



**DEPARTMENT OF CIVIL ENGINEERING
(DCE)**

Courses of Study

B. Tech.

Civil Engineering (CE)

(2017-21 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

2017 – 2021

(Applicable to Undergraduate Students of Entry Year 2017)

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 in 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.

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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 \times 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:

- 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.
- A semester when a student has been granted semester withdrawal or granted leave will not be considered as a registered semester.
- 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 eighth 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
<ul style="list-style-type: none">• 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.

Course Category Description & Credit Distribution

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

Total Credit Count

Sr.No.	Semester	Credits
1	First	26
2	Second	27
3	Third	24
4	Fourth	25
5	Fifth	23
6	Sixth	21
7	Seventh	25
8	Eighth	19
Total		190

SCHEME 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Scheme of Studies
B.Tech(CE)

1st Year SEMESTER – I						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	BSC	MA-101B	Applied Mathematics – I	3-1-0	4	ALL
2	BSC	PH-103B	Applied Physics	3-1-0	4	ALL
3	ESC	CS-105B	Computer Programming	3-0-0	3	ALL
4	HSMC	EN-107B	Communication Skills – I	3-0-0	3	ALL
5	MC	CE-109B	Environment Science and Ecology	2-0-0	2	ALL
6	BSC	CH-113B	Applied Chemistry	3-1-0	4	ME+CE
7	BSC	PH-151B	Applied Physics Lab	0-0-2	1	ALL
8	HSMC	EN-153B	Communication Skills Lab – I	0-0-2	1	ALL
9	ESC	CS-155B	Computer Programming Lab	0-0-2	1	ALL
10	BSC	CH-161B	Applied Chemistry Lab	0-0-2	1	ME+CE
11	ESC	ME-163B	Computer Based Engineering Graphics	0-0-4	2	ME+CE
				17-3-12	26	

1st Year SEMESTER – II						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	BSC	MA-102B	Advanced Mathematics and Numerical Methods	3-1-0	4	ALL
2	HSMC	EN-104B	Communication Skills – II	3-0-0	3	ALL
3	MC	BA-106B	Engineering Economics and Industrial Management	3-0-0	3	ALL
4	ESC	ME-108B	Engineering Mechanics	3-1-0	4	CE+ME
5	ESC	EL-111B	Basics of Electrical & Electronics Engg.	3-1-0	4	CE+ME
6	PCC	CE-110B	Surveying	3-0-0	3	CE
7	BSC	MA-150B	Applied Numerical Methods Lab	0-0-2	1	ALL
8	PDP	PD-191B	Co-curricular Activities/Hobby Club	0-0-2	1	ALL
9	ESC	EL-157B	Basics of Electrical & Electronics Engg. Lab	0-0-2	1	CE+ME
10	ESC	ME-159B	Workshop Practice – I	0-0-4	2	CE+ME
11	PCC	CE-162B	Surveying Lab	0-0-2	1	CE
				14-2-12	27	

SCHEME 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Scheme of Studies

B.Tech(CE)

2nd Year SEMESTER – III						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	PCC	CE-201B	Structural Analysis-I	3-1-0	4	CE+ME
2	PCC	CE-203B	Surveying-II	3-1-0	4	CE
3	PCC	CE-205B	Fluid Mechanics-I	3-1-0	4	CE+ME
4	PCC	CE-207B	Water Supply & Waste Water Engineering	3-1-0	4	CE
5	PCC	CE-209B	Engineering Geology	3-1-0	4	CE
6	PCC	CE-251B	Structural Analysis-I Lab	0-0-2	1	CE+ME
7	PCC	CE-253B	Surveying II Lab	0-0-2	1	CE
8	PCC	CE-255B	Fluid Mechanics-I Lab	0-0-2	1	CE+ME
9	PCC	CE-257B	Engineering Geology Lab	0-0-2	1	CE
				15-5-8	24	

2nd Year SEMESTER – IV						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	PCC	CE-202B	Environmental Engineering	3-1-0	4	CE
2	PCC	CE-204B	Fluid Mechanics II	3-1-0	4	CE
3	PCC	CE-206B	Structural Analysis – II	3-1-0	4	CE
4	PCC	CE-208B	Transportation Engineering – I	3-1-0	4	CE
5	PCC	CE-210B	Design of Concrete Structures – I	3-1-0	4	CE
6	PCC	CE-252B	Environmental Engineering Lab	0-0-2	1	CE
7	PCC	CE-254B	Fluid Mechanics – II Lab	0-0-2	1	CE
8	PCC	CE-256B	Structural Analysis – II Lab	0-0-2	1	CE
9	PCC	CE-258B	Transportation Engineering - I Lab	0-0-2	1	CE
10	PCC	CE-260B	CAD LAB	0-0-2	1	CE
				15-5-10	25	

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3rd Year SEMESTER – V						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	PCC	CE-301B	Building Construction & Material	3-1-0	4	CE
2	PCC	CE-303B	Concrete Technology	3-1-0	4	CE
3	PCC	CE-305B	Geotechnical Engineering – I	3-1-0	4	CE
4	PCC	CE-307B	Costing, Estimating, Billing & Accounts	3-1-0	4	CE
5	PCC	CE-309B	Design of Steel Structure – I	3-1-0	4	CE
6	PCC	CE-351B	Building Construction & Material Lab	0-0-2	1	CE
7	PCC	CE-353B	Concrete Technology Lab	0-0-2	1	CE
8	PCC	CE-355B	Geotechnical Engineering - I Lab	0-0-2	1	CE
				15-5-6	23	

