total Credits
1		Introduction to Extractive metallurgy	PC	3	0	0	3	3	
2		Electrometallurgy and Corrosion	PC	3	1	0	4	4	
3		Mechanical Behaviour and Testing of Metals	PC	3	1	0	4	4	
4		Metallurgical Thermodynamics and Kinetics	PC	3	1	0	4	4	
5		Foundry Technology	PC	3	1	0	4	4	
6		*Testing of Materials Lab*	PC	0	0	2	1	2	
7		*Foundry Technology Lab*	PC	0	0	2	1	2	
8		*Mineral Processing Lab*	PC	0	0	2	1	2	
9		*Fuel, Furnaces and Refractories Lab*	PC	0	0	2	1	2	
							23	**27**	**23**

Semester IV

1		Mechanical Working of Metals	PC	3	1	0	4	4	
2		Iron Making	PC	3	1	0	4	4	
3		Phase Transformation	PC	3	1	0	4	4	
4		NDT and Evaluation	PC	3	0	0	3	3	
5		Transport Phenomena	PC	3	1	0	4	4	
6		*Metallography and Structural Characterization Lab*	PC	0	0	2	1	2	
7		*Electrometallurgy and Corrosion Lab.*	PC	0	0	2	1	2	
8		*NDT and Metallurgical Analysis Lab*	PC	0	0	2	1	2	
9		*Heat Treatment and Thermodynamics Lab*	PC	0	0	2	1	2	
							23	**27**	**23**

Sreekumar

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Semester V

S. N.	Course Code	Course Title	Category	L	T	P	Credits	Contact Hrs	Total Credits
1		Materials Characterization	PC	3	0	0	3	3	
2		Production of Sponge Iron and Ferroalloys	PC	3	0	0	3	3	
3		Introduction to Nano Materials and Technology	PC	3	0	0	3	3	
4		Powder Metallurgy	PC	3	1	0	4	4	
5		Principles of Heat Treatment	PC	3	1	0	4	4	
6		*Materials Characterization Lab*	PC	0	0	2	1	2	
7		*Extractive Metallurgy and Thermodynamics Lab*	PC	0	0	2	1	2	
8		*Powder Metallurgy Lab*	PC	0	0	2	1	2	
9		*Metal Working Lab*	PC	0	0	2	1	2	
10		**Departmental Elective-I**	PE	3	0	0	3	3	
							24	**28**	**24**

Semester VI

1		Joining of Materials	PC	3	0	0	3	3	
2		Steel Making	PC	3	1	0	4	4	
3		Non-Ferrous Extractive Metallurgy	PC	3	0	0	3	3	
4		Composite Materials	PC	3	1	0	4	4	
5		*Joining of Materials Lab*	PC	0	0	2	1	2	
6		**Departmental Elective-II**	PE	3	0	0	3	3	
							18	**19**	**18**

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Semester VII

S. N.	Course Code	Course Title	Category	L	T	P	Credits	Contact Hrs	Total Credits
1		Training Seminar	PC	1	0	4	3	5	
2		Minor Project	PC	0	0	6	3	6	
3		**Departmental Elective-III**	PE	3	0	0	3	3	
4		**Departmental Elective-IV**	PE	3	0	0	3	3	
5		**Departmental Elective-V**	PE	3	0	0	3	3	
6		**Open Elective-I**	OE	3	0	0	3	3	
							18	**23**	**18**

Semester VIII

1		Major Project	PC	0	0	9	9	9	
2		Basic Management	PC	3	0	0	3	3	
3		**Departmental Elective-VI**	AE	3	0	0	3	3	
4		**Departmental Elective-VII**	AE	3	0	0	3	3	
5		**Departmental Elective-VIII**	AE	3	0	0	3	3	
6		**Open Elective-II**	OE	3	0	0	3	3	
							24	**24**	**24**

Sreekumar 29/07/2022

Total Credits: 36+14+23+23+24+18+18+24=180

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY JAIPUR

DEPARTMENT OF METALLURGICAL AND MATERAILS ENGINEERING

Curriculum structure For B.Tech Honours Degree

Semester V

S. N.	Course Code	Course Title	Category	L	T	P	Credits	Contact Hrs	Total Credits
6		Departmental Elective-IX	PE	3	0	0	3		
7		Departmental Elective-X	PE	3	0	0	3		

Semester VI

8		**Departmental Elective-XI (from M.Tech. electives)**	PE	3	0	0	3		
9		**Departmental Elective-XII**	PE	3	0	0	3		

Semester VIII

10		**Advanced Elective-1 (from M.Tech. courses)**	AE-I	3	0	0	3		
11		**Advanced Elective-2 (from M.Tech. courses)**	AE-II	3	0	0	3		

29/07/2022

MNIT Jaipur

Courses

and

Syllabus

for

I Year B.Arch.

Department of Architecture and Planning

B.ARCH CURRICULUM

(For presentation to Senate to be held on 8th April 2022)

UNDERGRADUATE DEGREE REQUIREMENTS

Council of Architecture Requirements:

The Council of Architecture (CoA) prescribes the Minimum Standards of Architectural Education for imparting 5-year undergraduate degree course in Architecture (i.e. Bachelor of Architecture) and also monitors the compliance of the same by approved Architectural Institutions all over the country for award of recognized qualifications under the provisions of the Architects Act, 1972. The standards of Education being imparted in these institutions including IITs and NITs is governed by Council of Architecture (Minimum Standards of Architectural Education) Regulations, 1983, which sets forth the requirement of eligibility for admission, course duration, standards of staff & accommodation, course content, examination etc. The Council is empowered to make recommendations to the Government of India with regard to recognition and de-recognition of a qualification pertaining to Architecture and subsequent registration of Architects.

The Department of Architecture and Planning endeavors to ensure that the curriculum at MNIT Jaipur fulfils the requirements/guidelines set by the CoA including Gazette notification by CoA of August 2020, and at the same time remains to the maximum possible extent within the overall framework of the Institute.

The CoA prescribes 5 categories with weightings (and subject lists included in each category) as below:

- **Professional Core- 50%**
- **Building Science & Applied Engineering (BS & AE)- 20%**
- **Professional Electives- 10%**
- **Open Electives – 5%**
- **Professional Ability Enhancement compulsory courses- 10%**
- **Skill Enhancement Courses- 5%**

Table 1: Comparison of Credit Requirements as a % between CoA Guidelines and the B. Arch curriculum:

Reference	Professional Core	Building Science & Applied Engineering	Professional Electives	Open Elective	Professional Ability Enhancement (Compulsory)	Skill Enhancement Courses
CoA recommendations	50	20	10	5	10	5
MNIT (Existing)	52	23	10	0	10	5
MNIT (Proposed)	51	24	11	2	10	2

The CoA further requires that the undergraduate program must be of a 5 year duration including one semester of Practical Training in an architects' office, in VIII/IX semester, prior to registering for Thesis.

