DEPARTMENT OF CIVIL ENGINEERING
(DCE)

Courses of Study

B. Tech.

Civil Engineering (CE)

(2019-23 BATCH)

Lingaya's Vidyapeeth, Faridabad

Vision

To contribute to India and the World through excellence in scientific and technical education and research; to serve as a valuable resource for industry and society; and remain a source of pride for all Indians.

Mission

- ➢ **To generate new knowledge by engaging in cutting-edge research and to promote academic growth by offering state of- the-art undergraduate, postgraduate and doctoral programmes.**
- ➢ **To identify, based on an informed perception of Indian, regional and global needs, areas of specialization upon which the Institute can concentrate.**
- ➢ **To undertake collaborative projects which offer opportunities for long-term interaction with academia and industry.**
- ➢ **To develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge in a range of professions.**

Values

- ➢ **Academic integrity and accountability.**
- ➢ **Respect and tolerance for the views of every individual.**
- ➢ **Attention to issues of national relevance as well as of global concern.**
- ➢ **Breadth of understanding, including knowledge of the human sciences.**
- ➢ **Appreciation of intellectual excellence and creativity.**
- ➢ **An unfettered spirit of exploration, rationality and enterprise.**

Courses of Study

2019 – 2023

(Applicable to Undergraduate Students of Entry Year 2019)

**Bachelor of Technology
In
Civil Engineering**

**Department of Civil Engineering
Lingaya's Vidyapeeth, Faridabad**

Preface

There has been a concern about quality of technical education in India although in terms of access and equity, India has done very well. Lingaya's Vidyapeeth is mandated for planned and coordinated development of Technical Education with the guidelines of AICTE; regulate proper maintenance of norms & standards and expansion of technical Education with Quality.

During the meetings held for developing model curriculum for undergraduate engineering courses, a concern was shared that n the present system, the first-year syllabus is heavily loaded and it is of utmost importance that the students entering into the first year of an engineering course should feel at ease by lowering the burden of syllabus and credits. This is necessary for a student to acclimatize to the new environment of a college and to create a bonding between the teacher and a student. An idea to introduce induction program in the curriculum to equip the students with communication skills, and get them acquainted with the culture of institution and human values was formalized. A student has to undergo this induction program after joining the institute and before the commencement of classes. Normal classes of the engineering program shall begin after the students have undergone a three-weeks induction program. The Induction program for students comprises of Physical activities; Learning an art form; Literature & Cinema; Social Awareness; Lectures &Visits; Universal Human Values; Familiarization to Department/ Branch, College& Innovations.

Also, Lingaya's Vidyapeeth has made one semester internships mandatory before completion of under graduation. This will equip the students with practical understanding and training about industry practices in a suitable industry or organization.

Lingaya's Vidyapeeth will ensure the revision of the model curriculum on regular basis and this updation will certainly help students to achieve better employability; start-ups and other avenues for higher studies.

TABLE OF CONTENTS

Contents	Page No.

LIST OF ABBREVIATIONS/SYMBOLS

Abb./Symbols	Description
AICTE	All India Council of Technical Education
DCE	Department of Civil Engineering
UG	Under Graduate
PG	Post Graduate
PE	Programme Elective
OE	Open Elective
UID	Unique Identification Number
NC	Non-credited
CE	Civil Engineering
L-T-P	Lecture-Tutorial-Practical
SGPA	Semester Grade Point Average
CGPA	Cumulative Grade Point Average
NP	Not Pass
DGPA	Degree Grade Point Average
R & D	Research & Development

1. ACADEMIC SYSTEM

Introduction

The medium of instruction in the University is English. The University follows the Credit Based Semester System for all courses running in the Civil Engineering Department. The academic year runs from July through June each year and comprises of two regular semesters. Typically, the first semester (odd semester) starts in July and ends in December. The second semester (even semester) starts in January and ends in May. Detailed scheduled for the Semester is given before the commencement of every new semester.

Academic Structure:

The major academic units of the University are its various Schools and Departments. The activities of departments include teaching and research at all levels.

(a) Academic Programmes:

Department of Civil Engineering at Lingaya's Vidyapeeth, Faridabad, Haryana offers a variety of academic programmes such as B.Tech, M.Tech & Ph.D for students with a wide range of backgrounds. Admission to these programmes are based on performance in national / University level entrance tests/ other entrance examinations followed by interviews in some cases. The courses offered by Department of Civil Engineering at Lingaya's Vidyapeeth are presently classified into Diploma, Undergraduate, Postgraduate and Research programmes.

This classification is based primarily on entry/admission qualification of students rather than the level of degree offered. For all undergraduate programmes, students are admitted after 10+2 schooling while for all postgraduate programmes, students are admitted after they have obtained at least a college level Bachelor's degree. In certificate and diploma programs the entry level qualification may vary from program to program.

(b) Student's Unique ID/Roll Number (UID):

Each admitted student is given unique identification number (UID). This UID will remain the same during the entire tenure of the student with university. eg. 18CE001 which means the student admitted in 2018 in Civil Engineering Department. For any communication, students must mention their UID/Roll Number.

2. COURSE STRUCTURE AND CREDIT SYSTEM

Course Numbering Scheme

Normally every course at Department of Civil Engineering at Lingaya's Vidyapeeth runs for the full length of the semester. At the beginning of the semester, the students register for courses that they want to study and at the end of the semester a grade is awarded. On obtaining a pass grade, the student earns all the credits associated with the course. A fail grade does not get any credit. Partial credits are also not awarded.

Credit System:

Education at the University is organized around the semester-based credit system of study. A student is allowed to attend classes in a course and earn credit for it, only if he/she has registered for that course. The prominent features of the credit system are a process of continuous evaluation of a student's performance/progress and flexibility to allow a student to progress at an optimum pace suited to his/her ability or convenience, subject to fulfilling minimum requirements for continuation.

A student's performance/progress is measured by the number of credits that he/she has earned, i.e. completed satisfactorily. Based on the course credits and grade obtained by the student, grade point average is calculated. A minimum grade point average is required to be maintained for satisfactory progress and continuation in the programme. Also, a minimum number of earned credits and a minimum grade point average should be acquired in order to qualify for the degree. All programmes are defined by the total credit requirement and a pattern of credit distribution over courses of different categories.

Course Credits Assignment:

Each course, except a few special courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and laboratory contact hours in a week. This weightage is also indicative of the academic expectation that includes in-class contact and self-study outside of class hours.

Lectures and Tutorials: One lecture or tutorial hour per week per semester is assigned one credit.

Practical/Laboratory: One laboratory hour per week per semester is assigned half credit.

Some courses are without credit and are referred to as non-credit (NC) courses.

Example: Course CE-202C Soil Mechanics & Engineering Geology, 4 credits (3-1-0)

The credits indicated for this course are computed as follows

3 hours/week lectures   = 3 credits

1 hours/week tutorial   = 1 credit

0 hours/week practical   = 0 x 0.5 = 0 credit

Total = 3 + 0 + 1 = 4 credits

Also, (3-0-2) **4** credit course = (**3** h Lectures + **0** h Tutorial + **2** h Practical) per week = **5** contact hours per week

Earning Credits:

At the end of every course for which a student has registered, a letter grade is awarded in each course for which a student had registered. On obtaining a pass grade, the student accumulates the course credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average. A student has the option of auditing some courses. Grades obtained in these audit courses are not counted for computation of grade point average. However, a pass grade is essential for earning credits from an audit course; this does not apply to postgraduate programmes.

A minimum number of earned credits are required in order to qualify for a degree and continuation of registration at any stage. Currently students in the postgraduate programmes can opt audit courses but they do not count towards earned credits.

The credit system enables continuous evaluation of a student's performance and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

Course Content Description

Course content description consists of following components: (i) Course Number, (ii) Title of the Course; (iii) Credit and L-T-P; (iv) Pre-requisites; (v) Overlapping/Equivalent courses; and (vi) Description of the content. An example is given below:

3. GRADING SYSTEM

The grading reflects a student's own proficiency in the course. While relative standing of the student is clearly indicated by his/her grades, the process of awarding grades is not necessarily based upon fitting performance of the class to some statistical distribution. The course coordinator and associated faculty for a course formulate appropriate procedure to award grades that are reflective of the student's performance vis-à-vis instructor's expectation. The credit system enables continuous evaluation of a student's performance, and allows the students to progress at an optimum pace suited to individual ability and convenience, subject to fulfilling minimum requirement for continuation.

Evaluation of Performance

The performance of a student will be evaluated in terms of three indices, viz. the **Semester Grade Point Average** (SGPA) which is the Grade Point Average for a semester, **Cumulative Grade Point Average** (CGPA) which is the Grade Point Average for all the completed semesters at any point in time, and **Degree Grade Point Average** (DGPA).

The *Earned Credits* (EC) is defined as the sum of course credits for courses in which A - D or NP or S grades have been obtained.

Points earned in a semester = Σ (Course credits *x* Grade point) for courses in which A - D grade has been obtained)

The *SGPA* is calculated on the basis of grades obtained in all courses, except audit courses and courses in which S/Z grade is awarded, registered for in the particular semester.

$$SGPA = \frac{\text{Points secured in the semester}}{\text{Credits registered in the semester, excluding non credited grade courses}}$$

The *CGPA* is calculated on the basis of all pass grades, except audit courses and courses in which S/Z grade is awarded, obtained in all completed semesters.

$$CGPA = \frac{\text{Cumulative points secured in all courses}}{\text{Cumulative earned credits, excluding non credited grade courses}}$$

4. REGISTRATION AND ATTENDANCE

4.1. Registration

Registration is a very important procedural part of the academic system. The registration procedure ensures that the student's name is on the roll list of each course that he/she wants to study. No credit is given if the student attends a course for which he/she has not registered. Registration for courses to be taken in a particular semester will be done according to a specified schedule before the end of the previous semester. Each student is required to complete the registration form and deposit the semester fee well in advance.

Various activities related to registration, the relevant dates are included in the Semester Schedule that is available before the start of the semester.

4.2. Registration and Student Status

Registration by a student confirms his/her status as student at the University. Failure to register before the last date for registration will imply that the student has discontinued studies and his/her name will be struck-off the rolls.

Every registered student is considered as a full-time student at the University. They are expected to be present at the University and devote full time to academics. Students registered only for a self-study course or only for project or thesis are also considered as full-time students.

4.3. Advice on Courses

At the time of registration, each student must consult his/her Mentor/programme coordinator to finalize the academic programme, keeping in view factors, such as, minimum/maximum numbers of total lecture credits, past performance, backlog of courses, SGPA/CGPA, pre-requisite, work load and student's interests, amongst others.

4.4. Registration Validation

Before the first day of classes, every student is required to be present on campus and validate his/her registration by their class in charges. The updated registration record will be available on the Byndr and the hard copy will be available with the student's advisor/programme coordinator / Examination Section/HOD. Students who do not register themselves will not be permitted to add/drop courses. However, for the first semester, all the courses are compulsory and students need not to do this exercise.

4.5. Late Registration

Late registration is permitted with certain file as applicable.

4.6. Registration for The Practical Training

Before proceeding for practical training or training as part of curricular requirement, the student should register for the respective course after obtaining approval from the training coordinator and Head of the department. On returning after training a continuation grade will be awarded and the students must register for the course in the regular semester immediately following the training period. During this semester, evaluation of the training will be carried out and regular grade will be awarded.

4.7. Continuous Absence and Registration Status

If a student is absent from the University for more than four weeks without notifying the Head of Department/Dean, his/her registration will be terminated and name will be removed from the University rolls.

4.8. Attendance Rule

a) It is mandatory for the students to attend all classes. Attendance Records of all students for each course will be maintained.

b) For all 1st year courses the attendance will be taken and maintained by U.G. Section. If any student's attendance falls below 75% attendance in any of these courses, he/she may be put under academic probation. Henceforth, he/she will be governed by the rules for student under academic probation.

c) For all other courses, the Course Coordinator will announce the class policy on attendance with respect to grading etc., at the beginning of the semester. This shall be done keeping in mind the importance of classroom learning in the teaching-learning process. Once the class attendance policy has been made clear to all the students registered for the course, the Course Coordinator will implement the same in totality.

For the purpose of attendance calculation, every scheduled practical class will count as one unit irrespective of the number of contact hours.

Attendance record will be maintained based upon roll calls (or any equivalent operation) in every scheduled lecture, tutorial and practical class. The course coordinator will maintain and consolidate attendance record for the course (lectures, tutorials and practical's together, as applicable).

5 UNDERGRADUATE DEGREE REQUIREMENTS, REGULATIONS AND PROCEDURES

5.1 Overall Requirements

B.Tech.

The total credit requirement for the B.Tech. (4-year programme) is 190 credits. For B.Tech. programmes, the total credits are distributed over following categories:

The Undergraduate core (UC) has following categories:

Course Category	Description
BSC	Basic Science Courses
PCC	Professional Core Courses
HSMC	Humanities and Social Sciences including Management Courses
ESC	Engineering Science Course
PEC	Professional Elective Course
OEC	Open Elective Course
MC	Mandatory Course
PROJ	Project
INT	Internship
MOOC	Massive Open Online Courses

5.2 Degree Requirements Breakup

The degree requirements for the various programmes listed earlier are detailed
below.

5.2.1   Earned Credits

i. Completion of 180 earned credits out of 190 credits for 4-year B. Tech. Programmes subject to pass in all compulsory courses.

These credits are needed to be earned under different categories for individual programmes.

5.2.2   Degree Grade Point Average (DGPA) Requirement

A student must obtain a minimum DGPA of 5.0 to be eligible for award of the B.Tech., M.Tech. programme.

All exceptions to the above conditions will be dealt with as per following regulations:

If a student completes required credits for B.Tech./M.Tech. with DGPA less than 5, then the student will be permitted to do additional elective courses under appropriate category to improve the DGPA within the maximum time limit for completion of B.Tech./ M.Tech. degree respectively, as the case may be. In case a DGPA of 5 or more is achieved within the stipulated period, a B.Tech./ M.Tech. degree will be awarded and in case the same is not achieved no degree will be awarded.

5.2.3   Practical Training

A student of the B.Tech. must complete the prescribed number of days of practical training to the satisfaction of the concerned department. This training will be arranged in the 8th semester. Practical training duration is a minimum of 50 working days. Practical training should be carried out preferably in industry or R & D institutions in India. Practical training in academic institutions is not permitted. In some special cases the permission may be granted with prior approval of Academic Council.

5.2.4   Break-Up of Credits

The breakup of various categories of course are as follows:

Course Category	Description	Credit
BSC	Basic Science Courses	23
PCC	Professional Core Courses	77
HSMC	Humanities and Social Sciences including Management Courses	16
ESC	Engineering Science Course	23
PEC	Professional Elective Course	20
OEC	Open Elective Course	3
MC	Mandatory Course	3
PROJ	Project	7
INT	Internship	16
MOOC	Massive Open Online Courses	3

The breakup of course semester wise are as follows:

Sr.No.	Semester	Credits
1	First	24
2	Second	20
3	Third	22
4	Fourth	27
5	Fifth	27
6	Sixth	26
7	Seventh	25
8	Eighth	19
Total		190

5.3 Lower and Upper Limits for Credits Registered

A student must register for a minimum of 12 credits and a maximum of 27 credits in a semester. The minimum and maximum lecture credits that a student can register for in a semester are 9 and 18, respectively except the 8th semester of B.Tech programme when minimum credits are 9 and maximum credits are 18.

For Integrated M.Tech. programmes, the above limits apply up to the 8th semester. In the 9th and 10th semesters, these students will normally register for a minimum of 9 credits and a maximum of 22 credits per semester. Under exceptional circumstances a student can register for a maximum of 28 credits including not more than 6 (six) 'L' (Lecture) courses. However, this will be permitted at most twice during the programme in semesters other than 1st and 2nd and those in which the student is registered for Major Project Part 1 or 2. These conditions will not be applicable for those students who are on probation according to the criteria defined.

5.4 Maximum Duration for Completing Degree Requirements

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

(a) Only the 1st and 2nd semesters of an academic year can be registered semesters. The summer semester will not be considered as a registered semester.

(b) A semester when a student has been granted semester withdrawal or granted leave will not be considered as a registered semester.

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

The summer semesters falling in between the permitted registered semesters shall be available for earning credits. After the student has registered for the maximum permissible number of registered semesters, the subsequent summer semesters will not be available for earning credits.

2. The maximum permissible number of registered semesters for completing all degree requirements would be:

Table 9. Maximum permissible duration for completing degree requirements.

Programme Name	Maximum number of registered semesters permitted for completing degree requirements
B.Tech.	12 (*)
M.Tech.	8 (*)

Note: (*) If a student opts for the slow-paced programme (as defined in clause B1), then the maximum permissible number of registered semesters shall be increased by two semesters.