3rd Year SEMESTER – VI (Specialization in Transportation Engineering)						
SN	Category	Course Code	Course Name	L-T-P	Cr.	Sp.
1	PEC	CE-302B	Highway Planning & Management	3-1-0	4	TE
2	PEC	CE-304B	Construction & Pavement Materials	3-1-0	4	TE
3	PEC	CE-306B	Bridge Engineering	3-1-0	4	TE
4	PEC	CE-308B	Mass Transport System	3-1-0	4	TE
5	PEC	CE-310B	Airport Engineering	3-1-0	4	TE
6	PEC	CE-352B	Material Testing Lab	0-0-4	2	TE
				15-5-4	21	
3rd Year SEMESTER – VI (Specialization in Structural Engineering)						
SN	Category	Course Code	Course Name	L-T-P	Cr.	Sp.
1	PEC	CE-312B	Design of Concrete Structure-II	3-1-0	4	SE
2	PEC	CE-314B	Advanced Design of Steel Structures	3-1-0	4	SE
3	PEC	CE-306B	Bridge Engineering	3-1-0	4	SE
4	PEC	CE-316B	Industrial Structures	3-1-0	4	SE
2	PEC	CE-318B	Structural Dynamics	3-1-0	4	SE
5	PEC	CE-352B	Material Testing Lab	0-0-4	2	SE
				15-5-4	21	

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4th Year SEMESTER – VII (Specialization in Transportation Engineering)						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	PEC	CE-401B	Railway Engineering	3-1-0	4	TE
2	PEC	CE-403B	Docks & Harbour Engineering	3-0-0	3	TE
3	PEC	CE-405B	Transportation & Environment	3-0-0	3	TE
4	PEC	CE-407B	Analysis & Design of Pavement	3-1-0	4	TE
5	PEC	CE-409B	Traffic Engineering	3-1-0	4	TE
6	OE	OE	Open Elective – I	3-0-0	3	ALL
7	PEC	CE-451B	Traffic & Transport Engg. Lab.	0-0-2	1	TE
8	PCC	CE-453B	Seminar	0-0-4	2	TE
9	PDP	PDP	Problem Solving Skill	0-0-2	1	CE
				18-3-8	25	
4th Year SEMESTER – VII (Specialization in Structural Engineering)						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	PEC	CE-411B	Composite Materials	3-0-0	3	SE
2	PEC	CE-413B	Advanced Structural Analysis	3-1-0	4	SE
3	PEC	CE-415B	Earthquake Analysis & Design of Structures	3-1-0	4	SE
4	PEC	CE-417B	Advanced RCC Design	3-1-0	4	SE
5	PEC	CE-419B	Construction & Maintenance Management	3-0-0	3	SE
6	OE	OE	Open Elective – I	3-0-0	3	ALL
7	PCC	CE-453B	Seminar	0-0-4	2	SE
8	PEC	CE-455B	Advanced Structural Engg. Lab	0-0-2	1	SE
9	PDP	PDP	Problem Solving Skill	0-0-2	1	CE
				18-3-8	25	

	COURSE CODE	COURSE NAME
Open Elective-I	CE-423B	Building Construction & Materials
	CE-425B	Transportation Engineering & Systems

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4th Year SEMESTER – VIII						
SN	Category	Course Code	Course Name	L-T-P	Cr.	
1	MOOC	CE402B	MOOC	3-0-0	3	CE
2	INT	CE452B	Internship	0-0-32	16	CE
				3-0-32	19	

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Course Code	Course Name	L-T-P	Credit
MA-101B	Applied Mathematics	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.

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Course Code	Course Name	L-T-P	Credit
PH-103B	Applied 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

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Course Code	Course Name	L-T-P	Credit
CS-105B	Computer Programming	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

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Course Code	Course Name	L-T-P	Credit
EN-107B	Communication Skills - I	3-0-0	3

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

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Course Code	Course Name	L-T-P	Credit
CE-109B	Environmental Science & Ecology	2-0-0	2

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.
- 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.

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Course Code	Course Name	L-T-P	Credit
CH-113B	Applied Chemistry	3-1-0	4

Unit-I PHASE RULE

Terminology, Definition of phase rule, Derivation of phase rule equation, One component system (H₂O system and CO₂ 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 H₃, H₂F 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. Vollhardt and N. E. Schore, 5th Edition <http://bcs.whfreeman.com/vollhardtschore5e/default.asp>

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Course Code	Course Name	L-T-P	Credit
PH-151B	Applied 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.

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Course Code	Course Name	L-T-P	Credit
EN-153B	Communication Skills – I 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

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Course Code	Course Name	L-T-P	Credit
CS-155B	Computer Programming 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 is 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 and 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

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- 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.

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Course Code	Course Name	L-T-P	Credit
CH-161B	Applied 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 demonstrate 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 analyse a salt sample.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 1st Year/1st Semester

Course Code	Course Name	L-T-P	Credit
ME-163B	Computer Based Engineering Graphics	0-0-2	1

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 Publishers (Corresponding set of) CAD Software Theory and User Manuals

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Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
MA-102B	Advanced Mathematics & Numerical Methods	3-1-0	4

Unit-1

Interpolation and Approximation

Newton forward interpolation, Newton backward interpolation for equal intervals, Lagrange's interpolation and Newton divided differences interpolation for unequal intervals. Gregory-Newton forward, Gregory-Newton backward, Stirling and Bessel interpolation for central differences.

Unit-2

Numerical Differentiation and Integration

Numerical Differentiation for unequal, equal and central differences formula, Numerical Integration by Trapezoidal methods, Simpson 1/3 rule, Simpson 3/8th rule, Gauss Quadrature formula.

Unit-3

Solution of Ordinary Differential equations

Picard's method, Euler's method, Euler's, modified method, Runge-Kutta method, Milne P-C method, Adams-Bashforth method.