CONVENER DUGC / CURRICULUM COMMITTEE
21/9/22

Credits & Contact Hours

	B. Arch. only		B. Arch (honours)		B. Arch (minor spl.)	
	Credits	Hours	Credits	Hours	Credits	Hours
Semester 1	22	27	22	27	22	27
Semester 2	25	30	25	30	25	30
Semester 3	24	29	24	29	24	29
Semester 4	24	29	24	29	24	29
Semester 5	24	27	24+0/3	27/30	24+0/3	27/30
Semester 6	25	28	25+0/3	28/31	25+0/3	28/31
Semester 7	25	29	25+0/3/6	29/32/35	25+0/3/6	29/32/35
Semester 8	12	0	12+0/3	0-3	12+0/3	0-3
Semester 9	26	27	26+0/3/6	27/30/33	26+0/3/6	27/30/33
Semester 10	20	20	20+0/3/6	20/23/26	20+0/3/6	20/23/26

Exit policy

Sr. No.	Degree/Certificate	Exit Point
1.	Diploma in Architectural Technology.	Completion of IV Semester
2.	B.Sc. in Architecture.	Completion of VI Semester
3.	B.Arch.	Completion of X Semester
4.	B.Arch with Honors.	Completion of X Semester with 18 extra credits
5.	B.Arch with Minor Specialization.	Completion of X Semester with 18 extra credits in any other discipline

Credit break-up as per MNIT Norms:

COURSE	CODE	CREDITS	HOURS
INSTITUTE CORE	IC	2	2
PROGRAMME CORE	PC	81	108
ARCHITECTURAL DESIGN	AD	69	69
ARCHITECHTURAL THESIS	AT	16	16
PROGRAMME LINKED	PL	17	21
PROGRAMME ELECTIVE	PE	24	24
OPEN ELECTIVE	OE	6	6
PRACTICAL TRAINING	PT	12	Nil
		227	246

Credit break-up as per Council of Architecture Norms:

PROFESSIONAL CORE		
Course	Credits	Hours
Architectural Design (All Design and Thesis)	85	85
Architectural Drawing	4	6
Architectural Presentation Technique and Model Making	6	10
History of Architecture	9	12
Theory of Design and Architecture Appreciation	3	3
Quantity Survey and Specification	2	3
Site Planning & Landscape	3	4
Working Drawing & Preparation of Portfolio	4	6
Total Credits	116	129
Percentage of total credits	51%	
(BS & AE) BUILDING SCIENCES & APPLIED ENGINEERING		
Environmental Science and Ecology	2	2
Building Construction & Materials (All)	24	30
Architectural Structure (All)	12	14
Building Science	6	8
Surveying and Introduction of GIS	3	4
Building Services	9	12
Total Credits	57	71
Percentage of total credits	24%	
PROFESSIONAL ELECTIVES		
Programme Elective	24	24
Percentage of total credits	11%	
OPEN ELECTIVES		
Open Elective	6	6
Percentage of total credits	2%	
PROFESSIONAL ABILITY ENHANCEMENT - Compulsory		
Practical Training and Report	12	0
Construction Management	3	4
Professional Practice	3	3
Introduction to Planning	3	4
Total Credits	21	19
Percentage of total credits	10%	
SKILL ENHANCEMENT COURSES		
Technical Communication & Research Methodology	2	3
Computer Application	2	3
Total Credits	4	6
Percentage of total credits	2%	

DEPARTMENT OF ARCHITECTURE AND PLANNING

MNIT JAIPUR.

AGENDA FOR SUGB/ SENATE

1). To approve Syllabi of I and II Semester B. Arch.

3). To make necessary changes in Ordinances for B. Arch course in order to accommodate CoA Guidelines.

The following changes need to be made:

- B. Arch course to be completed in 8 years and an extra year may be granted under special circumstances.
  The Architecture Course shall be completed in a maximum period of 8 years, however under special circumstances an extra year to complete the course may be granted only once and treated as zero year.

- Classroom size to not exceed 40 students.
  The university or institution shall admit candidates at the first year level as per the intake sanctioned by the Council, subject to a maximum of forty candidates in a class, separate classes shall be organised for each 40 candidates or part thereof.

- Passing marks for each course to be not less than 45%.
  (The pass percentage shall not be less than 45 per cent. in each subject).

- Internal assessment component of each course to not exceed 50% of maximum marks.
  (The weightage of internal marks for various courses of study shall not exceed 50 percent of the total marks).
- Passing of Architectural design compulsory in each semester for registration to Architectural design in next semester.
  (A candidate shall not be permitted to enroll for the Architectural Design course in a semester unless he has completed the Architectural Design course of the previous semester).
- Completion of Practical Training of VIII Semester compulsory for registration in Architectural Design Thesis of X semester.
  (A candidate shall not be permitted to enroll for the tenth semester Architectural Design Thesis or dissertation or project course unless he has successfully completed Practical Training or Internship of six months or one semester of approximately 16 working weeks during 8th or 9th Semester).
- 1 Study tour per year needs to be included in the curriculum – this may include site visits within the city

(The institution shall, as an integral part of architectural education curriculum and as a part of teaching course, arrange for study tours, visits, to places of architectural interest).

- Exist Policy after III Year B.Arch. only and not after II Year B. Arch.
  (As per provisions of the COA in Gazette August 2020)