5.5 Courses of Special Nature

a) **Major Project**

A course under this title may be floated by departments from fifth semester onwards. Major project will be a regular course to conduct a design and fabrication type project. The student and teacher would decide upon the topic, prepare a plan of work and get the approval of the Course Coordinator before the end of the semester when the course is registered for. The duration of the course will be the entire semester. A project report would be submitted by the student on completion of the course. The student's performance will be evaluated by a departmental committee via a mid-term and a final evaluation. Major-project can be done jointly by 3 students

b) **Practical Training**

Practical Training is to be done typically in eights semester. The duration for practical training is one semester, preferably in an industry or R&D institution in India. Practical training in academic institutions is not permitted.

It is the joint responsibility of the departments and the Training and Placement (T&P) unit to arrange for training for all their students. In the beginning of each academic session, T&P unit will prepare programme-wise lists of potential training organizations in consultation with the respective departments. These organizations will be approached by the T&P unit with a request to provide training seats. Consolidated lists of training offers will be made available to the students through departments in the beginning of the second semester of the session. If a student is interested in making his/her own arrangement for the training seat, he/she will need to have the training organization approved and route the application through the departmental training in charge and T&P unit. All such applications must be completed before the end of first semester. No self-arranged practical training, not approved through the above process, will be allowed and faculty members will not sign any forms for the purpose.

The department will appoint a training supervisor for each student. The supervisor is expected to keep contact with the assigned students through e-mail and /or telephone. The students will be required to get their training plan reviewed by their supervisor within the first week and report their progress on weekly basis. The supervisor, if desires, may visit the organization. Visits within the country will be supported by the institute.

c) **Open Category**

Open category credits should provide an opportunity to a student to exercise his/her options in an unrestricted fashion.

A student can complete open category credits by choosing courses from different departments. The student will be permitted to register for maximum of 2 courses under open category.

5.6 Major Project Guidelines

All students who are on project are required to submit the report (One per Group) after the work done.

Evaluation

1. Weightage of different evaluation components are shown in below table

Evaluation Component	Weightage (%)
Regular Assessment	
6 Interaction with Guide of 5 Marks Each	30
• 2 Presentation of 10 Marks each (PPT + Progress Report) • Along with Mid Term I & II respectively	20
End Semester Evaluation	
Presentation	15
Viva	15
Final Report	10
Paper Publication/Presentation Paper Presentation in National or International Conference or seminar held in IIT/NIT.	8
Paper Presentation in National or International Conference or seminar held in any college.	5
Paper published in recommended/index journal.	10
Paper published in open access journal.	6
Paper published/presented in any university	7
Note: Maximum 10 marks can be obtained in **paper presentation/published** category**.**	
Total	**100**

2. Suggested points to be judged through each evaluation component

2.1 **Evaluation by supervisor on weekly basis:** Observation is a channel for the evaluation of student performance on the basis of their frequent interaction with the faculty supervisor. The students are required to make the handwritten report of their progress in every week with the faculty supervisor.

2.2 **Project Report**: The draft of the Project Report should be submitted at the submission of project at the campus. The report is a written presentation of the work done by the students on his

overall learning in the project. If a group of students are working on same project they are required to submit individual report.

Guidelines and format for writing a project report are given at the end of document which may be reviewed by faculty supervisor. The assessment of project report will be done by the committee consisting of external examiner and faculty supervisor during presentation.

2.3 **Publication on project:** The students should publish a paper on project work.

2.4 **Presentation/Viva**: The students need to present their project report. Through these presentations the faculty supervisor will be able to evaluate the students on their overall learning in the project. This presentation will be conducted at the campus by the committee consisting of external examiner and faculty supervisor.

2.5 Evaluation by Examiner: The evaluation by external examiner will also be done on viva basis.

2.6 **Major Project Registration Form:** Attached as Annexure I.

2.7 Report Writing Guidelines

- Write in **Times New Roman** font with 12 **font size**.
- Spacing between consecutive lines should be 1.5.
- Separate successive paragraphs by before 10 points and after 4 points.
- Page Margins- Top: 1", Bottom: 1", Left: 1.5", Right: 1".
- Figure name, table name, should be in Times New Roman font with 10 font size.
- Chapter title should be bold and write in Arial font with 16 font size.
- Each heading should be bold and write in Times New Roman with 14 font size.
- Subheading should be bold and write in Times New Roman with 12 font size.
- Heading and subheading matter should be in Times New Roman with 12 font size.
- A total of THREE hard bound copies in black color background with text in golden color must be prepared – one for the guide, second for department and third for the library.
- Project Report should be minimum in **60 pages.**
- A soft copy containing the document and presentation should be submitted with the report.
- It should completely refer to the synopsis submitted.
- The project work should be implemented at the laboratory before the project Presentation.
- Presentation duration for each group is a maximum of 30 minutes and maximum 2 students can enroll in a group.
- Presentation should be presented through Power Point slide show containing at least 20 slides.
- It is also suggested to students keep one hard copy with them duly signed by the supervisor and External examiner.

B.Tech(CE)

			1st Year SEMESTER – I			
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	BSC	BSC-101	Physics	3-1-0	4	ALL
2	BSC	BSC-103	Mathematics-I	3-1-0	4	ALL
3	ESC	ESC-101	Basic Electrical Engineering	3-1-0	4	ALL
4	ESC	ESC-103	Introduction to Computer Systems & Internet Basics	3-0-0	3	ALL
5	ESC	ESC-153	Engineering Graphics & Design	0-0-6	3	ALL
6	HSMC	HSS-101	English	2-0-0	2	ALL
7	BSC	BSC-151	Physics Lab	0-0-2	1	ALL
8	ESC	ESC-151	Basic Electrical Engineering Lab	0-0-2	1	ALL
9	HSMC	HSS-151	English Lab	0-0-2	1	ALL
10	MC	MC-101	Environmental Science	2-0-0	0	ALL
11	HSMC	PDP-101	Induction & Nurturing Hobbies	0-0-2	1	ALL
				16-3-14	24	

			1st Year SEMESTER – II			
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	BSC	BSC 102	Chemistry	3-1-0	4	ALL
2	BSC	BSC-104	Mathematics-II	3-1-0	4	ALL
3	ESC	ESC-102	Programming for problem solving	3-0-0	3	ALL
4	HSMC	HSS-102	Effective Technical Communication	3-0-0	3	ALL
5	ESC	ESC-154	Workshop/Manufacturing Practice	0-0-4	2	ALL
6	BSC	BSC 152	Chemistry Lab	0-0-2	1	ALL
7	ESC	ESC-152	Programming for problem solving Lab	0-0-4	2	ALL
8	HSMC	PDP-102	People Connect	0-0-2	1	ALL
9	MC	MC-102	Constitution of India	2-0-0	0	ALL
				14-2-12	20	

SCHEME FROM-2019 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Scheme of Studies

B.Tech(CE)

SN	Category	Course Code	Course Name	L-T-P	Cr.	
			2ⁿᵈ Year SEMESTER – III			
1	BSC	BSC-201	Mathematics-III (Numerical Methods)	3-1-0	4	CE+ME
2	PCC	ME203C	Fluid Mechanics	3-1-0	4	CE+ME
3	ESC	ME205C	Engineering Mechanics	3-1-0	4	CE+ME
4	HSMC	CE201C	Introduction to Civil Engineering	3-0-0	3	CE
5	PCC	CE203C	Building Materials & Construction	3-0-0	3	CE
6	ESC	CE251C	Computer Aided Civil Engineering Drawing	0-0-2	1	CE
7	BSC	BSC-251	Mathematics-III (Numerical Methods) Lab	0-0-2	1	CE+ME
8	PCC	ME256C	Fluid Mechanics Lab	0-0-2	1	CE+ME
9	HSMC	PDP201	Personality Development & Grooming	0-0-2	1	ALL
				15-3-8	**22**	

SN	Category	Course Code	Course Name	L-T-P	Cr.	
			2ⁿᵈ Year SEMESTER – IV			
1	PCC	CE202C	Soil Mechanics & Engineering Geology	3-1-0	4	CE
2	PCC	CE204C	Disaster Preparedness & Planning	3-0-0	3	CE
3	PCC	ME204C	Strength of Materials	3-1-0	4	CE+ME
4	PCC	CE206C	Surveying & Geomatics	3-1-0	4	CE
5	PCC	CE208C	Environmental Engineering	3-1-0	4	CE+ME
6	MC	HSS202	Engineering Economics & Management	3-0-0	3	CE+ME
7	PCC	CE252C	Soil Mechanics & Engineering Geology Lab	0-0-2	1	CE
8	PCC	ME254C	Strength of Materials Lab	0-0-2	1	CE+ME
9	PCC	CE254C	Surveying & Geomatics Lab	0-0-2	1	CE
10	PCC	CE256C	Environmental Engineering Lab	0-0-2	1	CE
11	HSMC	PDP202	Life Skills	0-0-2	1	ALL
				18-4-10	**27**	

B.Tech(CE)

SN	Category	Course Code	Course Name	L-T-P	Cr.	
			3rd Year SEMESTER – V			
1	PCC	CE301C	Concrete Technology	3-0-0	3	CE
2	PCC	CE303C	Geotechnical Engineering	3-1-0	4	CE
3	PCC	CE305C	Hydrology & Water Resource Engineering	3-1-0	4	CE
4	PCC	CE307C	Highway Engineering	3-1-0	4	CE
5	PCC	CE309C	Design of Concrete Structures	3-1-0	4	CE
6	PEC		Program Elective-I	3-0-0	3	CE
7	PCC	CE351C	Concrete Technology Lab	0-0-2	1	CE
8	PCC	CE353C	Geotechnical Engineering Lab	0-0-2	1	CE
9	PCC	CE355C	Hydraulic Engineering Lab	0-0-2	1	CE
10	PCC	CE357C	Highway Engineering Lab	0-0-2	1	CE
11	HSMC	PDP301	Leadership & Entrepreneurial Development	0-0-2	1	ALL
				18-4-10	27	

	COURSE CODE	COURSE NAME
	CE311C	Repair & Rehabilitation of Structures
Program Elective-I	CE313C	Construction Equipment's & Automation
	CE315C	Building Construction Practice

SCHEME FROM-2019 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Scheme of Studies

B.Tech(CE)

SN	Category	Course Code	Course Name	L-T-P	Cr.	
3rd Year SEMESTER – VI						
1	PCC	CE302C	Specification Estimation & Costing	3-1-0	4	CE
2	PCC	CE304C	Structural Analysis-I	3-1-0	4	CE
3	PCC	CE306C	Design of Steel Structures	3-1-0	4	CE
4	PCC	CE308C	Open Channel Flow	3-0-0	3	CE
5	PEC		Program Elective-II	3-0-0	3	CE
6	PEC		Program Elective-III	3-0-0	3	CE
7	PEC		Program Elective-IV	0-0-2	1	CE
8	PCC	CE352C	Structural Analysis-I Lab	0-0-2	1	CE
9	Project	CE354C	Major Project-I	0-0-4	2	CE
10	HSMC	PDP302	Problem Solving Skills	0-0-2	1	ALL
				18-3-10	**26**	

	COURSE CODE	COURSE NAME
Program Elective-II	CE310C	Construction Project Management
	CE314C	Construction Productivity
	CE318C	Construction Project Planning & System
Program Elective-III	CE312C	Traffic Planning & Management
	CE316C	Transportation Economics
	CE320C	Traffic Engineering
Program Elective-IV	CE356C	Construction Project Management Lab
	CE358C	Building Drawing Lab
	CE360C	Structural Drawing Lab

B.Tech(CE)

			4th Year SEMESTER – VII			
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	PCC	CE-401C	Earthquake Resistant Design of Structures	3-1-0	4	CE
2	PCC	CE-403C	Channel Hydraulics	3-1-0	4	CE
3	PEC	CE-405C	Traffic Engineering	3-0-0	3	CE
4	PEC	CE-407C	Waste Management	3-0-0	3	CE
5	PEC	CE-409C	Foundation Engineering	3-1-0	4	CE
6	PEC	OE	Open Elective – I (CE-423C -Hydropower Engineering)	3-0-0	3	CE
7	OEC	CE-451C	Traffic & Transport Engg. Lab.	0-0-2	1	ALL
8	Project	CE-453C	Seminar	0-0-4	2	CE
9	HSMC	PDP-401	Campus to Corporate	0-0-2	1	ALL
				18-3-8	25	

LIST OF OE

	COURSE CODE	COURSE NAME
Open Elective-I	CE423C	Hydropower Engineering
	CE425C	Transportation Engineering & Systems

B.Tech(CE)

			4th Year SEMESTER – VIII			

<table>
<tr><td>SN</td><td>Category</td><td>Course Code</td><td>Course Name</td><td>L-T-P</td><td>Cr.</td><td></td></tr>
<tr><td>1</td><td>PCC</td><td>CE402C</td><td>Metro Systems & Engineering</td><td>3-0-0</td><td>3</td><td>CE</td></tr>
<tr><td>2</td><td>INT</td><td>CE452C</td><td>Internship</td><td>0-0-32</td><td>16</td><td>CE</td></tr>
<tr><td>3</td><td>INT</td><td>CE454C</td><td>Seminar on Internship</td><td>0-0-2</td><td>1</td><td>CE</td></tr>
<tr><td></td><td></td><td></td><td></td><td>3-0-34</td><td>20</td><td></td></tr>
</table>

Course Code	Course Name	L-T-P	Credit
BSC-101	Physics	3-1-0	4

Unit I: Electrostatics and Magnetostatics (12 lectures)
Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential, Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.
Bio-Savart law, Divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; the equation for the vector potential and its solution for given current densities.

Unit II: Mechanics (8 lectures)
Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical Coordinates

Unit III: Quantum Mechanics (8 lectures)
Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time independent Schrodinger equation for wave function, Born interpretation, probability current, Expectation values, Free-particle wave function and wave-packets, Uncertainty principle.

Unit IV: Wave optics (10 lectures)
Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.
Fraunhauffer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Unit V: Lasers (8 lectures)
Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

Suggested Text/Reference Books
(i)   David Griffiths, Introduction to Electrodynamics.
(ii)   W. H. Hayt and J. A. Buck. Engineering Electromagnetics.
(iii) Engineering Mechanics, 2nd ed. — MK Harbola.
(iv)   Introduction to Mechanics — MK Verma
(v)   Eisberg and Resnick, Introduction to Quantum Physics
(vi)   D. J. Griffiths, Quantum mechanics.
(vii) A. Ghatak, Optics
(viii) O. Svelto, Principles of Lasers

Course Code	Course Name	L-T-P	Credit
BSC-103	Mathematics - I	3-1-0	4

Unit I: Matrices (10 lectures)
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, Skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Unit II: Sequences and series: (12 lectures)
Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit III: Calculus: (8 lectures)
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit IV: Calculus: (8 lectures)
Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit V: Multivariable Calculus (Differentiation): (10 lectures)
Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Suggested Text/Reference Books
(i) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
(ii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(iii) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
(iv) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
(v) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
(vi) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
(vii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Course Outcomes
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Code	Course Name	L-T-P	Credit
ESC-101	Basic Electrical Engineering	3-1-0	4

Learning Objectives:
To understand and analyze basic electric and magnetic circuits
To study the working principles of electrical machines and power converters.
To introduce the components of low voltage electrical installations.

Detailed contents:

Unit 1: DC Circuits (8 hours)
Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton and maximum power transfer Theorems.

Unit 2: AC Circuits (8 hours)
Representation of sinusoidal waveforms, peak and rms values, phasor representation, real
power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits
consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three phase
balanced circuits, voltage and current relations in star and delta connections.

Unit 3: Transformers (8 hours)
Construction, working principle of transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and its comparison with ordinary transformer.

Unit 4: Electrical Machines (8 hours)
Generation of rotating magnetic fields, Construction and working of a three-phase induction
motor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

Unit 5: Power Converters & Electrical Installations (8 hours)
DC-DC converters and AC-DC converters, Switches, Fuses, MCBs, Earthing and its types, Important Characteristics for Batteries and battery backup. Elementary calculations for energy consumption, power factor improvement.

Suggested Text / Reference Books
(i) D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
(ii) D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
(iii)L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
(iv) E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
(v) V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Course Outcomes
Students are able to understand and analyze basic electric and magnetic circuits
Students are able to understand the working principles of electrical machines and power converters.