Unit-4

Solution of system of linear equations

Direct methods (Cramer rule, Gauss elimination method, Gauss Jordan method, Doolittle's method, Crout's method) Partition method, iteration method (Jacobi method, Gauss Seidel iteration method).

Unit-5

Solution of nonlinear equation in one variable

Bisection method, Secant method, Regula falsi method, Newton Raphson method and their rate of convergence, Descartes Rule of signs, Birge-Vita method, Bairstow method for solution of polynomial equations.

LIST OF RECOMMENDED BOOKS:

1. Numerical Methods-Jain Iyenger Jain.
Numerical Analysis-Goyal-Mittal, Pragati prakashan.

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Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
EN-104B	Communication Skills - II	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, Human factors, Managing technical communication projects, time estimation, Single sourcing, localization.

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)

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Department of Civil Engineering
Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
BA-106B	Engineering Economics & Industrial 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.

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Department of Civil Engineering
Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
ME-108B	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

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
EL-111B	Basics of Electrical & Electronics 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.

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SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
CE-110B	Surveying	3-0-0	3

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 Two point 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:

Surveying & Levelling by B. C. Punmia.

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Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
MA-150B	Applied Numerical Methods Lab	0-0-2	1

List of Experiments: (Using C++ Software)

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

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Department of Civil Engineering
Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
PD-191B	Co-curricular Activity/Hobby Club	0-0-2	1

ABOUT THE CLUB

The Green club is a part of academic curriculum scheme of Lingaya's Vidyapeeth and taken up by the students of First Year so that they could get the first-hand knowledge of Environment and its sustainability. This club is born with a vision to make the campus green and Eco-friendly and educate the youth about the importance of sustainable development, outside of the campus also.

OBJECTIVE

To make the Environment clean and green and pollution free.

ACTIVITIES OF THE CLUB

1. Colour coded dustbins for Recyclable and Non-Recyclable.
2. Work on renovating a unusual waste area/dump to provide value to the region.
3. Recycling of waste.
4. Create Blog of "Simply Green".
5. Water conservation day.
6. Reduce water usage.
7. Recycle waste water.
8. Reduce Power Consumption.
9. Cook Using Solar Cooker.
10. Rain Water Harvesting.
11. Tree planting.
12. Practical solution of ozone depletion.
13. Speech by a notable speaker/local environmentalist.
14. Quiz and GD on environmental issues
15. Debate on environmental issue
16. Collaborate with municipality and organic clean day.
17. Green march/marathon.
18. Cycle rally.
19. Zero food wastage awareness drive.
20. Writing articles and publicity them in the local newspapers.
21. Establishing link with local NGO's and works with them to save the degraded environment.
22. Zero waste campus.

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Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
EL-157B	Basics of Electrical & Electronics 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.

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Department of Civil Engineering
Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
ME-159B	Workshop Practice	0-0-4	2

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 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

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Department of Civil Engineering
Year/Semester: 1st Year/2nd Semester

Course Code	Course Name	L-T-P	Credit
CE-162B	Surveying Lab	0-0-2	1

List of Experiments:

1. To determine the difference in elevation of two given points Dumpy Level with AI 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.

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Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-201B	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 Determined 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 Determined 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. Vaidyanathan, 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

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Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-203B	Surveying - II	3-1-0	4

TRIGONOMETRICAL LEVELLING: Introduction-Height and Distance (Base of an object accessible and inaccessible)-Difference in elevations between two points-Geodetical observations and correction for temperature, refraction, curvature and signal.

TRIANGULATION: Triangulation systems, classification, strength of figure, selection of triangulation stations, grade of triangulation, field work of triangulation, triangulation computations. Survey adjustments: Definite weight of an observation, most probable values Types of error, principle of least squares and adjustment of triangulation figure.

FIELD ASTRONOMY: Definitions of Astronomical terms, Star at prime vertical, star at horizon, star at culmination, introduction of celestial sphere, celestial co-ordinate systems, Napier's rule of circular parts. A brief introduction of different types of time. Determination of Azimuth, altitude by astronomical observations.

ELEMENTS OF PHOTOGRAMMETRY: Introduction, types of photographs, Aerial photography and its interpretation, Flight planning for Aerial survey, Stereoscope and stereoscopic vision.

REMOTE SENSING: Special emphasis on applications of remote sensing in civil and environmental engineering. Concept of G.I.S and G.P.S-Basic components. Introduction to modern survey equipment's, their principle of working with special emphasis on total station, EDM (Electro Optical, Infrared, Microwave) and electronic precision, optic theodolite, automatic laser level etc.

TEXT BOOK

Punmia, B. C., Jain, Ashok Kumar., "Surveying Volume –II & III", Laxmi Publication Pvt limited, New Delhi.

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Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-205C	Fluid Mechanics-I	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"; McGrawHill 1983
3. SomSKandBiswasG., "Introduction to Fluid Mechanics and Fluid Machines", Tata McGrawHill, 1998
4. Bansal RK, "A Text Book of Fluid Mechanics" Laxmi Publications
5. Agrawal, S.K. "Fluid Mechanics and Machinery", Tata McGraw Hill.