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21/9/22

Proposed Teaching Scheme for B.Arch

S. No	Course Code	Category	Course	L-T-P-S	Credits	Hours/ Week	Prerequisite Course	Marking Break-up						Examination Duration (in Hours)			
								CWS	PRS	MTE	PRM	ETE	PRE	MTE	ETE	PRE	Internal/ External Viva-Voce
Semester I																	
1		IC	Environmental Science and Ecology	2-0-0-0	2	2		20-30		20-40		30-50		1.5	2.5		
2		PL	Architectural Structures (Statics) - I	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		PC	Architectural Drawing	2-0-4-0	4	6			50		20		30	2		4	
4		PC	Architectural Presentation Technique & Model Making - I	1-0-4-0	3	5			50		20		30	2		4	
5		PC	Building Construction & Materials - I	2-0-3-0	4	5			50	20		30		2	4		
6		AD	Introduction to Architecture and Basic Design	2-0-0-4	6	6			50	20			30	7	-	viva	External
					22	27											
Semester II																	
1		PC	History of Architecture - I	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
2		PL	Architectural Structure - II	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		PL	Surveying and Introduction to GIS	2-0-2-0	3	4			30	30		40		1.5	2.5		
4		PC	Architecture Presentation Techniques & Model Making - II	1-0-4-0	3	5			50		20		30	2		4	
5		PC	Building Construction & Materials - II	2-0-3-0	4	5			50	20		30		2	4		
6		AD	Architectural Design - I	2-0-0-7	9	9			50		20		30	7	-	viva	External
					25	30											
Semester III																	
1		PC	History of Architecture - II	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
2		PL	Architectural Structures – III	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
3		PC	Climatology	2-0-2-0	3	4		20-30		20-40		30-50		1.5	2.5		
4		PC	Comp. Applications for Architects	1-0-2-0	2	3			50		20		30	2		2	
5		PC	Building Construction & Materials – III	2-0-3-0	4	5			50	20		30		2	4		
6		AD	Architectural Design - II	2-0-0-7	9	9	ARP101 Architectural Drawing		50		20		30	7	-	viva	External
					24	29											
Semester IV																	
1		PC	History of Architecture - III	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
2		PC	Building Services - I	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
3		PL	Architectural Structures - IV	2-0-2-0	3	4		20-30		20-40		30-50		1.5	2.5		
4		PL	Technical Communication & Research Methodology	1-2-0-0	2	3			50		20		30	2		4	
5		PC	Building Construction & Materials - IV	2-0-3-0	4	5			50	20		30		2	4		
6		AD	Architectural Design - III	2-0-0-7	9	9	ARS112 Architectural Design - I		50		20		30	7	-	viva	External
					24	29											

Rupa Swarup
CONVENER DUGC / CURRICULUM COMMITTEE
21/9/22

Proposed Teaching Scheme for B.Arch

S. No	Course Code	Category	Course	L-T-P-S	Credits	Hours/ Week	Prerequisite Course	Marking Break-up						Examination Duration (in Hours)			
								CWS	PRS	MTE/ PRM		ETE	PRE	MTE	ETE	PRE	Internal/ External Viva-Voce
			Semester V														
1		PC	Theory of Design and Architectural Appreciation	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
2		PC	Building Services - II	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
3		PC	Quantity Survey and Specifications	1-2-0-0	2	3		20-30		20-40		30-50		1.5	2.5		
4		PC	Building Construction & Materials - V	2-0-3-0	4	5			50	20		30		2	4		
5		AD	Architectural Design - IV	2-0-0-7	9	9	ARS211 Architectural Design - II		50		20		30	7	-	viva	External
6		PE	Program Elective - I	2-1-0-0	3	3											
7		B.Arch(H)	Honours Elective - I/ International Internship (assessment after VI semester summer vacation)	2-1-0-0	0/3	0/3											
					24	27											
List of Electives in Sem V																	
1		PE	Universal Design	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
2		PE	Vernacular Architecture	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
			Semester VI														
1		PC	Building Science - II	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
2		PC	Site Planning & Landscape	2-0-2-0	3	4			50	20		30		2	4		
3		PC	Building Construction & Materials - VI	2-0-3-0	4	5			50	20		30		2	4		
4		AD	Architectural Design - V	2-0-0-7	9	9	ARS212 Architectural Design - III		50		20		30	7	-	viva	External
5		PE	Program Elective - II	2-1-0-0	3	3											
6		OE	Open Elective - I	3-0-0-0	3	3											
7		B.Arch(H)	Honours Elective - II/ International Internship (assessment after VI semester summer vacation)	2-1-0-0	0/3	0/3											
					25	28											
List of Electives in Sem VI																	
1		PE	Product Design	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
2		PE	Interior Design	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		PE	Design for Healthcare Facilities	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
List of Open Electives in Sem VI																	
1		OE	Construction Planning and Management for large Infrastructure Projects	3-0-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
2		OE	Urban Infrastructure Planning and Management	3-0-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		OE	Water Sensitive Urban Planning	3-0-0-0	3	3		20-30		20-40		30-50		1.5	2.5		

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Proposed Teaching Scheme for B.Arch

S. No	Course Code	Category	Course	L-T-P-S	Credits	Hours/ Week	Prerequisite Course	Marking Break-up						Examination Duration (in Hours)			
								CWS	PRS	MTE/ PRM		ETE	PRE	MTE	ETE	PRE	Internal/ External Viva-Voce
Semester VII																	
1		PC	Introduction to Planning	2-0-2-0	3	4		20-30		20-40		30-50		1.5	2.5		
2		PC	Building Services - III	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
3		PC	Working Drawings and Preparation of portfolio	2-0-4-0	4	6			50				50	-		viva	Internal
4		AD	Architectural Design - VI	2-0-0-7	9	9	ARS311 Architectural Design - IV		50		20		30	7	-	viva	External
5		PE	Program Elective - III	2-1-0-0	3	3											
6		PE	Flexible Elective - I	2-1-0-0	3	3											
7		B.Arch(H)	Honours Elective - III/ International Internship (assessment after VI semester summer vacation)	2-1-0-1	0/3/6	0/3/6											
8		B.Arch(H)	Honours Elective - III/ International Internship (assessment after VI semester summer vacation)	2-1-0-0	0/3/6	0/3/6											
					25	29											
List of Electives in Sem VII																	
1		PE	Advanced Building Services and Coordination	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
2		PE	Advance Building Construction Technology	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		PE	Urban Conservation	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
4		PE	Earthquake Resistant Architecture	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
5		PE	Energy Efficient Architecture	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
Semester VIII																	
1		PT	Practical Training		12				50				50			viva	Internal
2		B.Arch(H)	Research Paper/ Online Course/Monograph Writing		0/3	0/3											
					12												
Semester IX																	
1		AT	Architectural Thesis - I	1-0-0-7	8	8			50				50			viva	Internal
2		AD	Architectural Design - VII	2-0-0-7	9	9	ARS411 Architectural Design - V, ARS412 Architectural Design VI		50		20		30	7	-	viva	External
3		PC	Construction Management	2-2-0-0	3	4		20-30		20-40		30-50		1.5	2.5		
4		PE	Program Elective - IV	2-1-0-0	3	3											
5		PE	Flexible Elective - II	2-1-0-0	3	3											
6		B.Arch(H)	Honours Elective - IV/Research Paper/ Online Course/Monograph Writing		0/3/6	0/3/6											
7		B.Arch(H)	Honours Elective - IV/Research Paper/ Online Course/Monograph Writing		0/3/6	0/3/6											
					26	27											