Course Code	Course Name	L-T-P	Credit
ESC-103	Introduction to Computer Systems & Internet Basics	3-0-0	3

Objective: To give basic knowledge of Computer Hardware, Software systems & internets

Unit 1. Computer Systems

Overview of Computer Systems, Evolution of Computer Systems, Generations of computers, Characteristics of Computer: speed, storage, Accuracy, Categories of computer: Micro Computers, Mini Computers, Main Frames, Super Computers, Computer Organization: Central processing unit, Arithmetic and Logic Unit, Control Unit, Memory System: Primary memory, secondary memory and Data Representation in a Computer System. Number system : decimal, Binary, Octal, Hexadecimal representation and conversion

Unit 2. Programming Languages & Operating System basics

Software Basics: Application software, System Software, Utility Software, Programming languages: Low level languages, Machine language, Assembly language, Limitations of Low level languages, High Level languages, Translator, Assembler, Interpreter, Compiler, Operating System: Need of Operating System, Function of Operating System, Types of Operating System

Unit 3. Network Systems, Internet & Web

Introduction to networking, Local and Wide Area Networks, communication media: wired and wireless, Network Topologies: Star, Ring, Bus, Networking devices: Switch, Hub, Bridge, Internet overview, Internet Architecture, The idea of hypertext and hyper media; how the browser works: MIME types, plug-ins and helper applications; XML, XHTML, XSLT and the W3C, Hosting and Domains:

Unit 4: **Hypertext Markup Language:** The anatomy of an HTML document; marking up for structure and style: ordered and unordered lists, Structuring content with HTML using natural divisions, Marquee, Anchor Tag, Email Link; embedding images and controlling appearance, table creation: Frames and Nesting, iframes, forms, Semantic elements of HTML5, HTML5 Form elements, Media tags in HTML5, HTML5 Data Storage

Unit 5. Computer Security

Security Threats: Intruders, Password Cracking, Different types of malicious Software: Virus, Worms, Trojan Horse, Prevention from malicious Software: Antivirus (Introduction)

Text Books:
1. Computer Fundamentals: P. K. Sinha, BPB pub.
2. Fundamentals of Computer Science and Programming with C: A. K. Sharma, Dhanpat Rai Pub.
3. Uttam K. Roy, "Web Technology", Oxford Publication

Reference Books:
1. Computing Fundamentals & C Programming: E. Balaguruswamy, TMH.
Fundamentals of Computers: V Rajaraman, PHI

SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 1st Year/1st Semester

Course Code	Course Name	L-T-P	Credit
ESC-153	Engineering Graphics & Design	0-0-6	3

Learning Outcomes:
Engineering drawing is an effective language of engineers. It is the foundation block which strengthens the engineering and technological structure. Moreover, it's the transmitting link between ideas and realization. After learning the course the students should be able to understand conventions and the methods of engineering drawing and interpret engineering drawings, using fundamental technical mathematics, construct basic and intermediate geometric improve their visualization skills so that they can apply these skills in developing new projects improve their technical communication skill in the form of communicative drawings, comprehend the theory of projections and acquire basic knowledge of computer aided drafting**.**

Module 1: Introduction to Engineering Drawing
Principles of Engineering Graphics and their significance, usage of drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Dimensioning

Module 2: Orthographic Projections
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes;

Module 3: Projections of Solids
Projections of planes inclined Planes - Auxiliary Planes; Projection of Regular Solids covering those inclined to both the planes, Auxiliary Views; Section of such solids and the true shape of the section.

Module 4: Sections and Sectional Views of Right Angular Solids
Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; objects from industry and dwellings (foundation to slab only) Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids Conversion of Isometric Views to Orthographic Views and Vice-versa

Module 5: Overview of Computer Graphics,
Introduction to Computer Aided Drafting and CAD software [such as: The Menu System, Toolbars (Standard,Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

Suggested Text/Reference Books:
1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech
5. Publishers (Corresponding set of) CAD Software Theory and User Manuals

Course Outcomes

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

* to prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
* to prepare you to communicate effectively
* to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

The student will learn :

Introduction to engineering design and its place in society

* Exposure to the visual aspects of engineering design
* Exposure to engineering graphics standards

Exposure to solid modelling

Course Code	Course Name	L-T-P	Credit
HSS-101	English	2-0-0	2

Detailed contents

1. Vocabulary Building

1.1 The concept of Word Formation

1.2 Root words from foreign languages and their use in English

1.3 Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives.

1.4 Synonyms, antonyms and standard abbreviations.

2. Basic Writing Skills

2.1 Sentence Structures

2.2 Use of phrases and clauses in sentences

2.3 Importance of proper punctuation

2.4 Creating coherence

2.5 Organizing principles of paragraphs in documents

2.6 Techniques for writing precisely

2.7 Jane Austen: *Pride and Prejudice(novel)*

3. Identifying Common Errors in Writing

3.1 Subject-verb agreement

3.2 Noun-pronoun agreement

3.3 Misplaced modifiers

3.4 Articles

3.5 Prepositions

3.6 Redundancies

3.7 Clichés

4. Nature and Style of sensible Writing

4.1 Describing

4.2 Defining

4.3 Classifying

4.4 Providing examples or evidence

4.5 Writing introduction and conclusion

5. Writing Practices

5.1 Comprehension

5.2 Précis Writing

5.3 Essay Writing

5.4 Charles Dickens : *Oliver Twist*(novel)

6. Oral Communication

Suggested Readings:

(i) *Practical English Usage.* Michael Swan. OUP. 1995. (ii) *Remedial English Grammar.* F.T. Wood. Macmillan.2007 (iii) *On Writing Well.* William Zinsser. Harper Resource Book. 2001

(iv) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) *Communication Skills.* Sanjay Kumar and PushpLata. Oxford University Press. 2011. (vi) *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Course Code	Course Name	L-T-P	Credit
BSC-151	Physics Lab	0-0-2	1

List of Experiments:

1) To study response curve of a series LCR circuit.
2) To determine the Planck's constant using LEDs.
3) To determine the Rydberg's constant of Hydrogen atom.
4) To find the refractive index and Cauchy's constants of a prism.
5) To find the wavelength of light by Newton's rings experiment.
6) To determine the thickness of a thin wire by interference.
7) To determine the wavelength of LASER using diffraction grating.
8) To determine the resolving power of a telescope.
9) To find the numerical aperture of an optical fiber cable.
10) To find the wavelength of light using Michelson's interferometer.

Course Code	Course Name	L-T-P	Credit
ESC-151	Basic Electrical Engineering Lab	0-0-2	1

List of Experiments:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi – meter, oscilloscope. Resistors, capacitors and inductors.
2. Demonstration of cut – out sections of machines.
3. Torque speed characteristic of dc motor.
4. Parallel operation of single-phase Transformer.
5. Open circuit & short circuit test on single phase transformer.
6. To verify the Thevenin's & Norton's theorem.
7. To verify the Superposition theorem.
8. To study frequency response of series & parallel RLC Circuit.
9. Load test on D.C. Shunt generator
10. Torque – speed characteristics of three phase Induction motor & direction reversal by change of phase sequence of connection.
11. To plot field current Vs Armature voltage characteristics of synchronous generator.

SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 1ˢᵗ Year/1ˢᵗ Semester

Course Code	Course Name	L-T-P	Credit
HSS-151	English Lab	0-0-2	1

1. Comprehension
2. Pronunciation, Intonation, Stress and Rhythm
3. Common Everyday Situations: Conversations and Dialogues communication at Workplace
4. Interviews
5. Formal Presentations

Course Code	Course Name	L-T-P	Credit
MC-101	Environmental Science	2-0-0	0

1. **THE MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES:** Basic definitions related to environment; Scope, vis-à-vis environmental science and environmental engineering; a uses of environmental degradation, atmospheric composition and associated spheres, habitat and climate; objective, goals and principals involved in environmental education, environmental awareness, Environmental ethics, environmental organization and their involvement.

2. **NATURAL RESOURCES:** Renewable and non-renewable resources; forest resources, over-exploitation, and deforestation / afforestation; water resources, impact of over-utilization of surface and ground water, floods, drought, conflicts over water, dams; mineral resources: dereliction of mines, environmental effects of extracting and using mineral resources; Food resources, modern agriculture and its impact, problem associated with fertilizer and pesticide, water logging, salinity ; energy resources, renewable, non-renewable energy sources, solar energy, wind energy, hydro energy, biomass energy, geothermal energy, nuclear energy and its associated hazards; land as a resource, land degradation, man induced landslides, soil erosion and desertification.

3. **ECOSYSTEMS:** Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem - forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

4. **BIODIVERSITY AND ITS CONSERVATION:** Bio-geographical classification of India; biodiversity at global, national and local levels, India as a mega-diversity nation, hot-spots of biodiversity; value of biodiversity-consumptive use, productive use, social, ethical aesthetic and option values; threats to biodiversity; conservation of biodiversity: in-situ and ex-situ conservation of biodiversity.

5. **ENVIRONMENTAL POLLUTION:** Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management, e-waste management; disaster management –floods, earthquake, cyclone and landslides.

6. **SOCIAL ISSUES AND THE ENVIRONMENT:** Water conservation, rain water harvesting, watershed management; climate change, global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.

7. **HUMAN POPULATION AND THE ENVIRONMENT:** Population growth, population explosion – family welfare programmes; role of information technology in environment and human health; case studies, Chipko movement, Sardar Sarovar dam, mining and quarrying in Udaipur, salinity and water logging in Punjab, Haryana and Rajasthan, Bhopal gas tragedy, Chernobyl nuclear disaster, arsenic pollution in ground water.

TEXT BOOK

Kaushik, Anubha, and Kaushik, C.P., "Perspectives in Environmental Studies", 4th Edition,
New Age International Publishers, 2004

REFERENCE BOOKS
1. Agarwal, K.C., "Environmental Biology", 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
2. Bharucha Erach, "The Biodiversity of India", 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
3. Brunner R. C., "Hazardous Waste Incineration", 1st Edition McGraw Hill Inc., 1989.
4. Clark R.S., "Marine Pollution", 1st Edition Clanderson Press Oxford,1989
5. .Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., Environmental Encyclopedia",
   2nd Edition, Jaico Publ. House, 2001.
6. De, A. K., "Environmental Chemistry", 2nd Edition, Wiley Eastern, 1989
7. Jadhav, H. and Bhosale, V.M ., "Environmental Protection and Laws", 1st Edition,
   Himalaya Pub. House, Delhi, 1995.
8. Mckinney, M.L. and Schocl. R.M., "Environmental Science Systems & Solutions", 2nd Edition,
   Web enhanced edition, 1996.
9. Rao M.N. and Datta, A.K.,"Waste Water Treatment", 2nd Edition, Oxford & IBH Publ.Co.,
   1987.
10. Sharma B.K., "Environmental Chemistry", 2nd Edition, Goel Publ. House, Meerut, 2001 Trivedi
    R.K. and Goel, P.K., "Introduction to Air Pollution", 2nd Edition, Techno-science Publications,
    1996.

Course Code	Course Name	L-T-P	Credit
PDP-101	Induction & Nurturing Hobbies	0-0-2	1

Course Code	Course Name	L-T-P	Credit
BSC-102	Chemistry	3-1-0	4

Unit-I PHASE RULE

Terminology, Definition of phase rule, Derivation of phase rule equation, One component system (H_2O system and CO_2 system), two components system, Simple eutectic system (Pb – Ag), Pattinson's Process, congruent system (Zn–Mg), incongruent system (Na-K system), Merits and demerits of phase rule.

UNIT-II THERMODYNAMICS

Second law of thermodynamics, entropy change for reversible & irreversible processes, Entropy change for ideal gas, variation of free energy with temperature & pressure, Gibbs-Helmholtz equation, Clapeyron- Clausius equation & it's integrated form Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications.

UNIT-III CORROSION AND ITS PREVENTION

Definition, Types of corrosion: Dry, wet corrosion (rusting of iron), galvanic corrosion, differential aeration corrosion, stress corrosion. Factors affecting corrosion, preventive measures (proper design, Cathodic and Anodic protection, sacrificial protection and barrier protection), Soil Corrosion.

UNIT-IV SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Part-A:Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques.

UNIT-V INTERMOLECULAR FORCES AND POTENTIAL ENERGY SURFACES

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena, Potential energy surfaces of H_3, H_2F and HCN and trajectories on these surfaces.

UNIT-VI ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

UNIT-VII STEREOCHEMISTRY

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal
compounds

Suggested Text Books :
(i)University chemistry, by B. H. Mahan
(ii)Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(iv)Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(v)Physical Chemistry, by P. W. Atkins
(vi)Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th
Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Code	Course Name	L-T-P	Credit
BSC-104	Mathematics - II	3-1-0	4

Unit I: Basic Probability: (12 lectures)
Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Unit II: Continuous Probability Distributions: (6 lectures)
Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

Unit III: Complex Variable – Differentiation: (14 lectures)
Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof).

Unit IV: First order ordinary differential equations: (8 lectures)
Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Unit V: Ordinary differential equations of higher orders: (10 lectures)
Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Suggested Text/Reference Books
(i) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(ii) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
(iii)S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
(iv) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
(v) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
(vi) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
(vii)E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
(viii) E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.

Course Outcomes
The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

SCHEME & SYLLABUS FROM-2019 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 1ˢᵗ Year/2ⁿᵈ Semester

Course Code	Course Name	L-T-P	Credit
ESC-102	Programming for Problem Solving	3-0-0	3

Unit-1: BASICS OF PROGRAMMING AND OVERVIEW OF C PROGRAMMING:
Programming Fundamental, Problem definition, Idea of Algorithm, steps to solve logical and numerical problems, Representation of Algorithms: Flow charts/ Pseudocode with example, Types of programming languages, Translators, From algorithms to programs; source code, variables and memory location, Introduction to C, Structure of C program, C character set, Identifier and Keywords, Data types, constants, variables, Declaration, Arithmetic expressions & precedence , statements, Symbolic constants, type conversion, Types of operators, Input and output functions in C, header files, common programming errors, Control Statements, Sequencing, Selection, Condition and iteration.

Unit-2: ARRAYS AND STRING: Declaring, Referencing and initializing arrays, array subscript, using for loop for sequential access, multi-dimensional array, String basics string library functions, assignment and substring, concatenation, string comparison.

Unit-3: FUNCTIONS AND POINTERS: Definition of function, function prototype, Purpose of main function, passing parameters, Scope of function, recursion, Call by value and reference, Types of storage classes, Scope of variable: Global and local, static variables, Recursion.. Pointer variables, initializing pointers, pointer operators, pointer expressions, pointers and arrays, pointer and functions,

Unit-4: STRUCTURES, UNIONS & RECURSION
Defining a structure, Declaring structure variables, Structure initialization, Copying and Comparing Structure variables, Array of structures, Arrays within structure, nested structures, Unions. Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit-5: DYNAMIC MEMORY ALLOCATION AND FILE PROCESSING: C's dynamic allocation functions. Streams and file types, opening and closing a data file, input and output operations, text mode versus binary mode, formatted input output operations with files, random access to files.

Reference Books:-
1. Programming in C by Schaum Series, McGraw Hills Publishers, New Delhi.
2. Let Us C by YashwantKanetkar; BPB Publication, New Delhi.
3. Exploring C by YashwantKanetkar; BPB Publications, New Delhi.
4. Application Programming in C by RS Salaria, Khanna Book Publishing Co. (P) Ltd., New Delhi.
5. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi.
6. Programming with C Language by C Balaguruswami, Tata McGraw Hill, New Delhi.
7. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi

Course Code	Course Name	L-T-P	Credit
HSS-102	Effective Technical Communication	3-0-0	3

Module 1:

Information Design and Development- Different kinds of technical documents,
Information development life cycle, Organization structures, factors affecting information and document design, Strategies for organization, Information design and writing for print and for online media.

Module 2:

Technical Writing, Grammar and Editing- Technical writing process, forms of
discourse, Writing drafts and revising, Collaborative writing, creating indexes, technical writing style and language. Basics of grammar, study of advanced grammar, editing strategies to achieve appropriate technical style. Introduction to advanced technical communication, Usability, Hunan factors, Managing technical communication projects, time estimation, Single sourcing,ocalization.

Module 3:

Self Development and Assessment- Self assessment, Awareness, Perception and
Attitudes, Values and belief, Personal goal setting, career planning, Self-esteem. Managing Time; Personal memory, Rapid reading, Taking notes; Complex problem solving; Creativity

Module 4:

Communication and Technical Writing- Public speaking, Group discussion, Oral presentation, Interviews, Graphic presentation, Presentation aids, Personality Development.
Writing reports, project proposals, brochures, newsletters, technical articles, manuals, official notes, business letters, memos, progress reports, minutes of meetings, event report.

Module 5:

Ethics- Business ethics, Etiquettes in social and office settings, Email etiquettes,
Telephone Etiquettes, Engineering ethics, Managing time, Role and responsibility of engineer, Work culture in jobs, Personal memory, Rapid reading, Taking notes, Complex problem solving, Creativity.