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Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-207B	Water Supply & Waste Water Engineering	3-1-0	4

Unit I Introduction to waste water engineering: Systems of sanitation, Types of sewage and sewerage systems, Components of a sewerage system, Design and planning of a sewerage system, Financing the sewerage projects

Sewers, their construction and maintenance: Shapes of sewer pipes, Forces acting on Sewer pipes, Sewer materials, Laying and testing of sewer pipes

Sewer appurtenances: Manholes, drop manholes and lamp holes, clean outs, street inlets, Catch basins, flushing tanks, Grease and oil traps

Unit II Hydraulic design of Sewers and S.W. Drain sections: Difference in the design of water supply pipes and sewer pipes, Provision of free board in sewers and S.W. Drains, Hydraulic formulas for determining flow velocities in sewers and drains

Estimating the design sewage discharge and peak drainage discharge: Estimating the sewage discharge, Design periods for different components of a sewerage scheme, Future forecasts and estimating design sewage discharge, the runoff process and peak runoff rate, Estimating the peak runoff

Unit III Quality and characteristics of sewage: Decay and decomposition of sewage, Physical characteristics of sewage, Chemical characteristics of sewage, Population equivalent and relative stability

Primary Treatment of Sewage: Classification of treatment processes, Types of screens, their designs and cleaning, Grit chambers: Aerated grit chambers, Detritus tanks, skimming tanks, Sedimentation, Sedimentation aided with coagulation

Unit IV Secondary Treatment of Sewage: Sewage filtration, Contact beds and intermittent sand filters for biological filtration of sewage, Trickling filters, Sludge digestion process, Stages in sludge digestion process, Sludge digestion tank, Disposal of sludge, Activated sludge process, Rotating biological contractors, Oxidation ponds, Septic tanks, Imhoff tanks

Unit V Disposal of sewage effluents by dilution: Conditions favoring disposal by dilution, Disposal of waste waters in rivers and self-purification of natural streams, Disposal of waste water in lakes and sea

Disposal of sewage effluents on land: Disposal of waste water on land for irrigation, Methods of applying sewage effluents to farms, Sewage sickness, Dilution method v/s land disposal for disposal of sewage

Text Books:

1. SEWAGE DISPOSAL AND AIR POLLUTION ENGINEERING by S.K.GARG, KHANNA PUBLISHERS, 23th Edition, (2010)
2. WASTEWATER ENGINEERING TREATMENT AND REUSE by METCALF AND EDDY, MCGRAW HILL EDUCATION, 4th Edition, (2003)
3. water & waste water engg by B.C.Punmia
4. Manual of Waste Water and Water Treatment, Ministry of Urban Development, Govt.of India

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-209B	Engineering Geology	3-1-0	4

Module 1: Introduction-Branches of geology useful to civil engineering, scope of work- GSI, Granite Dimension Stone Cell, NIRM. Mineralogy-Mineral, Origin and composition. Physical properties, Rock forming minerals, megascopic identification of common primary & secondary minerals.

Module 2: Petrology-Rock forming processes. Specific gravity of rocks. Igneous petrology. Types of volcanic eruption. Concept of Hot spring and Geysers. Division of rock on the basis of depth of formation, and their characteristics. Chemical and Mineralogical Composition. Texture and its types. Various forms of rocks. Sedimentary petrology. Texture and its types, Structures, Gradation of Clastic rocks. Classification of sedimentary rocks and their characteristics.

Module 3: Physical Geology- Weathering. Erosion and Denudation. Strength Behavior of Rocks- Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Earthquake and Subsidence. Strength of Igneous rock structures. Geological Hazards. Concept of sliding blocks. Different controlling factors. Ground water Earthquake: Magnitude and intensity of earthquake.

Module 4: Rock masses as construction material: rock properties and behavior. Effect of alteration and weathering. Classification of Rock material strength. Geology of dam and reservoir site. Failure of Reservoir. Favorable & unfavorable conditions in different types of rocks in presence of various structural features.

Module 5: Rock Mechanics- Sub surface investigations in rocks and engineering characteristics of rocks masses; Structural geology of rocks. Classification of rocks, Field & laboratory tests on rocks, Stress deformation of rocks, Failure theories and sheer strength of rocks, Bearing capacity of rocks.

Text/Reference Books:

1. Engineering and General Geology, Parbin Singh, 8th Edition (2010), S K Kataria & Sons.
2. Text Book of Engineering Geology, N. Chenna Kesavulu, 2nd Edition (2009), Macmillan Publishers India.
3. Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press (1982).

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SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-251B	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 continuous 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.

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SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-253B	Surveying II Lab	0-0-2	1

List of Experiments:

1. To determine the difference in elevation of two given points Dumpy Level with AI 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.

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Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-255B	Fluid Mechanics I 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

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Department of Civil Engineering
Year/Semester: 2nd Year/3rd Semester

Course Code	Course Name	L-T-P	Credit
CE-257B	Engineering Geology Lab	0-0-2	1

List of Experiments:

1. Study of physical properties of minerals.
2. Study of different group of minerals.
3. Study of Crystal and Crystal system.
4. Identification of minerals: Silica group: Quartz, Amethyst, Opal; Feldspar group: Orthoclase, Plagioclase; Cryptocrystalline group: Jasper; Carbonate group: Calcite; Element group: Graphite; Pyroxene group: Talc; Mica group: Muscovite; Amphibole group: Asbestos, Olivine, Hornblende, Magnetite, Hematite, Corundum, Kyanite, Garnet, Galena, Gypsum.
5. Identification of rocks (Igneous Petrology): Acidic Igneous rock: Granite and its varieties, Syenite, Rhyolite, Pumice, Obsidian, Scoria, Pegmatite, Volcanic Tuff. Basic rock: Gabbro, Dolerite, Basalt and its varieties, Trachyte.
6. Identification of rocks (Sedimentary Petrology): Conglomerate, Breccia, Sandstone and its varieties, Laterite, Limestone and its varieties, Shales and its varieties.
7. Identification of rocks (Metamorphic Petrology): Marble, slate, Gneiss and its varieties, Schist and its varieties. Quartzite, Phyllite.
8. Study of topographical features from Geological maps. Identification of symbols in maps.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-202B	Environmental Engineering	3-1-0	4

Module 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

Module 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.

Module 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

Module 4: Noise- Basic concept, measurement and various control methods.

Module 5: 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 6: 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.