Rina Saxena

List of Electives in Sem IX

1		PE	Remote Sensing and GIS	2-1-0-0	3	3												
2		PE	Urban Infrastructure Planning	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		PE	Housing	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
4		PE	Campus Planning	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
5		PE	Mega Structures	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
6		PE	Building Automation	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
7		PE	Advanced Landscape	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		

Proposed Teaching Scheme for B.Arch

S. No	Course Code	Category	Course	L-T-P-S	Credits	Hours/ Week	Prerequisite Course	Marking Break-up						Examination Duration (in Hours)			
								CWS	PRS	MTE		ETE	PRE	MTE	ETE	PRE	Internal/ External Viva-Voce
			Semester X														
1		AT	Architectural Thesis - II	0-0-0-8	8	8	ARS501 Architectural Thesis - I		50				50			viva	External
2		PC	Professional Practice & Management	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		OE	Open Elective - II	3-0-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
4		PE	Program Elective - V	2-1-0-0	3	3											
5		PE	Flexible Elective - III	2-1-0-0	3	3											
6		B.Arch(H)	Honours Elective - V/Research Paper/ Online Course/Monograph Writing	2-1-0-0	0/3/6	0/3/6											
7		B.Arch(H)	Honours Elective - VI/Research Paper/ Online Course/Monograph Writing	2-1-0-0	0/3/6	0/3/6											
					20	20											
List of Electives in Sem X																	
1		PE	Urban Design	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
2		PE	Architecture and Development Legislation	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
3		PE	Building Economics and Estate Management	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
		PE	Advanced Building Structures	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
4		PE	History Theory and Criticism	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
5		PE	Architectural Journalism	2-1-0-0	3	3		20-30		20-40		30-50		1.5	2.5		
			Total Credits & Teaching Hours/week		227	246											

Dr. Rina Surana

Convener, B.Arch Curriculum Revision Committee

* DUGC. CONVENER.

Dr. Satish Pipralia

Head, Department of Architecture and Planning

Malaviya National Institute of Technology Jaipur

Department of Architecture & Planning

Syllabus Semester 1 & 2 (w.e.f. 2022-23)

Semester I

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22CET102		**Course Name:** Environmental Science	
Credit: 2		**Contact Hours: L**-2 **T**-0 **P**-0 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	CWS: (As per institute)	MTE:	ETE
Exam Duration	**Mid Term**	**End Term**	
	Theory:1.5hrs	Theory: 2.5hrs	

COURSE OBJECTIVE

To equip the students with basic knowledge of environmental issues, challenges and identifying solutions on local and global scale.

COURSE OUTCOMES

CO1	To be able to critically examine aspects of local and global environmental issues and apply understating to create informed opinions about how to interact with the environment on both a personal and a social level.
CO2	To recognize environmental issues as among the highest educational priorities and as a key determinant to sustainable development.
CO3	To sensitize about existing environmental conditions, policies, programs and practices for implementation at different stages of life in an environmentally sound manner.
CO4	To create awareness about various techniques/practices to conserve and protect the environment.

COURSE ASSESSMENT

Course Assessment (culminating to the final grade), will be made up of the following:

S. No.	Component	Weightage
a)	Assignments / Scrap Book / Activities	20%
b)	Mid-term examination	30%
c)	End Semester Examination	50%

COURSE CONTENTS

Air Pollution **(No. of Lectures – 6)**

Types of air pollutants, classification, sources and impacts; Air Quality Index; NAAQS; Tropospheric ozone and photochemical smog; Monitoring of air pollutants; Dispersion of air pollutants; Air pollution disasters; Vehicular pollution and control; Introduction to indoor environmental quality

Noise Pollution **(No. of Lectures – 2)**

Sources, measurements, monitoring, impacts, standards, control measures of noise pollution

Water Pollution **(No. of Lectures – 5)**

Sources of water pollution; Classification of pollutants; Drinking water standards; Impacts of poor water quality; Water conservation; Restoration of water bodies.

Soil and marine Pollution **(No. of Lectures – 2)**

Nature & composition of soil; fertilizers & nutrient enrichment, soil pollutants, nutrient loss & degradation of quality; case study: soil pollution by solid waste.

Solid Waste Management **(No. of Lectures – 5)**

Composition of Municipal solid waste (MSW); Generation rate, properties, collection, storage, transport, treatment technologies (composting, incineration, gasification etc.) and disposal of MSW; e-waste; Plastic waste; Hazardous waste; MSW rules 2016; Zero-waste cities.

Social issues and Environment **(No. of Lectures – 10)**

Sustainable Development Goals (SDGs) of the UN; Climate change, global warming, ozone layer depletion, acid rain and urban heat island (UHI). Introduction to ISO 14000; Green Building Concepts; Conservation of energy and Renewable energy technologies; Environmental Impact Assessment (EIA); Role of an individual in preventing pollution.

Case studies on various topics related to environmental degradation / restoration

TEXT BOOKS/ REFERENCE BOOKS (Authors, Title, Publisher)

1. Bala Krishnamoorthy," Environmental Management" PHI Pvt. Ltd., 2005
2. R. Rowe and H. S. Peavy, “Environmental Engineering”, McGraw Hill Education, 2017.
3. R. Rajagopalan, “Environmental Studies”, Oxford university press, 2015.
4. Standards and Manuals of Central Pollution Control Board. WHO, USEPA reading materials.
5. Municipal Solid Waste Management Manual, Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, 2016