Text/Reference Books:

1.David F. Beer and David McMurrey, Guide to writing as an Engineer, John Willey. New York, 2004
2.Diane Hacker, Pocket Style Manual, Bedford Publication, New York, 2003. (ISBN 0312406843)
3.Shiv Khera, You Can Win, Macmillan Books, New York, 2003.
4.Raman Sharma, Technical Communications, Oxford Publication, London, 2004.
5.Dale Jungk, Applied Writing for Technicians, McGraw Hill, New York, 2004. (ISBN:07828357-4)
6.Sharma, R. and Mohan, K. Business Correspondence and Report Writing, TMH New Delhi 2002.
7.Xebec, Presentation Book, TMH New Delhi, 2000. (ISBN 0402213)

Course Code	Course Name	L-T-P	Credit
ESC-152	Workshop/Manufacturing Practice	0-0-4	2

Course Objectives:
- To teach students the practices of workshop management and maintenance.
- To familiarize students with workshop machinery like drills, lathes, welding torches, files, saws, hammers, etc.
- To teach students the need to economize materials when managing a workshop.
- To teach students the safety measures needed in a workshop and how to deal with accidents at work.
- To teach student welding and manufacture of selected items.
- To teach students the practice of plumbing.
- To teach students the basics of electrical installations.

Course Outcomes: Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops. Upon completion of this course, the students will gain knowledge of the different manufacturing processes and day to day industrial as well domestic life which are commonly employed in the industry, to fabricate components using different materials.

(A) Fitting Trade:
1. Preparation of T-Shape Work piece as per the given specifications.
2. Preparation of U-Shape Work piece which contains: Filing, Sawing, Drilling, Grinding.

(B) Machine shop: Study of machine tools in particular Lathe machine (different parts, different operations, study of cutting tools)
1. To obtain required diameters (steps) on a cylinder work piece with the given lengths.
2. To obtain the required diameters (taper) on a cylinder work piece with the given dimensions.

(C) Carpentry: Study of Carpentry Tools, Equipment and different joints
1. To make a dovetail lap joint.
2. To make a cross half lap joint.

(D) Foundry Trade: Introduction to foundry, Patterns, pattern allowances, ingredients of   molding sand and melting furnaces. Foundry tools and their purposes
1. To prepare a sand mold, using the given single piece pattern.
2. To prepare a sand mold, using the given split piece pattern.

(E) Welding: Introduction, Study of Tools and welding Equipment (Gas and Arc welding)
1. To make a single v-butt joint, using the given mild steel pieces and by arc welding.
2. To make a T-joint using the given mild steel pieces and by arc welding.

(F) Electrical and Electronics: Introduction to House wiring, different types of cables. Types of power supply, types of motors, Starters, distribution of power supply, types of bulbs, parts of tube light, Electrical wiring symbols.

1. Two lamps connected in series - measure and check the voltage and current using multimeter.
2. Two lamps connected in parallel - measure and check the voltage and current using multimeter.

(G) CNC Machining: To study the working principle of CNC machining.

Reference Books:
1. Mechanical Workshop Practice by K C John, PHI Learning
2. Workshop Technology Vol. 1 and 2 by Raghuvanshi B.S. DhanpatRai& Sons 1998
3. Workshop Technology by Chapman W.A. J and Arnold E. Viva low priced student edition, 1998

Course Code	Course Name	L-T-P	Credit
BSC-152	Chemistry Lab	0-0-2	1

Chemistry Laboratory

Choice of 10-12 experiments from the following:

♣Determination of surface tension and viscosity

♣Thin layer chromatography

♣Ion exchange column for removal of hardness of water

♣Determination of chloride content of water

♣Colligative properties using freezing point depression

♣Determination of the rate constant of a reaction

♣Determination of cell constant and conductance of solutions

♣Potentiometry - determination of redox potentials and emfs

♣Synthesis of a polymer/drug

♣Saponification/acid value of oil

♣Chemical analysis of a salt

♣Lattice structures and packing of spheres

♣Models of potential energy surfaces

♣Chemical oscillations- Iodine clock reaction

♣Determination of the partition coefficient of a substance between two immiscible liquids

♣Adsorption of acetic acid by charcoal

♣Use of the capillary viscosimeters to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

Laboratory Outcomes

•The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

•Estimate rate constants of reactions from concentration of reactants/products as a function of time

•Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.

•Synthesize a small drug molecule and analyses a salt sample.

Course Code	Course Name	L-T-P	Credit
ESC-152	Programming for Problem Solving Lab	0-0-2	1

LIST OF EXPERIMENTS

(Students have to do at 3-4 programs from each section)

SEQUENTIAL CONTROL STATEMENTS

1   Write a program to Print HELLO
2   Write a program to add two numbers
3   Write a program to calculate simple interest
4   Write a program to calculate average of three numbers
5   Write a program to swap two numbers
6   Write a program to illustrate mixed data types
7   Write a program to calculate area and circumference of circle
8   Write a program to evaluate a polynomial expression
9   Write a program to add digits of a four digit number
10 Write a program to check whether the person if eligible for voting or not

CONDITIONAL CONTROL STATEMENTS

11 Write a program to find greatest of two numbers
12 Write a program to find out which type of triangle it is
13 Write a program to find out greatest of three numbers
14 Write a program to evaluate performance of the student
15 Write a program to make a basic calculator

LOOP CONTROL STATEMENTS

16 Write a program to print Fibonacci up-to the given limit
17 Write a program to find the sum of digits of a number
18 Write a program to find factorial of a number
19 Write a program to print table of any number
20 Write program for printing different pyramid pattern

ARRAYS AND STRINGS

21 Write a program to enter the elements in a one dimensional array
22 Write a program to find the sum and average of five numbers
23 Write a program to sort the array elements
24 Write a program to enter the marks of 50 students an calculate the average
25 Write a program to add 2 matrix
26 Write a program to multiply 2 matrices
27 Write a program to calculate the length of string
28 Write a program to concatenate 2 strings
29 Write a program to reverse the string
30 Write a program to count the numbers of characters in a string

31	Write a program that converts lower case characters to upper case
32	Write a program without using predefined functions to check whether the string is palindrome or not

FUNCTIONS & POINTERS

33	Write a program using function to find the largest of three numbers
34	Write a program using function to sum the digits of a number
35	Write a program to calculate factorial of a number using recursive function
36	Write a program to print first n Fibonacci using recursive function
37	Write a program to illustrate the concept of chain of pointers
38	Write a program using function to swap two numbers using call by reference
39	Write a program to calculate the area and perimeter of circle using pointers
40	Write a program to copy the contents of one array into another in the reverse order using pointers

STRUCTURES

41	Write a program to read an employee record using structure and print it
42	Write a program to prepare salary chart of employee using array of structures
43	Write a program to print the name and percentage of 20 students (array of structures and arrays within structures).
44	Write a program to demonstrate structure within structure.

FILE HANDLING

45.	Write a program to create, open, and close files.
46.	Write a program to demonstrate the purpose of different file opening modes.
47.	Write a program to count the number of characters, spaces, tabs, new line characters in a file.
48.	Write a program to receive strings from keyboard and write them to a file.
49.	Write a program to copy a file to another.
50.	Write a program to read strings from a file and display them on screen.

Course Code	Course Name	L-T-P	Credit
PDP-102	People Connect	0-0-2	1

Course Code	Course Name	L-T-P	Credit
MC-102	Constitution of India	2-0-0	2

Objective: Constitution of India is the lengthiest written Constitution in the world. Came into existence as a result of the independence, the Constitution strikes a perfect balance between the State (allocation of powers) and a citizen within his/her individual capacity (providing the rights). This paper will emphasize on some of the important provisions of the Constitution, giving an insight about the functioning of the State and its essential pillars.

UNIT – 1
- Making and Basic structure of the Constitution
- Salient features of the Constitution
- Citizenship

UNIT – 2
- Fundamental Rights of a citizen
- Fundamental Duties of a citizen
- Directives principles of State policy

UNIT – 3
- Union and the Executive (President, Vice-President, Judiciary)

UNIT – 4
- Emergency Provisions

UNIT – 5
State Liability

Course Code	Course Name	L-T-P	Credit
BSC-201	Mathematics – III (Numerical Methods)	3-1-0	4

Unit I: Matrices (10 lectures)
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, Skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Unit II: Sequences and series: (12 lectures)
Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit III: Calculus: (8 lectures)
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Unit IV: Calculus: (8 lectures)
Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit V: Multivariable Calculus (Differentiation): (10 lectures)
Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.

Suggested Text/Reference Books
(i) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
(ii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(iii) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
(iv) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
(v) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.

Course Code	Course Name	L-T-P	Credit
ME-203C	Fluid Mechanics	3-1-0	4

UNIT-1: FLUID PROPERTIES AND FLUID STATICS

Concept of fluid and flow; ideal and real fluids; Continuum concept; properties of fluids; Newtonian and non-Newtonian fluids; Pascal's Law; hydrostatic equation; hydrostatic forces on plane and curved surfaces; stability of Floating and submerged bodies; relative equilibrium; Problems

UNIT-2: FLUID KINEMATICS AND DYNAMICS

Eulerian and Lagrangian description of fluid flow; stream; streak and path lines; types of flows; flow rate and continuity equation; differential equation of Continuity; rotation; vorticity and circulation; stream and potential functions; Problems Concept of system and control volume; Euler's equation; Bernoulli's equation; venturimeter; pitot tubes; orifice meter; kinetic and momentum correction factors; Impulse momentum relationship and its applications; Problems

UNIT-3: VISCOUS FLOW

Flow regimes and Reynolds's number; Relationship between shear stress and pressure gradient; uni-directional flow between stationary and moving parallel plates; Counter flow; laminar flow through pipes

UNIT-4: FLOW THROUGH PIPES

Friction loss in pipe flow; Darcy-Weisbach formula co-efficient of friction and friction factor: Major and minor losses in pipes; hydraulic Gradient and total energy lines; series and parallel connection of pipes; branched pipes; Equivalent pipe; power transmission through pipes; Problems

UNIT-5: BOUNDARY LAYER CONCEPT

Displacement; momentum and energy thickness; von-karman momentum integral equation; laminar and turbulent boundary layer flows; drag on a flat plate; boundary layer separation; Stream lined and bluff bodies; lift and drag on a cylinder and an airfoil; Problems

TEXT BOOKS: Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publication House, 2002

REFERENCE BOOKS:
1. Kumar, D. S., "Fluid Mechanics and Fluid Power Engineering", SK Kataria and Sons,1998
2. Wylie, E. B, Streeter VL; "Fluid Mechanics";McGrawHill1983
3. SomSKandBiswasG.,"IntroductiontoFluidMechanicsandFluidMachines",TataMcGrawHill, 1998
4. Bansal RK, "A Text Book of Fluid Mechanics" Laxmi Publications
5. Agrawal, S.K."Fluid Mechanics and Machinery",Tata McGraw Hill.

Course Code	Course Name	L-T-P	Credit
ME-205C	Engineering Mechanics	3-1-0	4

UNIT-1: FORCE SYSTEMS

Basic concepts of space, time, mass, force, particle and rigid body; scalars and vectors; principle of transmissibility; force classification; Representation of force in vector form; rectangular components of two-dimensional force systems; resultant of two dimensional and concurrent force systems. moment about a point; Varignon's theorem; Representation of moment in vector form; couple. Numerical.

UNIT-2: EQUILIBRIUM

Equilibrium in two dimensions; Lame's Theorem; system isolation and the free-body-diagram; modelling the action of forces; equilibrium conditions; Numerical.

UNIT-3: PROPERTIES OF SURFACES/CROSS SECTIONS

Centre of mass; determining the centre of gravity; centre of gravity of areas including composite sections; moments of inertia; MI of plane figures; parallel axis & perpendicular axis theorem; MI of composite figures. Numerical.

UNIT-4: RECTILINEAR AND CURVILINEAR MOTION

Types of motion, definitions of displacement, distance, velocity, speed, acceleration Newton's laws of motion, Uniform and non-uniform motion equations of motion, motion under gravity. Numerical.

UNIT-5: PROJECTILES

Angle of projection, Trajectory, Range of projectile, Duration of flight, Path of Projectile, Greatest height attained by a projectile. Numerical

TEXT BOOKS

Meriam, J. L. "Engineering Mechanics", John Wiley & Sons.

Beer, F.P. and Johnston, E.R. "Mechanics of Materials", Tata McGraw Hill

Shames, I.H. "Engineering Mechanics", 4th Edition, Pearson Education, 2003

Pytel, A and Kiusalaas, J. Thomsom, "Mechanics of Materials", Brooks & Cole, 2003

Course Code	Course Name	L-T-P	Credit
CE-201C	Introduction to Civil Engineering	3-0-0	3

UNIT I: Evolution and history of Civil Engineering.

Classification and domains of Civil Engineering.

Surveying; Compass survey, chain survey, Introductions to modern surveying equipment's and techniques such as EDM or Distometer, Total station, Remote sensing & GPS.

UNIT II: Basic building materials and constructions: Common building materials, properties, Bricks, limes, timbers, stones, asphalt, bitumen, tar, Foundations, Types of buildings, Masonary: brick & composite, plastering, walls, roofs, floors.

UNIT III: Concrete materials and technology: Concrete materials & their compositions, properties, cements, grades of concrete, admixtures, formwork, concrete handling in fields.

UNIT IV: Traffic & Transportation Engineering: History of transportation engineering, Modes of transportation, Classification of roads, road plans, traffic signs, traffic signals, road markings, traffic & parking surveys, street lights, road accidents, railway engineering, airport engineering and planning, airport components, zonings, obstructions.

UNIT V: Environmental & hydraulic Engineering: Water supply, waste water, irrigation & hydraulic structures.

Geotechnical Engineering & soil mechanics: Soil constituents, water contents, void ratio, porosity, soil classification, soil stabilization, soil exploration, bearing capacity.

Books:
1. Building materials, S.C. Rangwala
2. Building Construction, B.C Punmia
3. Concrete Technology, Neville & Brooks, Pearson
4. Highway Engineering, S.K. Khanna, Soil Mechanics, K. R. Arora

Course Code	Course Name	L-T-P	Credit
CE-203C	Building Material & Construction	3-0-0	3

Unit I: Introduction: Common building material, Mechanical properties of material, Comparison of various mechanical properties. **Stones**: Common building stones, Requirement of a good building stones, Dressing and preservation of stones. **Bricks**: Manufacture of clay bricks, Classification and testing of clay bricks, Problems of efflorescence.

Unit II: Lime: Manufacture, Classification of lime. **Timber**: Classification and wood based products of timber, Defects and their prevention, Factors effecting the strength of timber., Seasoning and preservation of timber. **Asphalt, Bitumen and Tar**: Terminology, Bituminous materials, Specification and usage **Cement**: Properties, Uses and types; manufacturing and materials, Plastering and Form Work.

Unit III: Introduction of Buildings and Foundations: General Introduction of Buildings, Types of Buildings, Components of Buildings, Design Loads, Introduction of Foundation, Types of Foundation, Function of Foundation, Essential Requirements of a good Foundation, Site Investigation and Sub-Soil Exploration, Method of Site Exploration, Settlement of Foundation, Causes of Failures **of** Foundations and Remedial Measures

Unit IV: Bricks Masonry and Composite Masonry: Introduction of Brick Masonry, Types of bricks, Bonds in brick work, Supervision of brick work, Defects in brick masonry, Strengths of brick masonry, Introduction of Composite Masonry, Reinforced brick masonry, Stone composite masonry, Brick-stone composite masonry, Concrete block masonry, Hollow clay block masonry, Damp Proofing, Termite proofing and Fire Protection of Buildings.