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

Course Code	Course Name	L-T-P	Credit
CE-204B	Fluid Mechanics - II	3-1-0	4

1. TURBULENT FLOW: Introduction to turbulent flow, Prandtl mixing length theory, velocity distribution in turbulent flow, resistance of smooth and artificially roughened pipes, commercial pipes, aging of pipes.

2. FLOW THROUGH PIPES: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length of pipe, Hydraulic Gradient Line (H.G.L), Total Energy Line (T.E.L), pipes in series, pipes in parallel, branching of pipes, pipe network siphon, water Hammer (only quick closure case). Transmission of power through pipelines.

3. FLOW IN OPEN CHANNEL: Uniform flow, basic concept, Resistance equation chezy's and manning formula, uniform flow construction of efficient channel section, specific energy concept critical flow, and channel transition.

4. TURBINES: Classification, definitions, similarity laws, specific speed and unit quantities, Pelton turbines- their construction and settings, speed regulation dimensions of various elements. Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines construction & setting draft tube theory, runaway speed, working proportion of hydraulic turbines and characteristic curves, cavitations. Forces on immersed bodies: types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift.

5. PUMPS: Centrifugal pumps: Various types and their important components, manometric and total head, net positive suction head, specific speed, shut off head, cavitations. Principle of working and characteristic curves. Priming and maintenance. Submersible pumps.

Reciprocating Pumps: principle working, coefficient of discharge, slip, single acting and double acting pump. Manometric head, Acceleration head, working of air vessels, construction and discharge of Air lift pump.

TEXT BOOK

Modi & Sethi., "Fluid Mechanics & Hydraulics", Standard Book House, New Delhi

REFERENCE BOOKS

1. K. Jain., "Fluid Mechanics", Khanna Publishers, New Delhi, (2008)
2. Subramanyam., "Fluid mechanics", Tata McGraw-Hill, New Delhi
3. Rajput, R.K., "Fluid Mechanics and Hydraulic Machines", Standard Publishing House, New Delhi, 2002
4. F.M. White., "Fluid Mechanics", Tata McGraw-Hill, New Delhi, 2008
5. Jagdish, Lal., "Hydraulics Machines", Metropolitan Book Co, New Delhi, 2003
6. Kumar, K.L., "Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi, 1995

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-206B	Structural Analysis – II	3-1-0	4

Unit I: Analysis of Indeterminate Structures

Concept of fixed and propped cantilever beams - Slope deflection method - Moment Distribution method for continuous beams and rigid frame with and without support settlement.

Unit II: Matrix Method of Analysis

Introduction to force and displacement method of analysis - Stiffness method of analysis using direct element approach

Unit III: Analysis for Moving Loads for Indeterminate Beams

Construction of Influence lines for Beams - Application of Mueller Breslau's principle

Unit IV: Analysis of Three and Two Hinged Arches, Parabolic & Circular Arch

Unit V: Plastic Analysis of Structures, Portal and Sway Mechanism

Structural Vibrations: Study of Single and Multiple degrees of freedom system, damping.

BOOKS RECOMMENDED

1. Reddy C S (2007) "Basic Structural Analysis" 2nd edition, Tata Mc Graw Hill, New Delhi
2. Structural Analysis, Ramamurtham
3. Meghere A S and Deshmukh S K (2003) "Matrix method of Structural Analysis" Charotar Publishing House, Anand.
4. Negi L S and Jangid R S (1999) "Structural Analysis", Tata Mc Graw Hill, New Delhi

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-208B	Transportation Engineering – I	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

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-210B	Design of Concrete Structures - I	3-1-0	4

1. INTRODUCTION TO VARIOUS DESIGN PHILOSOPHIES: Introduction to Various Design Philosophies, Working stress and limit state methods, Building code, characteristic strength and characteristics loads, design values, Partial safety factors and factored loads , Design of Rectangular Singly and Doubly Reinforced Sections by Working Stress Method.

2. LIMIT STATE METHOD: Assumptions in Limit State Design Method, Design of Rectangular Singly and Doubly Reinforced beams, T-beams, L-beams by Limit State Design Method

3. SHEAR, DEVELOPMENT LENGTH, ANCHORAGE BOND, FLEXURAL BOND:- Behavior of RC beams in Shear, Shear Strength of beams with and without shear reinforcement, Minimum and Maximum shear reinforcement, design of beam in shear, Introduction to development length, Anchorage bond, flexural bond. (Detailed Examples by Limit State Design Method).

4. DESIGN OF COLUMNS:- Design of Columns by Limit State Design Method- Effective height of columns, Assumptions, Minimum eccentricity, Short column under axial compression requirements for reinforcement, Column with helical reinforcement, Short column under axial load

5. DESIGN OF SLABS:- Design of one way and two way solid slabs by Limit State Design Method, Serviceability Limit States, Control of deflection, cracking and vibrations.

NOTE : All designs shall be conforming to IS : 456 – 2000

TEXT BOOK

I.C. Syal & A.K. Goel., N.Subramanian “Reinforced Concrete”, A.H. Wheeler & Co. Delhi.

REFERENCE BOOKS

1. P. Dayaratnam., “Design of Reinforced Concrete Structures”, Oxford & IBH Pub. N. Delhi
2. Jain, A.K., “Reinforced Concrete-Limit State Design”, Nem Chand & Bros., Roorkee.
3. Sinha, S. N., “Reinforced Concrete Design”, Tata McGraw Hill.
4. SP-16(S&T)-1980, “Design Aids for Reinforced Concrete”, to IS: 456, BIS, N. Delhi.
5. SP-34(S&T)-1987 Handbook on Concrete Reinforcement and Detailing, BIS, N. Delhi.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-252B	Environmental Engineering Lab	0-0-2	1

List of Experiments:

1. To determine pH value of given water sample.
2. To determine the residual chlorine content of water sample.
3. To determine turbidity of water sample using Turbidity meter.
4. To determine dissolved oxygen of given sample.
5. To determine the BOD content of a given water sample.
6. To perform jar test of water sample to calculate the optimum dose of coagulant.
7. To determine the Conductivity and Total dissolved solids content of a water sample.
8. To determine the hardness of given water sample.
9. To demonstrate the laying of SW pipes for sewers.
10. To study the waste water treatment process by visiting a sewage treatment plant.