LECTURE PLAN

S.No.	Topics to be covered	Number of lectures
1	**Basic Concepts:** Importance of environment and ecosystem, introduction to different forms of environmental pollution like air, water, land, marine etc. Introduction to carbon footprint.	1
2	Concept of an ecosystem, ecological succession, introduction to	2

	biodiversity Food chains, food webs, loss of species, ecological pyramids and recovery of damaged ecosystem (case studies).	
3	**Air Pollution:** Definition, air pollution parameters, sources, types of air pollutants, global effects of air pollution, introduction to air quality emission standards.	**1**
4	Health effect of air pollution, introduction to criteria pollutants and their health effects, characteristics of particulate matter, Environmental significance of air pollutants.	**2**
5	Introduction to Air Quality Index (AQI), impact of AQI, Air pollutants considered for calculating AQI, calculation and ranges of AQI.	**1**
6	Air pollution from Automobiles and its impact on human health, introduction to Bharat Stage (BS) engine and fuel, characteristics of the air pollutants emitted from automobiles, introduction to the air pollution control policies, case studies discussion.	**2**
7	**Social issues and environment:** Introduction to Green House Gases (GHGs), sources and its impact on the ecosystem. Introduction to global warming potential. Introduction to Montreal and Kyoto protocol, introduction to ozone depleting potential and its consequences, environmental and social impacts.	**3**
8	**Noise Pollution:** Introduction to noise pollution and controlled measures, effects and control measures (transportation and industrial noise), measurement of noise pollution (numerical). role of an individual, standards, preventive aspects.	**2**
9	**Solid Waste Management (SWM):** Waste generation aspects, types and characteristics of waste, waste collection, storage and transport, waste disposal, introduction to waste processing techniques, E-waste, plastic waste, source reduction, product recovery and recycling, incineration and energy recovery, environmental impact of SWM and its control measures of residential, commercial and industrial wastes. role of an individual in preventing pollution, pollution case studies. introduction to SWM rules and regulation, 2016.	**3**
10	**Water Pollution:** Introduction to water pollution, sources, classification, effects, introduction to water treatment processes, introduction to standard and guidelines for water and waste water treatment, rainwater harvesting, water conservation, fluorosis, nitrate and arsenic toxicity (case studies).	**4**
11	**Soil, Marine, Thermal Pollution:** Definition, causes, sources, effects and remedial measures.	**1**
12	**Sustainable development:** Green buildings, environmental management system (introduction to ISO 14000), case studies.	**2**
13	Introduction to urban problems related to energy, renewable energy technologies; solar and wind energy (advantages and disadvantages), environmental protection act, air act etc.	**2**

Malaviya National Institute of Technology Jaipur
Department of Architecture & Planning
Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22CET109		**Course Name:** Architectural Structures (Statics)-I	
Credit: 3		**Contact Hours: L**-2 **T**-1 **P**-0 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**: Nil**			
Marking Break-up	CWS:20-30	MTE:20-40	ETE:30-50
Exam Duration	**Mid Term**	**End Term**	
	Theory:1.5hrs	Theory: 2.5hrs	

Syllabus-

Course Objectives:

- To introduce the basic concepts of structural mechanics and Strength of Materials.
- Conceptual understanding of Compressive and tensile forces, and bending moments.
- Equilibrium of forces.

Contents:

- Centroid of an area, moment of inertia, radius of gyration, polar moment of inertia, parallel and perpendicular axes theorems.
- Concept of stress and strain, stress-strain curve, modulus of elasticity, Poisson's ratio.
- Theory of simple bending, distribution of bending stresses.
- Shear stress distribution in beams.
- Shear force and bending moment diagrams for simply supported and continuous beams, and cantilevers.
- Analysis of pin, roller, and fixed joints.
- Long and short columns, slenderness ratio, buckling load for various end conditions of columns.

Exercises:

- Mathematical, Analytical and illustrative exercises based on the above.

References:

1. B.C.Punmia, Strength of Materials & mechanic of Structure
2. V.S.Prasad, Structural Mechanics & Analysis
3. C.S.Reddy, Basic Structural Analysis

Malaviya National Institute of Technology Jaipur

Department of Architecture & Planning

Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ARP101		**Course Name:** Architectural Drawing	
Credit: 4		**Contact Hours: L**-2 **T**-0 **P**-4 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	PRS:50	PRM: 20	PRE:30
Exam Duration	**Mid Term**	**End Term**	
	Practical: 2 hrs	Practical: 4 hrs	

Syllabus-

Objectives:

- To develop drawing skills as tools for thinking, visualization, and representation of the design.

Contents:

Module I (Drafting Procedures):

- Familiarisation with drawing materials, equipment, sheet sizes and layout.
- Introduction to drafting procedures, graphic codes, symbols, and architectural lettering
- Practice of line-types, line weights, dimension lines, extension lines, centrelines, section lines, etc. and Introduction to architectural and construction symbols.
- Understanding architectural scales and their application to real objects and drawings (plain scale, graphic scale, diagonal scale, and isometric scale),
- Construction of basic and complex geometrical shapes, platonic shapes and their surface developments, Study of the interpenetration of solids

Module II (Projections in Drawings):

- Orthographic projections
    - Simple regular two-dimensional shapes. Projection of lines – True length, projection of planes and solids
    - Complex solids and hollow objects i.e cube, prism, pyramid, cylinder, cone and sphere
- Sections of solids.
- Isometric, axonometric and oblique projections

Module III (Graphic representation of views):

- Perspective- One-point and two-point Perspectives. Exercises in Perspective drawing of simple geometrical forms leading to the perspective of Buildings.

- Sciography of simple geometric forms leading to sciography of Architectural forms.
- Plotting of sciography on perspective drawings.

Exercises:

- Studio assignments based on the above topics.

References:

1. Engineering Drawing: N.D. Bhatt.
2. Engineering Drawing :Venugopal
3. Engineering Drawing: P.S. Gill.
4. Perspective and Sciography : Mulik
5. Rendering with Pen &Ink : Robert W. Gill.

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Department of Architecture & Planning

Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ARP102		**Course Name:** Architectural Presentation Techniques & Model Making- I	
Credit: 3		**Contact Hours: L**-1 **T**-0 **P**-4 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	PRS: 50	PRM: 20	PRE: 30
Exam Duration	**Mid Term**	**End Term**	
	Practical: 2 hrs	Practical: 4 hrs	

Syllabus-

Course Outcomes:

- Learning and practising tools for free-hand sketching, drawing and graphics for expressing ideas and concepts.
- Exploring various modelling materials as a medium of expression in three dimensions.

Contents:

Module I (Free Hand Sketching):

- Free hand sketching of objects of daily use, vegetation, human figures, automobiles, etc.
- Silhouettes drawings, Line drawings, Pencil or charcoal shading, Inking, hatching, cross hatching, stippling, doodling etc.
- Understanding depiction of forms in a minimal way through abstraction
- Indoor and outdoor sketching in pencil, crayon, colours, charcoal and ink.

Module II (Colour, Colouring Techniques and its application):

- Understanding the colour wheel and study of primary, secondary, tertiary, complementary, monochromatic, analogus, and triadic colours.
- Study of shades, tints and tones.
- Rendering techniques via using various colouring mediums such as water/acrylic/crayons/pastel/pencil colours and sketch pens.