Unit V: Walls: Types of walls, Introduction of cavity walls, General features of cavity walls, Construction of cavity walls, Introduction of partition walls, Brick partitions, Clay block partition walls, Concrete partitions, Glass partitions.
Floors and Roofs: Introduction of a Floor, Components of a Floor, Materials for Construction, Selection of Flooring Material, Cement Concrete Flooring, Brick Flooring, Marble flooring, Asphalt Flooring, Introduction of Roofs, Types of Roofs, Trussed Roofs, Steel Roof Trusses

Books:
1. Building Construction, B. C. Punmia
2. Construction Materials, S. C. Rangwala

Course Code	Course Name	L-T-P	Credit
CE-251C	Computer Aided Civil Engineering Drawing	0-0-2	1

List of Experiments:

1. Introduction and Refreshing to AutoCAD (Introduction of AutoCAD and Various Commands)
2. Fundamental Line Drawings (Fundamental line drawings & Practice Drawings)
3. Foundation Drawings (Various Types of Foundation drawings)
4. Brick Masonry Drawings (Drawings of Various Types of Bond of Brick Masonry)
5. House Planning Drawing (Planning and Drawings of Plumbing and Electrical in all Floors)
6. House Planning Drawing (Planning and Drawings of Different Floors)
7. Office Building Drawing (Planning and Drawings of Different Floors)
8. To design and draw a Primary Health Centre
9. To design and draw a Primary School
10. To design and draw a Rest House

Course Code	Course Name	L-T-P	Credit
BSC-251	Mathematics – III (Numerical Methods) Lab	0-0-2	1

List of Experiments: (Using C++ Software)

1. Bisection Method.
2. Newton Raphson Method.
3. Secant Method.
4. Regulai Falsi Method.
5. LU decomposition Method.
6. Gauss-Jacobi Method.
7. Gauss-Siedel Method.
8. Lagrange Interpolation or Newton Interpolation.
9. Simpson's rule.
10. Trapezoidal Rule

Course Code	Course Name	L-T-P	Credit
ME-256C	Fluid Mechanics Lab	0-0-2	1

List of Experiments:

1. To study the constructional details and draw characteristic and constant efficiency curves of a Pelton turbine
2. To study the constructional details and draw characteristic and constant efficiency curves of a Francis turbine
3. To study the constructional details and draw characteristic and constant efficiency curves of a Kaplan turbine
4. To study the constructional details and draw characteristic curve of centrifugal pump
5. To study the constructional details and draw characteristic curve of a reciprocating pump
6. To study the constructional details and draw performance curve of gear oil pump
7. To study the constructional details and determine the efficiency of a hydraulic Ram
8. To study the constructional details of a centrifugal compressor
9. To study the model of hydro power plant and draw it's layout
10. To determine the volumetric efficiency of a reciprocating compressor

Course Code	Course Name	L-T-P	Credit
PDP-201	Personality Development & Grooming	0-0-2	1

Course Code	Course Name	L-T-P	Credit
CE-202C	Soil Mechanics & Engineering Geology	3-1-0	4

Unit 1:
General Geology
Engineering Geology: Introduction; Formations of Rocks; Characterization; Weathering Processes, Types of Rocks, Fold and fault in Rock, Physical Properties of Minerals

Unit 2:
Introduction of Soil Engineering:
Soil and soil-mass constituents, water content, specific gravity, void ratio, porosity, degree of saturation, air void and air content, unit weights, density index etc. Inter- relationships of the above. Determination of index properties of soil: water content, specific gravity, particle size distribution, consistency limits, void ratio and density index. Classification of soil for general engineering purposes: particle size and I.S. Classification systems.

Unit 3:
Soil Permeability
Permeability of soil and its determination in laboratory. Field pumping out tests, factors affecting permeability, permeability of stratified soil masses

Unit 4:
Stress in soil mass and compaction of soil
Stresses in soil mass: total, effective and neutral pressure, calculation of stresses, influence of water table on effective stress, quick sand phenomenon. Seepage and Seepage Pressure, Principles of soil compaction, laboratory compaction tests; Proctor's test Modified Proctor tests

Unit 5:
Shearing strength of soil
shearing strength of soil, parameters of shear strength, Coulomb's failure envelope, determination of shear parameters by Direct Shear Box. Tri-axial and unconfined compression test apparatuses

Suggested Readings:
1. Parbin Singh-A Text Book of Engineering & General Geology- S.K.Kataria & sons
2. K.R. Arora - A text Book of Soil Mechanics
3. N Chenna Kesavulu- A Text book of Engineering Geology- Macmillan India Ltd.
4. M.T.Maruthesha Reddy- A Text book of Applied Engineering Geology- New Age International Publisher

SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2ⁿᵈ Year/4ᵗʰ Semester

Course Code	Course Name	L-T-P	Credit
CE-204C	Disaster Preparedness & Planning	3-0-0	3

Unit 1: Introduction - Concepts and definitions: disaster, hazard, vulnerability, risks- severity, frequency and details, capacity, impact, prevention, mitigation).

Unit 2: Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.

Unit 3: Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.

Unit 4: Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post-disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR programmes in India and the activities of National Disaster Management Authority.

Unit 5: Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land-use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Text/Reference Books:
1. http://ndma.gov.in/ (Home page of National Disaster Management Authority)
2. http://www.ndmindia.nic.in/ (National Disaster management in India, Ministry of Home Affairs).
3. Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
4. Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
5. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
6. Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State of California, EMSA no.214, June 2003
7. Inter Agency Standing Committee (IASC) (Feb. 2007). IASC Guidelines on Mental Health and Psychosocial Support in Emergency Settings. Geneva: IASC

Course Code	Course Name	L-T-P	Credit
ME-204C	Strength of Materials	3-1-0	4

UNIT-1: SIMPLE STRESSES AND STRAINS
Resistance to deformation; Hook's law and stress-strain diagram; types of stresses; stresses and strains in bars of varying sections; stresses in composite bars; lateral strain and Poisson's ratio; volumetric strain, modulus of rigidity and bulk modulus; relation between elastic constants. Numerical

UNIT-2: TORSION OF CIRCULAR SHAFTS AND REACTION OF BEAMS
Torsion formula of circular shaft, power transmission by shaft, types of beams and loads, reaction produced on supports for beams with point load uniformly distributed load, uniformly varying load and combined loads. Numerical.

UNIT-3: SHEAR FORCE & BENDING MOMENT
Definitions: SF and BM diagrams for cantilevers, simply supported beams with or without overhang and calculation of max. BM and SF and point of contra-flexure under i) concentrated loads, ii) uniformly distributed loads over wholes pan or part of it iii) combination of concentrated and uniformly distributed loads

UNIT-4: ANALYSIS OF PERFECT FRAMES
Types of frames, Assumptions made in finding out the forces in frames, Reactions of supports of a frame, Analysis of frame by Method of Joint, Analysis of frames by Method of Section.

UNIT-5: MOHR CIRCLE OF STRESSES
Mohr's circle of stress for a material under similar stresses in two mutually perpendicular plane, Mohr's circle of stress for a material under dissimilar stresses in two mutually perpendicular plane Mohr's circle of stress for a material under similar stresses in two mutually perpendicular plane along with shear stresses acting on all the planes, Mohr's circle for a material under dissimilar stresses in two mutually perpendicular plane along with shear stresses acting on all the planes. Numerical

TEXT BOOKS
Ferdinand P Beer &Russel E Johnston; Mechanics of Materials‖, Tata McGraw Hill;2009
REFERENCE BOOKS:
1. Hibbeler, R. C., Mechanics of Materials, Pearson Education, 2005
2. Ryder,G H., Strength of Materials, Macmillan, 2001
3. Srinath LS, Strength of Materials, Macmillan, 2001
4. Andrew / Kiusalaas, Jaan, Mechanics of Materials‖, Thomson, 2003

Course Code	Course Name	L-T-P	Credit
CE-206C	Surveying & Geomatics	3-1-0	4

Unit I: Introduction to Surveying: Basic principles, Concept and purpose of surveying, Measurements & its Units, Instruments used for taking measurements Classification based on surveying instruments, etc. **Chain Surveying**: Introduction Advantages and Disadvantages, Direct and indirect ranging Offsets and Recording of field notes. **Compass surveying**: Purpose, Use of prismatic compass.

Unit II: Levelling: Definitions of various terms in levelling. Different types of levelling, sources of errors in levelling curvature and refraction corrections. Temporary adjustment of dumpy and tilting levels. Computation and adjustment of levels. Profile levelling; L-Section and cross-sections. Mid ordinate, Average ordinate, Trapezoidal rule, Simpsons rule.
Plane Table Surveying: Purpose of plane table surveying, Equipment used in plane table survey, Setting of a plane table, Methods of plane table surveying Radiation Intersection Traversing Resection, Concept of Twopoint and Three point problems, Errors in plane table survey and precautions to control them Testing and adjustment of plane table and alidade.

Unit III: Triangulation: Merits and demerits of traversing, triangulation and trilateration. Grades of triangulation, Strength of figure, field procedure of triangulation. Reconnaissance and selection of triangulation stations. **Adjustment of Triangulation Figures:** Adjustment of levels. Adjustment of triangulations figures, braced quadrilateral Triangle with central, station. Approximate and method of least squares for figure adjustment, Trilateration.

Unit IV: Measurement of Distances, directions and elevations by different methods. Traversing. Vertical control, Precise levelling, Trigonometric levelling. **Contouring:** Characteristics of contours, contour interval, contour gradient, Methods of locating contours, uses of contour maps. **Measurement of Angles & Direction:** Different types of direction measuring instruments and their uses. Reference meridians, Bearing and azimuths, magnetic declination and its variation. Use and adjustment of surveyors and prismatic compass Errors of measurements and their adjustments.

Unit V: Introduction to the use of Modern Surveying equipment and techniques such as: EDM or Distomat, Total station, Study and use of Digital Planimeter, Introduction to remote sensing and GPS.

Text Book:
1. Surveying & Levelling by B. C. Punmia.

Course Code	Course Name	L-T-P	Credit
CE-208C	Environmental Engineering	3-1-0	4

Unit 1: *Water:* -Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.

Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes

Unit 2: *Sewage-* Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water-Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

Unit 3: *Air -* Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations

Noise- Basic concept, measurement and various control methods.

Module 4: *Solid waste management-*Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, recovery and recycle. Disposal methods- Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities.

Module 5: *Building Plumbing-*Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and

fittings used.

Suggested Readings:
1- Water Supply by S.K. Garg, Khanna Publishing Co.
2. Environmental Engineering by Peavy, H.S., Rowe D.R. and Techobanoglous, Mc Graw Hill, Book Company.
3.Manual of Water Supply and Water Treatment, Ministry of Urban Development, Govt.of India.

Course Code	Course Name	L-T-P	Credit
HSS-202	Engineering Economics & Management	3-0-0	3

Unit- 1: Introduction to Economics:
Definitions, Nature, Scope, Difference between Microeconomics & Macroeconomics Theory of Demand & Supply; meaning, determinants, law of demand, law of supply, equilibrium between demand & supply Elasticity; elasticity of demand, price elasticity, income elasticity, cross elasticity.

Unit-2: Theory of Production
production function, meaning, factors of production (meaning & characteristics of Land, Labour, capital & entrepreneur), Law of variable proportions & law of returns to scale Cost; meaning, short run & long run cost, fixed cost, variable cost, total cost, average cost, marginal cost, opportunity cost. Break even analysis; meaning, explanation, numerical

Unit- 3 : Macro-Economic Indicators
Macro-Economic Indicators, Changes in the Gross Domestic Product (GDP), Gross National Product (GNP), Inflation, Employment & Unemployment Indicators, Currency Strength, Interest rates, Corporate Profits, Balance of Trade, Agricultural Production, Current Account balance, Foreign exchange, Foreign Trade, Industrial Production Index, Wholesale Price Index (WPI), Retail Price Index (RPI), Consumer Price Index (CPI).

Unit-4 : Introduction to Management
Definitions, Nature, scope Management & administration, skill, types and roles of managers Management Principles; Scientific principles, Administrative principles, Maslow's Hierarchy of needs theory.
Functions to Management: Planning, Organizing, Staffing, Directing, Controlling (meaning, nature and importance) Organizational Structures; meaning, principles of organization, types-formal and informal, line, line & staff, matrix, hybrid (explanation with merits and demerits), span of control, departmentalization.

Unit-5 : Introduction to Marketing & Production Management
Marketing Mix, concepts of marketing, demand forecasting and methods, market segmentation Introduction to Finance Management; meaning, scope, sources, functions
Production Management: Definitions, objectives, functions, plant layout-types & factors affecting it, plant location- factors affecting it. Introduction to Human Resource Management; definitions, objectives of manpower planning, process, sources of recruitment, process of selection

Reference Books:
1. Engineering Economics, R.Paneerselvam, PHI publication
2. Fundamentals of Management: Essential Concepts and Applications, Pearson Education, Robbins S.P. and Decenzo David A.
3. Economics: Principles of Economics, N Gregory Mankiw, Cengage Learning
4. Principles and Practices of Management by L.M.Prasad
5. Principles of Management by Tripathy and Reddy

Course Code	Course Name	L-T-P	Credit
CE-252C	Soil Mechanics & Engineering Geology Lab	0-0-2	1

List of Experiments:

1. Physical Properties of Minerals
2. Physical Properties of Rocks
3. Identification of Minerals in Hand Specimen
4. Identification of Rocks in Hand Specimen
5. Determination of C-ϕ values by direct shear test apparatus
6. Grain size distribution by sieving
7. Determination of water content by Pycnometer
8. Determination of specific gravity by Pycnometer

Course Code	Course Name	L-T-P	Credit
ME-254C	Strength of Materials Lab	0-0-2	1

List of Experiments:

1. To perform the Brinell Hardness Test
2. To perform the Rockwell Hardness Test
3. To study the Impact Testing Machine and perform the Impact Tests (IZOD &CHARY)
4. To study UTM and Torsion Testing Machine
5. To perform the Tensile Test on UTM
6. To perform the Shear Test on UTM
7. To perform the torsion test on Torsion Testing Machine
8. To determine the Moment of Inertia of a Flywheel about its own axis of rotation
9. To study the Erichsen Sheet Metal Testing Machine and Perform the Erichsen Sheet Metal Test.
10. To verify support reactions for different types of loads at different locations on the beam

SCHEME & SYLLABUS FROM-2019 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-254C	Surveying & Geomatics Lab	0-0-2	1

List of Experiments:

1. To determine the difference in elevation of two given points Dumpy Level with Al Stand
2. Profile leveling and cross sectioning of a given route.
3. To measure the horizontal angle by the method of reiteration and repetition, theodolite traversing and error adjustment.
4. To prepare the contour map of an area by the method of radial lines.
5. Determination of elevation of top of tower using theodolite
6. Plane tabling by the method of radiation and intersection.
7. Solution of Three-point problem in plane tabling
8. Setting out of simple circular curve by one theodolite and by two theodolite method
9. To prepare the contour map of an area by the method of Total Station.

Course Code	Course Name	L-T-P	Credit
CE-256C	Environmental Engineering Lab	0-0-2	1

List of Experiments:

1. To determine the pH of the given sample of water.
2. To determine the turbidity of the given sample of water
3. To determine Total Solids of the given water sample.
4. To determine the Total Dissolved Solids of the given water sample.
5. To find out conductivity of the given water sample.
6. To determine hardness of the given water sample.
7. To find out chloride of the given water sample.
8. To determine alkalinity of the given water sample.
9. To find out acidity of the given water sample.
10. To determine hardness of the given water sample.
11. To determine the optimum dose of alum by Jar test.
12. To study various water supply Fittings.

Course Code	Course Name	L-T-P	Credit
PDP-202	Life Skills	0-0-2	1

Course Code	Course Name	L-T-P	Credit
CE-301C	Concrete Technology	3-0-0	3

Unit 1:
Cement Hydration: Cement Types, Paste Micro-structure; Workability; Durability; Factors affecting strength of concrete. **Ingredients of concrete:** Cement: hydration of cement and its basic compounds, structure of hydrated cement, C-S-H gel, heat of hydration, gelspace ratio and its significance.
Aggregates: types, physical properties and standard methods for their determination.

Unit 2:
Concrete : Grade of concrete, proportioning of ingredients, water content and its quality for concrete, water/cement ratio and its role, Properties of fresh concrete including workability, air content, Flow ability, Segregation, Bleeding and Viscosity etc. _ Factors affecting, methods of determination Hardening plasticity and fatigue; Creep and shrinkage; Fresh concrete modelling; Moisture/Ionic diffusion in concrete.

Unit 3:
Admixture in concrete: Chemical and mineral admixtures, their types and uses: water reducers, accelerator, retarders, water-proofing plasticizers, super plasticizers, air-entraining agents. Use of fly ash and silica fume in concrete, their properties and effect.