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Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-254B	Fluid Mechanics – II Lab	0-0-2	1

List of Experiments:

1. To determine the coefficient of drag by Stokes law for spherical bodies.
2. To study the phenomenon of cavitation's in pipe flow.
3. To determine the critical Reynolds number for flow through commercial pipes.
4. To determine the coefficient of discharge for flow over a broad crested weir.
5. To study the characteristics of a hydraulic jump on a horizontal floor and sloping Glacis including friction blocks.
6. To study the scouring phenomenon around a bridge pier model.
7. To study the scouring phenomenon for flow past a spur.
8. To determine the characteristics of a centrifugal pump.
9. To study the momentum characteristics of a given jet.
10. To determine head loss due to various pipe fittings.

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Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-256B	Structural Analysis – II Lab	0-0-2	1

List of Experiments:

1. Verification of reciprocal theorem of deflection using a simply supported beam.
2. Verification of moment area theorem for slopes and deflections of the beam.
3. Deflections of a truss-horizontal deflections & vertical deflections of various joints of a pin-jointed truss.
4. Elastic displacements (vertical & horizontal) of curved members.
5. Experimental and analytical study of 3 hinged arch and influence line for horizontal thrust.
6. Experimental and analytical study of behaviour of struts with various end conditions.
7. To determine elastic properties of a beam.
8. Experiment on a two-hinged arch for horizontal thrust & influence line for Horizontal thrust.
9. Experimental and analytical study of a 3-bar pin jointed Truss.
10. Experimental and analytical study of deflections for unsymmetrical bending of a Cantilever beam.

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Department of Civil Engineering
Year/Semester: 2nd Year/4th Semester

Course Code	Course Name	L-T-P	Credit
CE-258B	Transportation Engineering – I Lab	0-0-2	1

List of Experiments:

1. Sieve Analysis Test of coarse aggregates (IS: 2386 (Part I)).
2. Determination of specific gravity and water absorption of coarse aggregates.
3. To determine the combined Flakiness and Elongation Index of Coarse Aggregates. (According to MORTH.
4. To determine the Los Angeles abrasion value for given aggregate sample.
5. To determine the aggregate crushing value of coarse aggregates as per IS: 2386 (Part IV) – 1963
6. To determine the impact value of coarse aggregates.
7. To determine the penetration value and viscosity of a given sample of bitumen by using penetrometer and viscometer.
8. To determine the softening point and specific gravity of a given bitumen sample.
9. To determine the ductility and in-flammability of a given sample of bitumen.
10. Determine the CBR value of sub grade soil sample.

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

Course Code	Course Name	L-T-P	Credit
CE-260B	CAD Lab	0-0-2	1

List of Experiments:

1. Introduction to computer aided drafting.
2. Software for CAD- Auto CAD Commands.
3. Practice exercises on CAD Commands.
4. Drawing of plans of buildings using software for Single storeyed buildings.
5. Drawing of plans of buildings using software for Multi storeyed buildings.
6. Developing sections and elevations for Single storeyed buildings.
7. Developing sections and elevations for Multi storeyed buildings.
8. Detailing of building components like doors, windows using CAD software.
9. Development of building components roof trusses using CAD software

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-301B	Building Construction & Material	3-1-0	4

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

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SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-303B	Concrete Technology	3-1-0	4

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

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Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-305B	Geotechnical Engineering - I	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)

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-307B	Costing, Estimating, Billing & Accounts	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)

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SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-309B	Design of Steel Structure - I	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.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-351B	Building Construction & Material Lab	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
11. To design and draw a College Library

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-353B	Concrete Technology Lab	0-0-2	1

LIST OF EXPERIMENTS

1. To verify the purity of cement in the field.
2. To determine the quantity of water to be mixed to obtain a cement paste of normal consistency.
3. To determine initial and final setting time of cement.
4. To verify the soundness of a given sample of cement
5. To determine the fineness of cement by sieving through standard IS 90 micron sieve.
6. To determine the compressive strength of one 1:3 cement sand mortar cubes
7. To determine quantity of silt and fine aggregates in the field.
8. Phenomena of bulking of fine aggregates and to draw a curve between water content and bulking
9. To determine bulking of fine aggregates in the field
10. To determine flakiness index and elongation index of coarse aggregates
11. To determine the particle size distribution of fine, coarse and all in (mixed) aggregates by sieve analysis
12. To determine the consistency of concrete mixes of given proportion by Slump test
13. To determine by compacting factor test, the workability of concrete mixes of given proportion
14. To determine the compressive strength of concrete. (Concrete mix of M15 & M 20).

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/5th Semester

Course Code	Course Name	L-T-P	Credit
CE-355B	Geotechnical Engineering – I 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.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-302B	Highway Planning & Management	3-1-0	4

Unit I

Introduction. : Importance of transportation., Different modes of transportation., Classification of road transport., Importance of roads in India., Scope of highway engineering.

Highway development and planning. : Historical development of road construction., Highway development in India., Necessity of highway planning., Classification of roads., Road patterns., Planning surveys., Preparation of plans., Interpretation of planning surveys., Preparation of master plan and its phasing., Highway planning in India.