Module III (Modelling and Sculpting)

- Understanding proportions and scale via Thermocole/PU Foam/ Styro-foam modelling.
- Exploring forms through subtraction, addition and intersection of various forms using Plaster of Paris (POP) and clay modelling.
- Learning various surface finishing techniques in Thermocole/PU Foam/ Styro-foam/ Plaster of Paris (POP) and clay models.

Exercises:

Module I (Free Hand Sketching):

- Free hand live sketching
- Free hand sketching of daily use objects.
- Pencil and pen rendering techniques-based exercises
- Abstract sketches of natural or complex forms
- Free hand live sketching around the campus/walled city/ historical sites

Module II (Colour, Colouring Techniques and its application):

- Preparation of colour wheel
- Making drawings using different colour schemes (primary, secondary, tertiary, complementary, monochromatic, analogus, triadic colours)
- Preparation of colour wheel
- Making drawings using different colouring mediums or mixed mediums.

Module III (Modelling and Sculpting)

- Making scaled models of daily use objects, human figures etc.
- Making scaled models of daily use objects, human figures etc.
- Learning sanding, buffing, painting techniques.
- Applying textures on surfaces.

References:

- Rendering with Pen & Ink: Robert W. Gill
- The Color Source Book for Graphic Designers: SadaoNakamiva

Malaviya National Institute of Technology Jaipur

Department of Architecture & Planning

Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ART103		**Course Name:** Building Construction and Materials - I	
Credit: 4		**Contact Hours: L**-2 **T**-0 **P**-3 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	PRS: 50	MTE&/or PRM:20	ETE &PRE: 30
Exam Duration	**Mid Term**	**End Term**	
	Theory&/ or Practical:2hrs	Theory &Practical:4hrs	

Syllabus-

Course Outcomes:

- The understanding and application of basic building materials and techniques in conventional construction practices. Emphasis to be laid on Load bearing construction.

Contents:

Module 1: Introduction to basic components of a building

Introduction to building construction, understanding componentsof building (Foundation, plinth, wall, sill, openings (doors, windows, ventilators), lintel, sunshades, staircases, roof, parapetetc.)

Module 2: Masonry building materials

Study of manufacturing process, structural, visual and textural properties, varieties and application of Masonry building Materials.

Module 3: Masonry building construction

- Construction principles of Masonry work and bond details in brick and stone in walls, wall junctions and piers.
- Foundations - simple wall and pier footings.
- Openings – Construction details of lintels, arches, sill and jambs, jalis, and cornices in brick and stone.
- Roof- Construction details of Flat roof, Jack arch roof, domes, vaults etc.in brick and stone.
- Exterior and interior wall sections.

Exercises:

- Identification of materials and assignments on relevant I.S. codes, visits to manufacturing units, field trips to construction sites.
- Preparation of detailed drawings on above topics. Preparation of reports and term papers.

References:

1. Building Construction: Francis D.K. Ching.
2. Principles, Materials and Systems: W.B.McKay, Mehta, M. Scarborough, W.andArmpriest, Diane.
3. Building Construction: Materials and types of Construction: S.C. Rangwala,
4. Building Construction Handbook: R Chudley.
5. Building Construction: Sushil-Kumar.

Malaviya National Institute of Technology Jaipur
Department of Architecture & Planning
Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ARP104		**Course Name:** Introduction to Architecture and Basic Design	
Credit: 6		**Contact Hours: L**-2 **T**-0 **P**-0 **S**-4	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	PRS:50	MTE &PRM:20	PRE (External viva voce): 30
Exam Duration	**Mid Term**	**End Term**	
	Theory &Practical:7Hrs	Viva- voce on portfolio	

Syllabus-

Course Objectives:

- Introduction to architecture and various design principles
- Spatial design for humans and inter-relation of various spaces both indoor/outdoor.

Contents:

Module I (Perception of Architecture)

- Learning elements of design: point, line, plane, solid, curve etc.
- Understanding principles of design like harmony, rhythm, contrast, balance and proportions etc., and their application, Process of Arrangements such as symmetry, array, Translation, mirroring concentric & grid arrangements etc.
- Exploring kinaesthetic and sensory qualities of architectural space: size, proportion, scale, degree of enclosure, light and relationship with other spaces.

Module II (Architectural Elements)

- Introduction to architectural vocabulary and architectural appreciation through studying the works of Indian and Foreign architects and understanding their design concepts and realization of the same.

Module III (Human factors in Architecture)

- Understanding anthropological activities, anthropometrics, ergonomics etc., involved in the design of spaces and human responses to them.
- Study of small spaces with furniture layouts and its relationship with openings, staircase circulation areas etc.,
- Design of a shelter for a certain activity such as: Kiosk design, food vendor's stall, hostel room, community toilet, Entrance gate, Gazebo etc.,

Exercises:

Module I (Perception of Architecture)

- Developing two dimensional compositions.
- Making three dimensional compositions and their scaled models using paper/cardboard/sunboard/mountboard etc.
- Developing 1:1 scale sized human silhouettes/cut-outs and analyzing the spaces around us.
- Activity mapping in various spaces

Module II (Architectural Elements)

- Introduction to architectural vocabulary and architectural appreciation through studying the works of Indian and Foreign architects and understanding their design concepts and realization of the same.

Module III (Human factors in Architecture)

- Understanding anthropological activities, anthropometrics, ergonomics etc., involved in the design of spaces and human responses to them.
- Study of small spaces with furniture layouts and its relationship with openings, staircase circulation areas etc.,
- Design of a shelter for a certain activity such as: Kiosk design, food vendor's stall, hostel room, community toilet etc. and understanding these spaces through relevant case studies.

References:

1. Francis D.K. Ching, Form, Space & Order
2. Jatin Das, Elements of space making
3. James Scott, Elements of Design
4. Victor Papanek, Design for the real World
5. DebkumarChakrabarti, Indian Anthropometric Dimensions, National Institute of Design 1997

Malaviya National Institute of Technology Jaipur

Department of Architecture & Planning

Syllabus Semester 1 & 2 (w.e.f. 2022-23)

Semester II

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ART105		**Course Name:** History of Architecture-I (Indian)	
Credit: 3		**Contact Hours: L**-2 **T**-2 **P**-0 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	CWS: 20-30	MTE:20-40	ETE :30-50
Exam Duration	**Mid Term**	**End Term**	
	Theory:1.5hrs	Theory:2.5hrs	

Syllabus-

Objectives:

- To understand the genesis and characteristic features of Indian "Architectural styles" with reference to causative forces such as climate, society, technology, available materials, geo-natural factors and the underlying socio-cultural & religious aspects translating to design theories in the context of Indian architecture.