Unit 4:
Quality control; Concrete mix design; Types of concrete; Concrete production; Tests of concrete in structures; Failure criteria; Fracture mechanics;
Concrete Handling in Field: Batching, mixing, placing and transportation of concrete, equipment's for material handling, various methods their suitability and precautions. Compaction of concrete: methods & equipment's. Curing of concrete: various methods their suitability. Durability of concrete

Unit 5:
Fabrication and Erection Work: Fabrication of Structural steel at slopes and sites, Handling and transportation of units to be erected, Erection of Fabricated steel structures, Prefabricated/precast construction; relative advantages & disadvantage and various precast units & Erection of Precast Reinforced Concrete Structures

Suggested Readings:
1. Concrete Technology by Neville & Brooks, Pearson Education.
2. Concrete: Microstructure, Properties & Materials by Mehta P.K, Tata Mc Graw Hill.
3. Concrete Technology by M.S.Shetty, S.Chand & Co.
4.Concrete materials by Popovics, Standard Publishers

SCHEME & SYLLABUS FROM-2019 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-303C	Geotechnical Engineering	3-1-0	4

Unit I: Soil Exploration : Planning for soil exploration, Spacing of boring, Depth of boring, Soil Sampling, Sample disturbance, Split Spoon Sampler

Soil Bearing Capacity : Ultimate soil bearing capacity, Terzaghi's theory, Effect of ground water table on bearing capacity, Settlement of foundation, Construction practices to avoid differential settlement

Unit II: Lateral Earth Pressure: Introduction, Types of earth retaining structures, Lateral earth pressures, Earth Pressure at Rest, Earth Pressure theories, Active and Passive Pressures

Stability of Retaining Walls: Stability considerations for gravity retaining walls, Coulombs theory Vs Rankins theory, Choice of appropriate theory, Numerical Problems based on lateral earth pressure and stability of retaining walls

Unit III: Slope Stability: Infinite Slopes, Finite Slopes, Total Stress analysis for purely cohesive soil, Effect of tension cracks, Method of slices for a cohesive frictional soil, Effective Stress Analysis, Steady seepage, Rapid drawdown.

Unit IV: Shallow Foundation: Introduction to Shallow Foundation, Types of foundations settlement, Elastic settlement based on the theory of elasticity, Elastic Settlement of foundations on saturated clay, Elastic Settlement of Sand Soil, Types of Shallow foundation.

Deep Foundation: Introduction, Necessity, Classification of piles, Uses of Piles, Load carrying capacity of piles, Negative skin friction.

Design of Pile Foundation: Design of pile foundation, Construction of pile foundations, laterally loaded piles (Batter Piles)

Unit V: Well Foundations: Introduction, Advantages of well foundations, Elements of well foundation, Design Aspects of well foundation, Grip length, Forces acting on well foundation, Terzaghi analysis, Tilts and Shifts, Remedial measures for rectification of tilts and shifts

Machine Foundation: Natural frequency of machine foundation, Transmissibility, Transmitted force, Machine foundation Special features, Design Approach for machine foundation, Vibration Isolation, Properties of isolating materials, Construction Aspects
of machine foundations

Text Books: 1. SOIL MECHANICS AND FOUNDATION ENGINEERING by K.R ARORA, STANDARD PUBLISHERS & DISTRIBUTORS, 3rd Edition, (2011)

Course Code	Course Name	L-T-P	Credit
CE-305C	Hydrology & Water Resource Engineering	3-1-0	4

Unit I: INTRODUCTION TO WATER RESOURCES ENGINEERING

Need of water resources projects, Preliminary aspects of Environmental Impact Assessment of Water Resources Projects, Hydrologic cycle, scope and application, hydro-metrology, hydrologic equation, hydrologic models, water resources engineering

Unit II: PRECIPITATION AND ABSTRACTIONS

Mechanism of precipitation, types and forms of precipitation, measurement techniques, rain gauge network, variability in precipitation, estimation of missing data, test for consistency of rainfall record, rainfall hyetograph, rainfall mass curve, areal average rainfall, intensity duration curves, evaporation, factors affecting evaporation, evaporimeters, estimation of evaporation, evapotranspiration, measurement of evapotranspiration, initial loss, infiltration and infiltration indices.

Unit III: RUN OFF AND HYDROGRAPH

Direct runoff and base flow; run off characteristics of streams, computation of runoff, rainfall-runoff relationships, components of hydrograph and factors affecting shape of hydrograph, base flow separation, effective rainfall hyetograph, unit hydrograph theory.

STREAM GAUGING AND DESIGN FLOOD: Site selection for stream gauging, direct methods of discharge measurements, computation of design flood.

Unit IV: GROUND WATER HYDROLOGY

Occurrence, distribution of ground water, specific yield of aquifers, movement of groundwater, Darcy's law, permeability, safe yield of a basin, compressibility of aquifer, storage coefficient, specific storage, hydraulics of wells under steady & introduction to unsteady condition in confined and unconfined aquifers, yield of wells, pumping and recuperation tests, types of tube wells.

Unit V: FLOOD ROUTING

Reservoir and channel flood routing methods.

OPEN CHANNEL FLOW: Channel Characteristics and parameters, Uniform flow, Critical flow, Specific Energy concepts, Gradually Varied Flows, Rapidly Varied flow with special reference to hydraulic jump.

LIST OF RECOMMENDED BOOKS:

1. K. Subramanya, " Engineering Hydrology", Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi,1990.
2. Asawa G.L.,"Irrigation and water resources Engineering", New Age International Publishers, New Delhi, 2005.
3. Garg S. K., "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, New Delhi, 1996.

Course Code	Course Name	L-T-P	Credit
CE-307C	Highway Engineering	3-1-0	4

Unit 1: Highway development and planning-Classification of roads, road development in India, Current road projects in India; highway alignment and project preparation.

Unit 2: Geometric design of highways-: Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems

Unit 3: Traffic engineering & control- Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems

Unit 4: Pavement materials- Materials used in Highway Construction- Soils, Stone aggregates, bituminous binders, bituminous paving mixes; Portland cement and cement concrete: desirable properties, tests, requirements for different types of pavements. Problems

Unit 5: Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements components and functions; factors affecting design and performance

List of Recommended Books:
1. Transportation Engg by S.K Sharma
2. Highway Engg by L.R Khadiyali
3. Highway Engg by Justo and Khanna

Course Code	Course Name	L-T-P	Credit
CE-309C	Design of Concrete Structures	3-1-0	4

Unit I: Fundamentals of working Stress Method: Concept of reinforced concrete, Stress strain characteristics of concrete and steel reinforcement, Elastic theory, singly reinforced beam, Balanced section, under reinforced section, over reinforced section, Analysis and design of singly reinforced rectangular section, doubly reinforced

rectangular section and T-sections, Design of one way and two-way slab as per IS- 456

Fundamentals of ultimate strength theory: Curved stress distribution, Compressive stress block, Simplified rectangular stress block as per Whitney's approach, Ultimate moment of resistance of singly reinforced section

Unit II: Introduction to limit state method of design : Concepts of probability and reliability, Characteristic loads, Characteristic strength, Partial safety factors for load sand materials, Introduction to limit states of collapse in flexure, Stress strain relationship for concrete, Stress strain relationship for steel, Design Stress block parameters, Determination of neutral axis depth, Computation of moment of resistance, Analysis and design of singly reinforced beam, doubly reinforced beam and T beam Sections

Unit III: Shear, Bond and Torsion : Limit state of Collapse-Shear, Development Length, Bond, anchorage, development length and splicing, Limit State of Collapse-Torsion.

Limit State of Serviceability: Introduction, Limit state of Deflection-Short term and long term, Control of deflection, Limit state of Cracking

Design of slabs: Introduction to one way and two-way slab, Design of one-way slab, Design of two way simply supported slab on the four edges with corners not held down and carrying u.d.l, Design of two way slab simply supported on the four edges with corners held down and carrying u.d.l

Unit IV: Foundation: Introduction, pressure distribution beneath footing, Indian Standard code recommendation for design of footings, Design concepts of isolated and combined footing, Detailed design of isolated wall and column footings

Unit V: Axially Loaded Columns: Introduction, types of columns, Assumptions in limit state of collapse in axial compression, Short Axially loaded member in axial compression, Short axially loaded column with minimum eccentricity, Compression members with helical reinforcement

Books: 1. LIMIT STATE DESIGN OF REINFORCED CONCRETE (IS 456 : 2000) by DR. BC PUNMIA, ASHOK KUMAR JAIN AND ARUN KUMAR JAINT, LAXMI PUBLICATIONS, 1st Edition, (2010)
2. REINFORCED CONCRETE DESIGN by PILLAI AND D MENON, MCGRAW HILL EDUCATION, 2nd Edition, (2007)

Course Code	Course Name	L-T-P	Credit
CE-351C	Design of Concrete Structures Lab	0-0-2	1

List of Experiments:

1. Introduction to concrete mix design
2. Design of one-way Slab
3. Design of two-way Slab
4. Design of Beam
5. Design of Column
6. Design of Stair
7. Design of Sunshade
8. Design of Lintel
9. Design of Foundation
10. Design of retaining wall.

Course Code	Course Name	L-T-P	Credit
CE-353C	Geotechnical Engineering Lab	0-0-2	1

List of Experiments:

1. Determination of liquid limit by Casagrande's apparatus.
2. Determination of plastic limit
3. Determination of shrinkage limit
4. Determination of field density by sand replacement method
5. Determination of compaction properties by standard Proctor Test Apparatus
6. To determine the compressibility parameters of soil by consolidation test
7. To determine the permeability of soil by constant and falling head methods.
8. To determine the CBR of soil.

Course Code	Course Name	L-T-P	Credit
CE-355C	Hydraulic Engineering Lab	0-0-2	1

List of Experiments:

1. Viscous flow analogy (Hele-Shaw apparatus) for flow net.
2. Electrical analogy for flow net.
3. Study of development of boundary layer over a flat plate.
4. Study of Magnus effect using wind tunnel
5. Study of fluid flow around a cylinder.
6. Study of fluid flow around a sphere.
7. Study of hydraulic jump in open channel flow.
8. Specific energy studies in an open channel flow.
9. Study of flow profile over a spillway.
10. Study of sluice gates.
    TiltingFlume/Adjustable Channel
11. Study of characteristics of Pelton Wheel
    A) Pelton Wheel Turbine Test Rig (Closed Circuit Type) 5H.P. Output
    B) Option Miniature Model (1 H.P. output)
12. Study of characteristics of Francis Turbine
 A) Francis Turbine Test Rig (Closed Circuit Type) 5 H.P. Output
 B) Option Miniature Model (1 H.P. output)
 C) Study of centrifugal pump test rig.
 D) Study of reciprocating pump test rig.

Course Code	Course Name	L-T-P	Credit
CE-357C	Highway Engineering Lab	0-0-2	1

List of Experiments:

1. To determine the impact value of aggregate sample.
2. To determine the crushing value of aggregate sample.
3. To determine the flakiness and elongation index of aggregate sample.
4. To perform Los Angeles Abrasion test on aggregate sample.
5. To determine the CBR value of a given soil sample.
6. To perform traffic survey & determine traffic volume & capacity.
7. To perform spot speed study.
8. To carry out the grain size analysis of course aggregates & fine aggregates
    (A)   Sieve Shaker
    (B)   Brass Sieve
    (C)   G.I.Sieve
9. To perform penetration test on bitumen sample.

        A. Bitumen Penetrometer – Hand Operated

        B. Bitumen Penetrometer – Electrical - Same as above with electrical arrangement.
10. To determine the softening point of bitumen sample

        A. Hand Operated
        B. Electrically Operated
11. To determine the specific gravity and water absorption of aggregate sample

        A. Thermostatically controlled Oven
        B. Wire Basket
        C. Digital Weighing Balance, 10 kg capacity
12.   To determine the ductility value of a bitumen sample.
13. To determine the striping value of coarse aggregate coated with bitumen

Course Code	Course Name	L-T-P	Credit
PDP-301	Leadership & Entrepreneurial Development	0-0-2	1

Course Code	Course Name	L-T-P	Credit
CE-311C	Repair & Rehabilitation of Structures	3-0-0	3

Unit I Maintenance and Repair Strategies Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration;

Unit II Strength and Durability Of Concrete- Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete – Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion – Effects of cover thickness;

Unit III Special Concretes- Polymer concrete, Sulphur infiltrated concrete, Fibre reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self-compacting concrete, Geopolymer concrete, Reactive powder concrete, Concrete made with industrial wastes;

Unit IV Techniques for Repair and Protection Methods- Non-destructive Testing Techniques, Epoxy injection, Shoring, Underpinning, Corrosion protection techniques – Corrosion inhibitors, Corrosion resistant steels, Coatings to reinforcement, cathodic protection;

Unit V Repair, Rehabilitation and Retrofitting of Structures- Evaluation of root causes; Underpinning & shoring; some simple systems of rehabilitation of structures; Guniting, shotcreting; Non-Destructive testing systems; Use of external plates, carbon fibre wrapping and carbon composites in repairs.
Strengthening of Structural elements, Repair of structures distressed due to corrosion, fire, Leakage, earthquake – Demolition Techniques – Engineered demolition methods – Case studies.

Course Code	Course Name	L-T-P	Credit
CE-313C	Construction Equipment's & Automation	3-0-0	3

Unit I

Conventional construction methods Vs Mechanized methods and advantages of latter.

Unit II

Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; plastering machines.

Unit III

Prestressing jacks and grouting equipment; Cranes, Hoists and other equipment for lifting.

Unit IV

Equipment for transportation of materials.

Unit V

Equipment Productivities; Use of Drones for spread out sites; Use of robots for repetitive activities.

Course Code	Course Name	L-T-P	Credit
CE-315C	Building Construction Practice	3-0-0	3

Unit I

Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork. Masonry – stone masonry – Bond in masonry - concrete hollow block masonry.

Unit II

Flooring – damp proof courses – construction joints – movement and expansion joints – pre-cast pavements.

Unit III

Building foundations – basements – temporary shed – centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses – frames – braced domes – laying brick – – weather and water proof – roof finishes – acoustic and fire protection;

Unit IV

Sub Structure Construction- Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunnelling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation;

Unit V

Super Structure Construction- Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks.

Course Code	Course Name	L-T-P	Credit
CE-302C	Specification Estimation & Costing	3-1-0	4

Unit I

ESTIMATE: Methods of estimating, Deductions for openings, Building estimate by long wall-short wall method and centre line method, Arch masonry calculations

Unit II

ESTIMATE OF BUILDINGS: Estimate of single room with varandah, estimate of double room with varandah, estimate of masonry platform, estimate of masonry tank, estimate of hexagonal room, estimate of septic tank, estimate of roads and canals

Unit III

SPECIFICATIONS: Specification of roads, Specification of various building parameters, Specification of industries, Specification of earthwork

Unit IV

R.C.C WORKS AND STRUCTURES: R.C.C works, Standard hooks and cranks of reinforcement bars, Estimate of R.C.C slab, Estimate of R.C.C column, Estimate of R.C.C beam, Estimate of R.C.C footing, Estimate of R.C.C retaining wall

Unit V

RATE ANALYSIS: Preparing analysis of rates, Analysis of rates for cement concrete foundation, Analysis of rates for Earthwork in excavation with a concept of lead and lift, Analysis of rates for RCC in roof slab, Analysis of rates for Terrazzo and marble Flooring, Analysis of rates for Brick masonry in cement mortar

Text Books:

1. ESTIMATING AND COSTING IN CIVIL ENGINEERING by B.N .DUTTA, UBS PUBLISHERS' DISTRIBUTORS (P) LTD.-NEW DELHI, 26th Edition, (2013)

Course Code	Course Name	L-T-P	Credit
CE-304C	Structural Analysis – I	3-1-0	4

Unit I: Basic Introductory Concepts

Structural Systems - Equilibrium and compatibility - Stability and Indeterminateness - Types of Loadings -Free body diagram.

Analysis of Forces in Statically Determines Structures

Analysis Trusses (Including compound trusses), Beams and Frames (Including internal hinges) – Analysis of Beams and Frames (Including internal hinges)

Unit II: Analysis of Space Trusses Using Tension Coefficient Method.
Introduction to Force (Flexibility) And Displacement (Stiffness) Method of Analysis

Unit III: Analysis for Moving Loads

Influence lines for determinate beams and trusses - Criteria for maxima of internal forces for beams and trusses.

Unit IV: Displacement of Statically Determine Structures

Determination of slope and deflections of beams using successive integration and conjugate Beam methods – Determination of deflection of trusses using virtual work method – Williot Mohr Diagram

Unit V: ANALYSIS OF INDETERMINATE TRUSSES

Statically indeterminate structures –Force and Displacement method of analysis - Analysis by superposition – Selection of redundant restraints – Method of consistent deformations

BOOKS RECOMMENDED

1. Gupta S P and Pandit G S, " Theory of Structures" Volume 1 and 2, Tata Mc Graw Hill, New Delhi, 1999
2. Vaidyanatnan, R and Perumal P "Structural Analysis", Vol – I & II, 3rd edition, Laxmi Publication, New Delhi, 2007
3. Negi L S and Jangid R S, "Structural Analysis", Tata Mc Graw Hill, New Delhi, 1999
4. Utku, S, Norris, C H and Wilbur, J B "elementary Structural Analysis", Mc Gra Hill, NY, USA., 1991
5. Hibbler R C, "Structural Analysis",6th edition, Prentice Hall, NJ, USA, 2006

Course Code	Course Name	L-T-P	Credit
CE-306C	Design of Steel Structures	3-1-0	4

Unit 1: Plastic Analysis:
Plastic analysis of steel structures, static and mechanism method of analysis, shape factor. Classification of Cross Sections: As per IS 800-2007 Plastic, compact, semi compact, slender sections, their characteristics including moment- rotation.