Administration and Financing of roads in India. : Classification of roads., Administration of National highways., Administration of roads under other central Ministries., Roads of Inter-state and economic importance., Administration of state roads., Road research., Road making machinery., Highway financing in India.,

Transport policy and planning., Need for transport planning., National transport policy., Types of transport plans., City and town transport plans.

Unit II

Geometric design of Highways. : Road user and the vehicle., Human factor governing road user behavior., Pedestrian characteristics., Vehicle characteristics., Characteristics of cycle and slow moving vehicles., Highway classification., Design control and criteria., Horizontal alignment., Vertical alignment., Combination of vertical and horizontal alignment., Sight distance., Control of access., Driveways.

Unit III

Highway project preparation. : Importance of surveys and investigations., Types of surveys., Guidelines for alignment and route location., Desk study., Use of photogrammetry in highway location and survey., Conventional ground survey., Drainage studies., Soil investigations., Pavement design investigations., Design drawings., Estimates and project report.

Highway maintenance. : Need for maintenance., Maintenance of various types of road., Maintenance of shoulders., Maintenance of slopes of embankments., Maintenance of bridges and culverts., Special problems in Hill road maintenance., Maintenance practices in India., Maintenance management system., Effect of highways on environment.

Unit IV

Overlay design and construction. : Need for overlays., Overlay design methods for flexible pavements., Overlay design methods for rigid pavements., Importance of skid resistance., Factors governing skid resistance., Construction of skid resistant surfaces., Maintenance of skid resistance surfaces., Need for roughness maintenance., Measurement of road roughness., Towed Fifth wheel bump integrator., Car mounted roughness measuring device.

Unit V

Highway economics and finance. : Highway user benefits., Cost of initial construction., Cost of maintenance., Cost of vehicle operation., Equivalencies in thickness., Role of economic evaluation., Some basic principles., Economic analysis., Highway finance

Text Books:

1. HIGHWAY ENGINEERING by S.K. KHANNA AND C.E. JOSTO, NEM CHAND BROTHERS, 1st Edition, (2011)

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-304B	Construction & Pavement Materials	3-1-0	4

Unit I

Aggregates : Types of road aggregates, Requirements of a good road aggregate, Tests for road aggregates

Bituminous Materials : Bitumen, Bitumen emulsion, Tar, Primer, Manufacturing of bitumen, Functions of bituminous materials, Tests for bituminous materials

Unit II

Polymer and Rubber Modified binders : Physical and chemical properties, Marginal and waste materials in road construction, Properties and scope, Performance based mix design Approaches., Visco-elastic properties of bitumen and bituminous mixture

Mix design : Proportioning of materials,, Requirement of bitumen mixes, Design of bituminous mix, Marshall method

Unit III

Soils : Characteristics of soil, Particle sizes and distribution, Plasticity, Specific gravity, State of compaction, Grain or particle size classification

Soil stabilized roads : Introduction, Mechanical soil stabilization, Soil cement stabilization, Soil lime stabilization, Stabilization of soil using bituminous materials, Special problem in soil stabilization works

Subgrade soil strength : evaluation of soil strength by CBR test, Plate load test

Unit IV

Portland cement : Type, Functions, Requirements, Properties, Tests and specifications for use in various components road., Manufacturing of cement

Concrete : Proportioning of concrete mix, Special concrete, High strength concrete, Ready mix concrete and its manufacture, Distribution, Transportation and handling, Properties, Test of concrete

Unit V

Low Cost Materials : Earth roads, Kankar roads, Gravel roads, Moorum roads, Traffic bound macadam roads, Water bound macadam roads

Innovative Materials : Use of geo-synthetics., Use of Fly-ash in road embankment and cement concrete mixes.

Text Books:

1. HIGHWAY MATERIALS TESTING by KHANNA AND JUSTO, NEM CHAND BROTHERS, 8th Edition, (2009)

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Transportation/Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-306B	Bridge Engineering	3-1-0	4

Unit 1

General; classification of bridges, site selection, geometric and hydraulic design consideration. Loading standards for highway and railway bridges, general design consideration; optimum spans.

Unit 2

Concrete bridges: culverts; Slab, T-beam, box girder bridges, balanced cantilever bridge, cable stayed bridge, extrados bridges; arch bridge.

Unit 3

Special requirements for Prestressed Concrete bridges; Steel bridges: plate girder bridge, truss bridge, suspension cable bridge, cable stayed bridge.

Unit 4

Substructures: design of piers and abutments, pile and well foundations, bearings and expansion joints, special wearing coats; seismic design considerations.

Unit 5

Aerodynamic stability considerations; special durability measures; provisions for inspection and maintenance.

Text Book:

Bridge Engineering by S.C. Rangwala, Charotar Publishing House.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-308B	Mass Transport System	3-1-0	4

Unit-1 Transportation System Management: Travel Demand management, Traffic Management, The problems caused by turning traffic, Advantage and dis-advantage of one way street working, Tidal flow operation, Closing side streets advantages & dis-advantages, BRT (Bus Rapid Transit)

Unit-2 Trip Interchanges: Graded-separated intersections with or without interchange, Three leg interchange, Four leg interchange, Multi-leg interchange, Trumpet interchange, Diamond interchange, Clover leaf interchange, Rotary interchange, Interchange ramp, Loop, outer connection, Direct connection, Design speed for ramps.

Unit-3 Transport Planning Process: Scope, Interdependence of land use and Traffic, Stages in Transport planning, Survey and analysis of existing conditions, Fore-cast analysis of future condition, Evaluation, Program adoption and implementation, Continuing study, Trip Distribution, Opportunity Model

Unit-4 Urban Transportation Problem: Growth of Towns, Growth of Traffic, Nature of present difficulties in urban traffic conditions, Measures to meet the problems, New Transportation study, Traffic restraint measures, Promotion of public transport, Pedestrianisation, Staggering of office Hours, Promotion of Bi-cycle traffic, Role of Public transport, Fare and subsidies.