Contents:

Module I:

- **Buddhist Architecture**: Origin and sources of the Style.Rock-cut architecture of the Early Buddhist period, Stupas: concept, types and construction, the great stupa at Sanchi, Sarnath, and Amrawati. Stupas in other south Asian countries, Architecture of Chaityas and Viharas.

Module II:

- **Early Hindu Architecture**: Concept and origin of Hindu Temple Architecture, typology, and regional styles
- Introduction to Nagara, Dravida and Vesaratemples, Kutina, Latina, Bhumija and Shekhari modes
- Introduction to the concept and basic principles of Vastushastra
- **Early Temples:** Rock-cut temples of Pallavas and Rashtrkutas. Early North Indian temples of Guptas.Abrief introduction to Proto Nagara Shrines of South Kosala, maitrakas and Gopadri style. Early Chalukyan Temples at Badami and Aihole. Genesis of Temple architecture
- **Nagara Temples**: Pratihar and Solanki Temples of western India, Kalinga style of temples, Temples of Central India, Major temple groups in Malwa,Bundelkhand, and Orissa, (Khajuraho, Bhuvaneshwar, Jagannathpuri, Konark, Osian, Baroli etc.)
- **Dravida Temples:** Built-up temples of Pallavas, Cholas, Nayakas, and Pandyas, representative examples of each style and period. Temples of Kerala

- **Vesara Temples**: MishrakaVimanas of Chalukyan style.Introduction to Hoysala Temples, Kalyani Chalukyan architecture, Vijay Nagar style, MaruGurjara temples of Solankis
- **Jain Architecture**: Jain Temples, concept and select examples, comparison with Hindu temples

Module III:

- **Indo-Islamic Architecture in India**: Spatial, Structural and aesthetic concepts of Islamic culture. Islamic building typologies
- **Imperial Architecture at Delhi**: Slave, Khalaji, Tugalaq, and Sayyed/Lodhi tombs and Mosques
- **Provincial/Regional Architecture**: Styles of Bengal, Gujarat, Jaunpur, Deccan, Malwa, and Bijapur
- **Mughal Architecture of Delhi and Agra**: Mosques, Forts, tombs, and Gardens of Mughals
- **Post Mughal Buildings in India**: Genesis of a hybrid architectural style of Hindu and Islamic traditions in 18^{th} and 19^{th}-century. Introduction to, Rajput, Bengal, and Maratha architecture

Exercises:

- Students' seminars and presentations. Assignments on the above topics

References:

1. Indian Architecture(Buddhist & Hindu), Vol I and II, Percy Brown, Printed by - Kiran Book Agency, Delhi
2. Temples in India - origin & development stages, S.P Gupta & S. Vijayakumar, Centre for research & training in history, Archaeology &Paleo-Environment & D.K Printworld Ltd.
3. History of Indian and Eastern Architecture, J. H Ferguson, DODD Mead and Co. 1891, John Murray, Albemarle Street, W 1910
4. The Temple Architecture of India, Adam Hardy, John Wiley & Sons Ltd., Britain 2007
5. Sir Banister Fletcher: A History of Architecture

Malaviya National Institute of Technology Jaipur
Department of Architecture & Planning
Syllabus Semester 1 & 2 (w.e.f. 2022-23)

<table>
<tr><td colspan="2">UG/PG: UG</td><td colspan="3">Department: Architecture & Planning</td></tr>
<tr><td colspan="2">Course Code: 22CET110</td><td colspan="3">Course Name: Architecture Structures-II</td></tr>
<tr><td colspan="2">Credit: 3</td><td colspan="3">Contact Hours: L-2 T-1 P-0 S-0</td></tr>
<tr><td colspan="2">Version:</td><td colspan="3">Approved on:</td></tr>
<tr><td colspan="5">Prerequisite Courses (If Any):Nil</td></tr>
<tr><td rowspan="2">Mark Break-up</td><td colspan="2" rowspan="2">CWS:20-30</td><td rowspan="2">MTE:20-40</td><td rowspan="2">ETE :30-50</td></tr>
<tr></tr>
<tr><td rowspan="2">Exam Duration</td><td colspan="2">Mid Term</td><td colspan="2">End Term</td></tr>
<tr><td colspan="2">Theory:1.5 hrs</td><td colspan="2">Theory:2.5 hrs</td></tr>
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Syllabus-

Course Objectives:

- To introduce the understanding of statically determinate and indeterminate structures.

Contents:

- Slopes and deflections in statically determinate beams using double integrations method, moment area method and conjugate beam method.
- Equilibrium and stability of structures, static and kinematic indeterminacies of beams and plane frames.
- Analysis of continuous beams and simple portal frame using slope deflection method and M.D. method.
- Approximate method of analysis for lateral loads- portal and cantilever method.
- Arches: Geometrical properties, basic mechanics, arch action; three hinged arch, and two hinged arches.

Exercises:

- Analytical and illustrative exercises based on above

References:

1. B.C.Punmia, Strength of Materials & mechanic of Structure
2. V.S.Prasad, Structural Mechanics & Analysis
3. C.S.Reddy, Basic Structural Analysis
4. IS Codes

Malaviya National Institute of Technology Jaipur

Department of Architecture & Planning

Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22CET111		**Course Name** Surveying & Introduction to GIS	
Credit: 3		**Contact Hours: L**-2 **T**-0 **P**-2 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	PRS:30	MTE:30	ETE& PRE:40
Exam Duration	**Mid Term**	**End Term**	
	Theory:1.5 Hrs	Theory& Practical: 2.5 Hrs	

Syllabus-

Course Objectives:

To equip students with survey procedures and measurement tools for systematic study of topographic features in reference to planning and design of architecture projects.

Contents:

Module I - Introduction

Understanding of Principles, definitions, symbols and instruments used in Surveying, Reading of Survey maps, Understanding of topographic features: contours, slope analysis, grading process, graphic representations of landforms, Identification of common errors in surveying and their corrections.

Module II- Elementary survey methods

Horizontal plane measurements, Type of linear survey- chain survey, tape survey, compass survey, system of entries and record of measurement, setting field boundaries and area estimations.

Module III - Survey of Sloping Landforms

Characteristics of landform, Contouring methods & level instruments, contour intervals, methods of contouring, contour surveys, development of cross sections, and L-section, gradients, plotting contours & profiles, estimating areas & volumes. Measurements along sloping landforms, methods of simple & differential leveling.

Module IV - Advanced Survey methods and GIS

Limitations of traditional survey techniques, Theodolite surveying, Introduction to Remote sensing & GIS- concept and definition, Applications of GIS in surveying, automated & digital surveying, Total station, G.P.S, Aerial Photography, digital levels, auto-levels, drone survey.