Unit 2: Connections:
Riveted Connection, Types of bolts, load transfer mechanism, Design of bolted and welded connections under axial and eccentric loadings.
Introduction of Welded Connection: Introduction, Types of welded joints, Design of welded joint subjected to axial loads, Design of welded joints subjected to eccentric loads, Design of simple, semi-rigid and rigid connections

Unit 3: Compression Member:
Column buckling curves, Design of compression member; Axially loaded built up columns, design of lacings and battens.
Beams: Design of beams: simple and compound sections, laterally supported and unsupported beam design, Web buckling, web crippling, lateral torsional buckling.
Tension Members: Design strength in gross section yielding, net section rupture and block shear. Design of axially loaded tension members

Unit 4: Design of plate girder:
Design of welded and bolted sections. Connections for flange plate to flange angles and flange angles to web, etc. Design of welded connections. Web and flange splicing. Horizontal, Intermediate and Bearing stiffeners. Design of gantry girder.

Unit 5: Column Bases:
Design of column bases, Slab base, gusseted base for axial and eccentric compressive load.
Water tanks: circular tanks with segmental bottoms, rectangular tanks, pressed steel tanks, design of staging.

Reference Books:
1-Design of Steel Structures by N. Subramanian, Oxford University Press.
2. Limit state Design of Steel Structures: S K Duggal, TMH publication
3- Design of Steel Structures by S. Bhavikatti, I.K. International Pvt. Ltd.
4- Design of Steel Structures by V.L. Shah, Structures Publications.

Course Code	Course Name	L-T-P	Credit
CE-308C	Open Channel Flow	3-0-0	3

Unit I

Analyze for unsteady flows in open channels; Derivation of 1-D and 2-D shallow water flow equations.

Unit II

Consideration for nonhydrostatic pressure distribution; Basics of numerical methods: Finite-Difference and Finite Element Methods.

Unit III

Latest shock capturing Finite Volume methods for solving 1-D and 2-D shallow water flow equations; Dambreak flow.

Unit IV

Flood routing in large channel networks, Flood routing in compound channels; Flood routing in channels with flood plains.

Unit V

Surface irrigation flow modelling.

Course Code	Course Name	L-T-P	Credit
CE-352C	Structural Analysis – I Lab	0-0-2	1

List of Experiments:

1. Determination of Shear force for simply supported beams.
2. Determination of Bending Moment for simply supported beams
3. Determination of Slope of continuation beams.
4. Determination of Deflection of continuous beams.
5. Determination of deflection of pin-jointed trusses.
6. Determination of reaction of portal frames
7. Determination of deflected shape of portal frames.
8. Determination of influence line determinate beams.

Course Code	Course Name	L-T-P	Credit
CE-354C	Major Project – I	0-0-4	2

To set the objectives, deliverables, work plan, logistics planning and milestones with discernible outputs and then to demonstrate the feasibility through some initial work.

Course Code	Course Name	L-T-P	Credit
PDP-302	Problem Solving Skills	0-0-2	1

Course Code	Course Name	L-T-P	Credit
CE-310C	Construction Project Management	3-0-0	3

Unit I
Construction: Agencies involved and their methods of execution, Introduction to construction management, Unique features of Construction management, Stages in Construction, Description of Contract, Contract document, Contractual relationships, Bid and award process, Types of construction contracts, Phases of a project, Construction project planning- Stages of project planning, Pre-tender, post tender planning, Scheduling and Controlling

Unit II
Techniques of planning: Introduction and development of bar charts, Shortcomings of bar charts, Development of pert network, Development of network, Numbering the events, Modes of network construction, Steps in network development, Work Breakdown structure, Hierarchies

Unit III
PERT: Determining three-time estimates, Slack computations, Use of PERT, Time estimates, Frequency distribution, Mean, variance and standard deviation, Probability distribution, Beta distribution
CPM: Calendaring Networks, Activity time estimate, Computation of Te and Tl, Float, Critical path, Project cost, Optimum duration, Cost optimization.

Unit IV
Resource Scheduling: Process Updating, Data required for updating, Steps in the process of updating, Resource Allocation, Resource Smoothing and Levelling

Unit V
Construction Equipment and Safety: Excavators, Backhoe loaders, Cranes, Other construction equipment's, Quality assurance and Quality Control, Quality and Contractor selection, Safety Program Development, Accident/ incident investigation, Safety and health training, Need of training

Books:
1. PROJECT PLANNING AND CONTROL WITH PERT AND CPM by B.C.PUNMIA AND K. K. KHANDELWAL, LAKSHMI PUBLICATIONS, 4th Edition, (2012)
2. CONSTRUCTION MANAGEMENT FUNDAMENTALS by Y KRAG KNUTSON, CLIFFORD J. SCHEXNAYDER, CHRISTINE FIORI, RICHARD E. MAYO, TATA MCGRAW HILL, 2ND EDITION (2011), MCGRAW HILL EDUCATION, 2nd Edition, (2011)

Course Code	Course Name	L-T-P	Credit
CE-314C	Construction Productivity	3-0-0	3

Unit I

Definition of Productivity, Impact of productivities on construction duration and costs; Measuring productivities of construction equipment.

Unit II

Staff and Labour and typical benchmarks for the same; Productivity analysis from Daily Progress Reports.

Unit III

Lean Construction concepts of Value Adding activities, Non-Value Adding Activities and Non-Value Adding but Necessary Activities.

Unit IV

Productivity measurements by special Lean Construction-oriented field methods such as Work Sampling, Takt time analysis, Foreman Delay Surveys.

Unit V

Productivity improvement measures such as Value Stream Mapping, Location-Based management Systems, 5S, good Housekeeping, etc.; use of specialist software such as Vico for productivity studies.

Course Code	Course Name	L-T-P	Credit
CE-318C	Construction Project Planning & System	3-0-0	3

Unit I

Definition of Projects; Stages of project planning: pretender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail, work break-down structure, estimating durations, sequence of activities, activity utility data.

Techniques of planning- Bar charts, Gantt Charts. Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks.

Unit II

PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion.

Allocation of Resources- materials, equipment, staff, labour and finance; resource levelling and optimal schedules; Project organisation, documentation and reporting systems. Control & monitoring; Temporary Structures in Construction; Construction Methods for various types of Structures.

Unit III

Importance of Contracts Management; Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control.

Unit IV

Project Monitoring & Control- Supervision, record keeping, periodic progress reports, periodical progress meetings. Updating of plans: purpose, frequency and methods of updating. Common causes of time and cost overruns and corrective measures. Basics of Modern Project management systems such as Lean Construction; Use of Building Information Modelling (BIM) in project management.

Unit V

Quality control: concept of quality, quality of constructed structure, use of manuals and checklists for quality control, role of inspection, basics of statistical quality control. Safety, Health and Environment on project sites: accidents; their causes, effects and preventive measures, costs of accidents, occupational health problems in construction, organizing for safety and health.

Text Book:
1. Project Planning & Control with PERT & CPM by B. C. Punmia.

Course Code	Course Name	L-T-P	Credit
CE-312C	Traffic Planning & Management	3-0-0	3

Unit I

Transport planning process systems : Approach to transport planning, Stages in transport planning survey and analysis of existing conditions, Forecast analysis of future conditions and plan synthesis difficulties in the transport planning process, Transportation survey, Type of surveys, Inventory of transport facilities, Inventory of land use and economic activities, Expansion of data from samples

Unit II

Trip generation : Trip purpose, Factors governing trip generation and attraction rates, Multiple linear regression analysis, Category analysis

Trip distribution : Methods of trip distribution, Uniform constant factor method, Average factor method, Fratar method, Furness method, Gravity model, Tanners model, Opportunity model

Unit III

Traffic Assignment : Assignment technique, Capacity restraint assignment, Diversion curves

Modal split : Factors affecting modal split, Modal split in the transport planning process, Recent developments in modal split analysis

Unit IV

Evaluation : Need for Evaluation, Several plans to be formulated, Consideration in evaluation, Economic evaluation

Land use Transport models : Selection of land use transport models, Lowry Derivative Models, Garin–Lowry Model

Unit V

Transport planning for small, medium and large cities : Difficulties in transport planning for small and medium cities, Quick response techniques, Public transport in cities, Planning for public transport, Fares and subsidies

Intermediate public transport in Indian cities : Type of IPT vehicles in India, Characteristics of IPT modes

Unit VI

Computer application in transport planning : Transport planning and computer applications, Computer applications in public transport systems simulation, Programme packages, Use of information technology in transportation

Text Books:

1. TRAFFIC ENGINEERING AND TRANSPORT PLANNING by L.R. KADIYALI, KHANNA PUBLISHERS, 1st Edition, (2007)

2. HIGHWAY ENGINEERING by S.K. KHANNA AND C.E.J JUSTO, NEM CHAND BROTHERS, 1st Edition,

Course Code	Course Name	L-T-P	Credit
CE-316C	Transportation Economics	3-0-0	3

Unit I

Introductory Concepts in Transportation Decision Making: Overall transportation project development, budgeting, financial planning, the process of transportation project development, models associated with transportation impact evaluation.

Unit II

Transportation costs - Classification of transportation costs, transportation agency costs, transportation user costs, general structure and behavior of cost functions and road pricing.

Unit III

Estimating Transportation Demand and Supply - supply equilibration, dynamics of transportation demand and supply, elasticity of travel demand and supply, classification of elasticity; Vehicle operating costs: Fuel costs - Maintenance and spares, Depreciation - Crew costs - Value of travel time savings - Accident costs.

Unit IV

Economics of traffic congestion - Pricing policy; Economic analysis of projects - Methods of evaluation - Costbenefit ratio, first year rate of return, net present value, and internal-rate of return methods; Indirect costs and benefits of transport projects.

Unit V

Financing of road projects - methods – Private Public Partnership (PPP) - Toll collection - Economic viability of Design-Build-Operate-Transfer Schemes – Risk Analysis – Value for Money analysis - Case Studies.

Course Code	Course Name	L-T-P	Credit
CE-320C	Traffic Engineering	3-0-0	3

Unit I: Traffic engineering administration and functions.: Traffic engineering., Functions., Organisation of traffic engineering department., Human factors governing road user behaviour., Other vehicle characteristics., Characteristics of slow moving traffic in India.

Unit II: Analysis and Interpretations of traffic studies. : Statistical methods for traffic engineering., General trends in speed data., Time mean speed and space mean speed., Traffic forecasting., Limitations of traffic forecasting., Types of traffic., Forecasts and mathematical models., Period for forecasting.

Unit III: Traffic surveys. : Speed, Journey time and delay surveys., Methods of measuring spot speeds., Presentation of travel time and journey speed data., Vehicle volume count., Types of counts., Methods available for traffic counts., Origin-destination survey., Checking the accuracy of survey data., Parking surveys.
Geometric design. : Highway classification., Horizontal alignment., Vertical
alignment., Sight distance., Intersections., Grade separated intersections., Design for pedestrian facilities., Design criteria for separate cycle tracks., Traffic and parking problems., Design standards for on street parking facilities., Off street parking facilities.

Unit IV: Traffic control. : Importance of traffic sign., Need for international standardisation., General principles of traffic signing., Types of traffic signs., Road markings & types, Traffic signals & types, Advantages and disadvantages of traffic signals., Coordinated control of signals., Traffic control aids and street furnitures.
Traffic regulations and traffic safety. : Traffic regulations and traffic safety., Basic principles of traffic regulation., Regulation of speed, vehicles and driver., Road accidents., Cause and prevention., Road accidents and traffic engineering., Accident situation in India., Statistical methods for analysis of accident data., Roads and its effect on accidents., Cost of road accidents.

Unit V: Street lighting. : Need for street lighting, Some laws of illumination, Appearance of lighted pavement., Types of lamps., Illumination of traffic rotaries., Lighting at bends, dual carriageways & bridges., Tunnel lighting., Maintenance off lighting installations.

Text Books:
1. TRAFFIC ENGINEERING. by MATSON T.M. SMITH, W.S AND HURD F.W., M. G.HILLS
References:
1. TRAFFIC ENGINEERING HAND BOOK by EVANS, H.K, INSTITUTE OF TOWN PLANNERS, INDIA, 1st Edition,
2. AN INTRODUCTION TO HIGHWAY TRANSPORTATION ENGINEERING. by CAPOLLE

Course Code	Course Name	L-T-P	Credit
CE-356C	Construction Project Management Lab	0-0-2	1

Course Objectives:
• Student will get complete knowledge about applications of CPM and PERT.
• Student will learn about how to bring the project to completion on time.
• Syllabus emphasizes on managing the project cost and contingencies.

List of Practicals:
1. Practical 1: Introduction (Introduction to Primavera- Primavera modules)
   Introduction (To Generate the Enterprise project structure and Organizational Breakdown Structure for an organisation having different projects)
2. Practical 2: Introduction (To create a new project with the help of primavera)
3. Practical 3: Calendars and Scheduling (To Add Activity to the project and Relationships to activities)
   Calenders and Scheduling (How to create a project calender and editing of relationships in Gantt chart and Deleting Relationship)
   Calenders and Scheduling (To add Predecessors and Successors for different activities and formation of activity network for a construction project)
4. Practical 4: Introduction (To Create work breakdown structure for a project)
5. Practical 5: Activity, Resource and Project Codes (To Generate of activities and activity codes for a construction project)
6. Practical 6: Activity, Resource and Project Codes (To add and assign resources for a project and generation of resource curve)
7. Practical 7: Resource Analysis and Levelling (How to prepare resource histogram and spreadsheet, resource levelling)
8. Practical 8: Updating (How to set and restore a Base line and Activity in Progress) Practical
9. Updating (How to Display progress line in Gantt Chart and updating Resources and costs)

Course Code	Course Name	L-T-P	Credit
CE-358C	Building Drawing Lab	0-0-2	1

Course Objectives:
• Student will get complete knowledge about applications of building drawing using advanced design software's such as AutoCad 3D, Revit, etc.

List of Practical's:
1. Study Exercise – Principles of Planning, Orientation and Complete Joinery Details (Paneled And Glazed Doors and Windows)
2. A Reading Room With R.C.C Flat Roof
3. A Residential Building with Single Bed Room
4. Library Building With R.C.C Flat Roof
5. Residential Building with Load Bearing Walls and Flat Roof
6. Fully Tiled Gabled House
7. Residential Building with Load Bearing Walls and Pitched Roof
8. RCC Framed Building with RCC Roof
9. Primary Health Centre
10. School Building
11. Workshop Building

Course Code	Course Name	L-T-P	Credit
CE-360C	Structural Drawing Lab	0-0-2	1

Course Objectives:
• Student will get complete knowledge about applications of structural drawing using Staad Pro software.

List of Practical's:
1. Introduction to geometric, material.
2. Introduction to modeling of boundary condition and application of loads.
3. Analysis and Design of simple and Continuous RCC beams.
4. Analysis of results and preparation of working drawing showing general arrangement for CAD design for RCC beams.
5. Analysis and Design of single and multiple bay frame of RCC.
6. Analysis of results and preparation of working drawing showing general arrangement for CAD design for single and multiple bay frame of RCC.
7. Analysis of framed RCC structure for DL, LL and earthquake load.
8. Analysis of results and preparation of working drawing showing general arrangement.
9. Analysis and Design of a framed Steel structure.
10. Analysis of results and preparation of working drawing showing general arrangement of framed steel structure.
11. Analysis and Design of Steel Truss subjected to Concentrated load, UDL and moving load.

Course Code	Course Name	L-T-P	Credit
CE-401C	Earthquake Resistant Design of Structures	3-1-0	4

Unit I

Earthquake Basics: Interior of Earth, plate tectonics, faults, consequences of earthquake, Basic parameters of earthquake, magnitude & intensity, scales, Seismic zones of India, damages caused during past earthquakes (worldwide).

Unit II

Fundamentals of Earthquake Vibrations of buildings: Static load v/s Dynamic load (force control and displacement control), simplified single degree of freedom system, mathematical modelling of buildings, natural frequency, resonance v/s increased response, responses of buildings to different types of vibrations like free and forced, damped and un-damped vibration, response of building to earthquake ground motion, Response to multi degree (maximum three) of freedom systems up to mode shapes

Unit III

Design Philosophy: Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural configuration, Introduction to IS: 1893 (Part I), IS: 875 (Part V). Seismic load: Seismic Coefficient Method – base shear and its distribution along height. Introduction to Response spectrum, IS code provisions.