- **Exercises:** Analytical and illustrative exercises based on above

References:

- Surveying &Levelling: S.K. Duggal
- Surveying: Dr. B.C. Punmia
- Introduction to Remote Sensing and GIS: P K Garg
- Plane Surveying:Dr. A.M. Chandra
- Text of Surveying: P.B. Shahani
- Surveying and levelling: R. Subramanian

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Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ARP106		**Course Name:** Architectural Presentation Technique & Model Making- II	
Credit: 3		**Contact Hours: L**-1 **T**-0 **P**-4 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**:Nil**			
Marking Break-up	PRS: 50	PRM: 20	PRE: 30
Exam Duration	**Mid Term**	**End Term**	
	Practical: 2 hrs	Practical: 4 hrs	

Syllabus-

Course Objective:

- Advance learning and practicing of tools for free-hand architectural concepts sketching, drawing and rendering for presenting architectural plans, sections, elevations and 3D views.
- Exploring model making as a tool of architectural form development, analysis and three-dimensional visualization.
- Learning architectural photography, view angles, framing and editing.

Contents:

Module I (Architectural Rendering)

- Using lines, planes and volumes to express objective and spatial concepts in black & white or colour.
- Pen rendering of architectural drawings and applying methods such as hatching, cross hatching, stippling, doodling etc.
- Colour rendering of architectural drawings in various mediums such as water, acrylic, crayons, pastel, pencil colours and sketch pens.

Module II (Architectural Modelling)

- Understanding the appropriate scale in model making from block to detail models.
- Volumnar and architectural concepts through models such as study, block, and massing models.
- Learning detailed models, and sectional models for visualization of spatial aesthetics.
- Application of laser cutting and 3D printing for rapid prototyping.

Module III (Architectural Photography)

- Learning photographic composition, frames and viewing angles.
- Post-processing of photographs via photoshop/lightroom

Exercises:

Module I (Architectural Rendering)

- Drawing aesthetically pleasing 3D compositions
- Pen renderings of existing buildings plans, sections, elevations and 3D views
- Colour renderings of existing buildings plans, sections, elevations and 3D views

Module II (Architectural Modelling)

- Concept modelling of existing buildings
- Detailed modelling of facades and elevations, sectional models and details
- Preparing drawings for laser cutting /3D printing
- Model making of design studio exercises.

Module III (Architectural Photography)

- Photography of architectural models from same/various angles using natural or artificial lighting.
- Photography of various landmark buildings around the city.
- Perspective correction, brightness and contrast correction through software such as Adobe Photoshop, Adobe Lightroom etc.,

References:

- Rendering with Pen & Ink: Robert W. Gill
- The Color Source Book for Graphic Designers: SadaoNakamiva
- Landscape graphics: plan, section and perspective drawing of landscape spaces: Grant Reid
- Model Making: Megan Werner, Princeton Architectural Press, New York
- Architectural Modelmaking: Architectural Modelmaking, Laurence King Publishing LTD, London, 2014

Malaviya National Institute of Technology Jaipur
Department of Architecture & Planning
Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ART107		**Course Name:** Building Construction and Materials – II	
Credit: 4		**Contact Hours: L**-2 **T**-0 **P**-3 **S**-0	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**: Nil**			
Marking Break-up	PRS: 50	MTEand/or PRM: 20	ETE &PRE: 30
Exam Duration	**Mid Term**	**End Term**	
	Theory &/or Practical: 2	Theory &Practical: 4	

Syllabus-

Course Outcomes:

- The understanding and application of Timber and its products in building. Emphasis to be laid on timber joinery details in various applications.

Contents:

Module I: Timber as a building material

- Types of timber, defects, seasoning and preservation of timber. Ecological impact due to use of wood etc. Study of engineered wood used in buildings, i.e., plywood, block board ,particleboards, and other types.
- Study of conversion and preservation process, structural, visual and textural properties, varieties and application of timber, and its different derivatives.

Module II :Timber Construction

- Structure: Timber frames, floors, walls/Partitions and roof trusses
- Flooring and finishes: Timber flooring and Timber panelling.
- Openings: Different types of Doors and windows in Timber
- Staircases: Timber staircase and railings
- Roofing: Roof covering in clay tiles, slates, wooden shingles etc.,

Module III:Paints & Varnishes

- Varieties and application of paints and varnishes.

Exercises:

- Identification of material and study of relevant I.S. codes, market surveys, field trips.
- Preparation of study reports and presentation of seminars, preparation of detailed drawings on above topics.

References:

- Building Construction: Francis D.K. Ching.
- Principles, Materials and Systems: W.B.McKay, Mehta, M. Scarborough, W.andArmpriest, Diane.
- Building Construction: Materials and types of Construction: S.C. Rangwala,
- Building Construction Handbook: R Chudley.
- Building Construction: Sushil-Kumar.

Malaviya National Institute of Technology Jaipur
Department of Architecture & Planning
Syllabus Semester 1 & 2 (w.e.f. 2022-23)

UG/PG: UG		**Department: Architecture & Planning**	
Course Code: 22ARP108		**Course Name:** Architectural Design-I (Evolution of Form and Space)	
Credit: 9		**Contact Hours: L**-2 **T**-0 **P**-0 **S**-7	
Version:		**Approved on:**	
Prerequisite Courses (If Any)**: As per 45/46th senate meeting**			
Marking Break-up	PRS:50	PRM:20	PRE:30 (External Viva voce)
Exam Duration	**Mid Term**	**End Term**	
	Practical:7Hrs	External Viva Voce on Portfolio.	

Syllabus-

Course Outcomes:

- To understand the process of evolution of architectural form through analysis of simple activities, structural systems and geometry.

Contents:

- Introduction to determinants of Architectural form with respect to Site, Context and Climate, Aesthetics.
- Study of various Architectural forms with reference to Construction techniques and Materials and structural concepts.
- Interdependence of space, structure, circulation and function.
- Introduction to basic design methodologies involving study of single functions with due emphasise on development of form, study of mass, void skyline and materials used.

Exercises:

- Mono functional structures, accommodating specific activities like Artist residency, Memorial, Nursery/Play School, Exhibition Pavilion, Dispensaryetc. including layout of interiors; to examine due relationship between anthropometrics, furniture, movement, and space& form through relevant case studies.

References:

- Joseph De Chiara & John Hancock, Neufert Architects' Data
- Callender, Time Saver Standards for Building Types