Unit IV

Lateral Loads on Buildings: Lateral Load Distribution (SDOF): Rigid diaphragm effect, centers of mass and stiffness, torsionally coupled and uncoupled system, Lateral Load Analysis: Analysis of frames using approximate methods like portal & cantilever methods

Unit V

Ductile Detailing: Concepts of Detailing of various structural components as per IS: 13920 provisions, Introduction to Earthquake Resistant Features of un-reinforced & reinforced masonry Structure, Confined Masonry, Soil liquefaction, Structural controls, Seismic strengthening.

Reference Books:
1. Manish Shrikhande & Pankaj Agrawal; Earthquake resistant design of structures, PHI Publication, New Delhi
2. S.K.Duggal; Earthquake resistance design of structures; Oxford University Press, New Delhi.
   3. A.K.Chopra; Dynamics of structures, Pearson, New Delhi

Course Code	Course Name	L-T-P	Credit
CE-403C	Channel Hydraulics	3-0-0	4

Unit I:
Introduction to Open Channel Flow: Difference between Open Channel Flow and Pipe Flow, Types of Channel, Geometric parameters of a channel, Classification of Open Channel Flow, Continuity and Momentum equation.

Unit II:
Uniform flow: Resistance flow formula, Velocity distribution, Equivalent roughness coefficient, Velocity coefficients, Uniform flow in rigid boundary channel, Uniform flow in mobile boundary channel

Unit III:
Energy and Momentum Principle: Concept of Specific Energy, Critical Depth, Alternate depth, Specific Force, Sequent depth. Non-Uniform Flow: Governing equation of GVF, Classification of Gradually Varied Flow, Computation of GVF profile, Rapidly Varied Flow, hydraulic Jump, Flow over a Hump, Flow in Channel Transition

Unit IV:
Canal Design: Concept of best hydraulic section, Design of rigid boundary canal, design of channel in alluvial formation- Kennedy's theory, Lacy's theory, Method of Tractive force, Free-board in canal. Unsteady Flow: Wave and their classification, Celerity of wave, Surges, Characteristic equation.
Pipe Flow: Losses in pipes, Pipe in series and parallel, Pipe network analysis, Water hammer, Surge tank
Hydraulic Model Study: Important dimensionless flow parameters, Similitude: Geometric, Kinematic and Dynamic Similarity, Model scales

Course Code	Course Name	L-T-P	Credit
CE-405C	Traffic Engineering	3-0-0	3

Unit I: Traffic engineering administration and functions.: Traffic engineering., Functions., Organisation of traffic engineering department., Human factors governing road user behaviour., Other vehicle characteristics., Characteristics of slow moving traffic in India.

Unit II: Analysis and Interpretations of traffic studies. : Statistical methods for traffic engineering., General trends in speed data., Time mean speed and space mean speed., Traffic forecasting., Limitations of traffic forecasting., Types of traffic., Forecasts and mathematical models., Period for forecasting.

Unit III: Traffic surveys. : Speed, Journey time and delay surveys., Methods of measuring spot speeds., Presentation of travel time and journey speed data., Vehicle volume count., Types of counts., Methods available for traffic counts., Origin-destination survey., Checking the accuracy of survey data., Parking surveys.
Geometric design. : Highway classification., Horizontal alignment., Vertical
alignment., Sight distance., Intersections., Grade separated intersections., Design for pedestrian facilities., Design criteria for separate cycle tracks., Traffic and parking problems., Design standards for on street parking facilities., Off street parking facilities.

Unit IV: Traffic control. : Importance of traffic sign., Need for international standardisation., General principles of traffic signing., Types of traffic signs., Road markings & types, Traffic signals & types, Advantages and disadvantages of traffic signals., Coordinated control of signals., Traffic control aids and street furnitures.
Traffic regulations and traffic safety. : Traffic regulations and traffic safety., Basic principles of traffic regulation., Regulation of speed, vehicles and driver., Road accidents., Cause and prevention., Road accidents and traffic engineering., Accident situation in India., Statistical methods for analysis of accident data., Roads and its effect on accidents., Cost of road accidents.

Unit V: Street lighting. : Need for street lighting, Some laws of illumination, Appearance of lighted pavement., Types of lamps., Illumination of traffic rotaries., Lighting at bends, dual carriageways & bridges., Tunnel lighting., Maintenance off lighting installations.

Text Books:
1. TRAFFIC ENGINEERING. by MATSON T.M. SMITH, W.S AND HURD F.W., M. G.HILLS
References:
3. TRAFFIC ENGINEERING HAND BOOK by EVANS, H.K, INSTITUTE OF TOWN PLANNERS, INDIA, 1st Edition,

Course Code	Course Name	L-T-P	Credit
CE-407C	Waste Management	3-0-0	3

Unit 1
Relevant Regulations Municipal solid waste (management and handling) rules; hazardous waste (management and handling) rules; biomedical waste handling rules; flyashrules;recycled plastics usage rules; batteries (management and handling) rules

Unit 2
Municipal Solid Waste Management – Fundamentals Sources; composition; generation rates; collection of waste; separation, transfer and transport of waste; treatment and disposal options

Unit 3
Hazardous Waste Management – Fundamentals Characterization of waste; compatibility and flammability of chemicals; fate and transport of chemicals; health effects

Unit 4
Radioactive Waste Management – Fundamentals Sources, measures and health effects; nuclear power plants and fuel production; waste generation from nuclear power plants; disposal options

Unit 5
Environmental Risk Assessment Defining risk and environmental risk; methods of risk assessment; case studies**Physicochemical Treatment of Solid and Hazardous Waste** Chemical treatment processes for MSW (combustion, stabilization and solidification of hazardous wastes); physicochemical processes for hazardous wastes (soil vapour extraction, air stripping, chemical oxidation); ground water contamination and remediation

References:
1. John Pichtel Waste Management Practices CRC Press, Taylor and Francis Group 2005.
2. LaGrega, M.D.Buckingham,P.L. and Evans, J.C. Hazardous Waste Management, McGraw Hill International Editions, New York, 1994.
 3. Richard J. Watts, Hazardous Wastes - Sources, Pathways, Receptors John Wiley and Sons, New York, 1997.

Course Code	Course Name	L-T-P	Credit
CE-409C	Foundation Engineering	3-1-0	4

Unit 1

Soil Exploration and Geophysical Investigation Introduction 1.10 Planning for subsurface exploration 1.11 Methods of exploration 1.12 Geophysical exploration 1.13 Soil sampling and samplers 1.14 In-situ tests 1.15 Common soil tests 1.16 Soil investigation report

Unit 2

Theory of Lateral Earth Pressure Introduction 2.11 Types of earth pressures 2.12 Different theories of earth pressures 2.13 Displacement-related earth pressure 2.14 Rankine and Coulomb theory 2.15 Friction circle method 2.16 Terzaghi's analysis 2.17 Development of bearing capacity theory 2.18 Development of uplift capacity theory

Unit 3

Methods of Analyses Introduction 3.8 Different methods of analysis 3.9 Limit equilibrium 3.10 Limit analysis 3.11 Method of characteristics 3.12 Finite element method

Unit 4

Design of Shallow Foundations Introduction 4.9 Different types of foundations 4.10 Calculation of bearing capacity 4.11 Stresses in soil 4.12 Concept of contact pressure 4.13 Calculation of settlements 4.14 Codal provision

Unit 5

Design of Deep Foundations Introduction 5.11 Different types of foundations 5.12 Design methodology for piles 5.13 Calculation of pile capacity 5.14 Stresses in pile 5.15 Analysis of pile group 5.16 Settlement of pile group 5.17 Concept of negative skin friction 5.18 Piles subjected to lateral loads 5.19 Pile load test 5.20 Design and construction of well foundation, piers etcDesign of Retaining Structures Introduction 6.10 Different types of retaining structures 6.11 Stability analysis of rigid walls 6.12 Design of cantilever sheet piles 6.13 Design of anchored sheet piles 6.14 Bracing system for underground construction 6.15 Failure analysis for bracing system

NPTEL http://nptel.ac.in Civil Engineering Coordinators: Prof. Mahendra Singh Department of Civil EngineeringIITRoorkee

Course Code	Course Name	L-T-P	Credit
CE-451C	Traffic and Transportation Engineering Lab	0-0-2	1

1. Determination of specific gravity and water absorption of coarse aggregate.
2. Determination of particle size distribution.
3. Determination of aggregate impact value.
4. Determination of aggregate crushing value.
5. Determination of Los Angeles abrasion value of aggregates.
6. Determination of flakiness index and elongation index of coarse aggregate.
7. Determination of penetration value of bitumen.
8. Determination of softening point value of bitumen.
9. Determination of ductility value of bitumen.

Course Code	Course Name	L-T-P	Credit
CE-453C	Seminar	0-0-4	2

Presentation by each student on any other topics specified by the course coordinator.

Course Code	Course Name	L-T-P	Credit
PDP-401	Campus to Corporate	0-0-2	1

UNIT 1 –Employability Quotient   - Resume Writing, Types of Resume, Profile Building

Resume Writing Practice

UNIT 2 – Group Discussion – Definition of GD, Difference between GD and debate, Do's and don'ts of GD. Mock GD sessions

UNIT 3 – Interview Skills – Facing Personal, Technical & HR, FAQ and their answers

Mock interviews

UNIT 4 – Organizational Skills at Work place – focus & productivity, delegation, resource management & management skills

UNIT 5 – Corporate Policies, Corporate Life, Corporate Etiquette Corporate Truths for every Fresher

UNIT 6 – Presentation Skills – how to prepare an effective Presentation Skills, do and don'ts of presentation.   Mock   presentations

Course Code	Course Name	L-T-P	Credit
CE-423C	Hydropower Engineering	3-0-0	3

Unit I: Introduction: Common building material, Mechanical properties of material, Comparison of various mechanical properties. **Stones**: Common building stones, Requirement of a good building stones, Dressing and preservation of stones. **Bricks**: Manufacture of clay bricks, Classification and testing of clay bricks, Problems of efflorescence.

Unit II: Lime: Manufacture, Classification of lime. **Timber**: Classification and wood based products of timber, Defects and their prevention, Factors effecting the strength of timber., Seasoning and preservation of timber. **Asphalt, Bitumen and Tar**: Terminology, Bituminous materials, Specification and usage **Cement**: Properties, Uses and types; manufacturing and materials, Plastering and Form Work.

Unit III: Introduction of Buildings and Foundations: General Introduction of Buildings, Types of Buildings, Components of Buildings, Design Loads, Introduction of Foundation, Types of Foundation, Function of Foundation, Essential Requirements of a good Foundation, Site Investigation and Sub-Soil Exploration, Method of Site Exploration, Settlement of Foundation, Causes of Failures **of** Foundations and Remedial Measures

Unit IV: Bricks Masonry and Composite Masonry: Introduction of Brick Masonry, Types of bricks, Bonds in brick work, Supervision of brick work, Defects in brick masonry, Strengths of brick masonry, Introduction of Composite Masonry, Reinforced brick masonry, Stone composite masonry, Brick-stone composite masonry, Concrete block masonry, Hollow clay block masonry, Damp Proofing, Termite proofing and Fire Protection of Buildings.

Unit V: Walls: Types of walls, Introduction of cavity walls, General features of cavity walls, Construction of cavity walls, Introduction of partition walls, Brick partitions, Clay block partition walls, Concrete partitions, Glass partitions.
Floors and Roofs: Introduction of a Floor, Components of a Floor, Materials for Construction, Selection of Flooring Material, Cement Concrete Flooring, Brick Flooring, Marble flooring, Asphalt Flooring, Introduction of Roofs, Types of Roofs, Trussed Roofs, Steel Roof Trusses

Books:

Building Construction, B. C. Punmia

Construction Materials, S. C. Rangwala

Course Code	Course Name	L-T-P	Credit
CE-425C	Transportation Engineering & Systems	3-0-0	3

UNIT 1:
Transportation Systems and their classification and description. Role of Roads, Road Transport and Planning in India. Road User and the Vehicle.
Highway Planning: Highway Planning Process, specifically in India, Transport or Highway related Agencies in India, Classification of Roads and Road Development Plans

UNIT 2:
Highway Geometric Design: Cross Sectional Elements, camber, Sight Distances – definition and analysis of SSD and OSD.
Highway Project Preparation: Surveys and Investigations. Controlling Factors and Surveys for Highway Alignment. Road Patterns

UNIT 3:
Pavements: Types of Pavements, Road Construction Materials. Highway Maintenance.
Traffic Engineering: Traffic Characteristics, Functions, PIEV theory, Traffic Survey, PCU, Parkings & survey, Traffic signs, Road Markings, Traffic Signals, Traffic Safety.

UNIT 4:
Introduction to Railway Engineering
Permanent Way Components: Types and Selection of Gauges, Permanent way & its requirements, functions of rail, requirements of an ideal rail, types of rails, markings & length of rails, Drainage, Salient Features and types of Components viz. Rails, Sleepers, Ballast, Rail Fastenings, Coning of Wheels, Wear Rail Joints, Length of Rail, Sleeper Density and Spacing, Stations, Yards.
Tunneling: Introduction, advantages, disadvantages.

UNIT 5:
Airport Engineering: -Introduction: Requirements to Airport Planning, Airport Classifications, Factors in Airport Site Selection, Airport Size, Obstructions, Zoning.
Planning and Design of Airport: Requirements of Airport, Planning of Terminal Area, and different Layouts, Location of Gates, Types of Runway patterns, Runway Layout, Runway Length, Layout of Taxiways, Exit or Turnaround Taxiways, Apron and Hangers, Wind-rose diagram.

List of Recommended Books:
4. Transportation Engg by S.K Sharma
5. Highway Engg by L.R Khadiyali
6. Highway Engg by Justo and Khanna
7. Railway Engineering by S. C. Saxena
8. Airport Planning & Design by S. K. Khanna, Nem Chand & Bros. Publication

Course Code	Course Name	L-T-P	Credit
CE-402C	Metro Systems & Engineering	3-0-0	3

Unit I

GENERAL: Overview of Metro Systems; Need for Metros; Routing studies; Basic Planning and Financials

Unit II

CIVIL ENGINEERING-Overview and construction methods for: Elevated and underground Stations; Viaduct spans and bridges; Underground tunnels; Depots; Commercial and Service buildings. Initial Surveys & Investigations.

Unit III

CIVIL ENGINEERING- Basics of Construction Planning & Management, Construction Quality & Safety Systems. Traffic integration, multimodal transfers and pedestrian facilities; Environmental and social safeguards; Track systems-permanent way. Facilities Management

Unit IV

ELECTRONICS AND COMMUNICATION ENGINEERING- Signaling systems; Automatic fare collection; Operation Control Centre (OCC and BCC); SCADA and other control systems; Platform Screen Doors.

Unit V

MECHANICAL & TV + AC: Rolling stock, vehicle dynamics and structure; Tunnel Ventilation systems; Air conditioning for stations and buildings; Fire control systems; Lifts and Escalators ELECTRICAL: OHE, Traction Power; Substations- TSS and ASS; Power SCADA; Standby and Back-up systems; Green buildings, Carbon credits and clear air mechanics.

Course Code	Course Name	L-T-P	Credit
CE-452C	Internship	0-0-32	16

Presentation by each student on his/her practical training and other topics specified by the course coordinator

Course Code	Course Name	L-T-P	Credit
CE-454C	Seminar on Internship	0-0-32	16

.

Presentation by each student on any other topics specified by the course coordinator.

<h1>Project Allotment Form (B.Tech Civil)</h1>

Subject Code & Name:

Project Title

…………………………………………………………………………………………………

Abstract

…………………………………………………………………………………………….....
…………….....……………………………………………………………………………...
………………………………………………………………………………………………..
…………………………………………………………………………………………………..
………………………………………………………………………………………………..
………………………………………………………………………………………………..
…………….....……………………………………………………………………………...
…………………………………………………………………………………………………..
………………………………………………………………………………………………..
………………………………………………………………………………………………..
…………………………………………………………………………………………………..
…………...………………………………………………………………………………....

S. No.	Roll Number (B.Tech)	Name of Student
1		
2		
3		
4		
Group Leader Name & Contact No.:		
Name of the Guide ………………………	**Signature of the Guide** ……………………	

Remarks of Project Coordinator

…………………………………….……………………………………………………………
…………………………………….……………………………………………………………

Signature of Project Coordinator……………………… **Signature of HOD** …………………

Department of Civil Engineering

Lingaya's Vidyapeeth
(Approved by MHRD/AICTE/PCI/BCI/COA/
NCTE, Govt.of India, u/s 3 of UGC Act 1956)

Nachauli, Jasana Road, Faridabad – 121002
www.lingayasuniversity.edu.in