Unit-5 Intermediate Public Transport (IPT) vehicles: Types of IPT, Characteristics of IPT modes, Traffic & Environment: Introduction, Detrimental effects of Traffic on Environment, Safety, Noise, Air pollution, Visual Intrusion, Severance. Factors affecting Fuel consumption of Motor vehicles: vehicle, Drive, Road, Fuel characteristics and environmental conditions, Measures for economy of fuel in road transport. Public-private partnership in Transport Projects: Benefits from privatization, Forms of privatization, BOT, Annuity Project, Special Purpose Vehicle (SPV), Design Build finance & Operate (DBFO)

Suggested Readings;

- 1. L.R.Kadiyali, Transport Engineering and Transport Planning, Eighth Edition 2013.**
- 2. C.S. Papacostas, P.D.Prevedouros, Transport Engineering and Planning, PHI Publication, 8th Edition 2002**

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-310B	Airport Engineering	3-1-0	4

Unit I

Introduction to Air transport : History of Air transport, Structure and Organisation of Air Transport, National Airports Authority, International Airports Authority of India, International Civil Aviation organisation

Airport Characteristics : General, Relation between Aircraft and Airports, Requirements of Aircraft Types, Influence of Aircraft Design on Runway Length, Weight Components, Aeroplane Component Parts, classification of Flying Activity, Relation of Aircraft to landing Facility, Aircraft characteristics

Unit II

Airport Planning : Airport Master plan, Regional Planning, Data required before Site Selection, Airport Site selection, Surveys for Site Selection, Estimation of future Air Traffic needs

Airport Obstructions : Zoning Laws, Classification of Obstructions, Approach and Turning Zone

Unit III

Runway Design : Runway Orientation, Basic Runway Length, Correction for Elevation, Temperature and Gradient, Airport Classification, Runway Geometric Design

Taxiway Design : Factors Controlling Taxiway layout, Geometric Design standards, Exit Taxiways, Fillets, Separation Clearance, Holding Apron

Unit IV

Airport capacity and configuration : Airport Capacity, Runway capacity, Taxiway Capacity, Airport Configuration, Runway Configuration, Runway Intersection Design

Structural Design of Airport Pavements : Introduction, Various Design Factors, Design Methods for flexible Pavements, Design Methods for Rigid Pavements, Joints in Cement Concrete Pavements

Unit V

Terminal area and Airport layout : Terminal Area, Building and Building Area, Apron, Vehicular Circulation and parking area, Hangar, Blast Considerations

Visual Aids : Airport Marking, Airport Lighting

Unit VI

Air traffic control : Need of Air Traffic Control, Air Traffic Control Network, Air Traffic Control Aids

Airport grading and drainage : Computation of earthwork, Airport drainage, Special Characteristic and requirements of Airport drainage

Environmental guidelines for Airport Projects : Introduction, Environmental Impact Assessment, Environment impact Statement, Environment management Plan, Measures for Offsetting Adverse Impacts, Environmental Monitoring Programme

Text Books:

1. AIRPORT PLANNING AND DESIGN by S.K. KHANNA - M.G. ARORA - S.S. JAIN, NEM CHAND & BROS, 6th Edition, (2012)

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Transportation/Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-352B	Material Testing Lab	0-0-4	2

List of Experiments:

1. Testing the strength of steel.
2. Shape test of aggregated.
3. Strength test of aggregates.
4. Testing the Compressive strength of Concrete.
5. Bitumen adhesion test with aggregates.
6. Abrasion test of aggregates.
7. Crushing test of aggregates.
8. Crushing test of concrete.
9. Failure analysis of concrete beam/column.
10. Ductility test of bitumen.
11. Softening point test of bitumen.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-312B	Design of Concrete Structure – II	3-1-0	4

Unit 1

Design of continuous beams and building frames, Moment redistribution, Estimation of wind and seismic loads.

Unit 2

Desirable features of earthquake resistant construction, Detailing for earthquake resistant construction – ductility criteria.

Unit 3

Water tank and staging; Introduction, Design criteria, Design of rectangular and circular water tank, Design of Intze tank, Staging for overhead tank; Introduction to bridge engineering, Investigation for bridges,

Unit 4

IRC loadings, Design of slab culvert; Design of Masonry walls and columns; Pre-stressed concrete, Introduction, pre-stressing system, losses in pre-stress, Design of simple span girders.

Unit 5

Design of end block; Design of staircases; Design of cantilever and counter-fort type retaining wall; All design steps/process to as per the most recent BIS code of practices

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)

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-312B	Advanced Design of Steel Structure	3-1-0	4

- 1. Introduction to Limit States:** Introduction, standardization, allowable stress design limit state design, partial safety factors, concept of section classification: Plastic, compact, semi-compact & slender.
- 2. Columns:** Basic concepts, strength curve for an ideal strut, strength of column member in practice, effect of eccentricity of applied loading, effect of residual stresses, concept of effective lengths, no sway & sway columns, torsional and torsional flexural buckling of column, Robertson design curve, modification to Robertson approach, design of column using Robertson approach.
- 3. Laterally restrained beams:** Flexural & shear behavior, web buckling & web crippling, effect of local buckling in laterally restrained plastic or compact beam combined bending & shear, unsymmetrical bending.
- 4. Unrestrained beam:** Similarity of column buckling & lateral buckling of beams lateral torsional buckling of symmetric section, factor affecting lateral stability, buckling of real beam, design of cantilever beams, continuous beam.
- 5. Beam columns:** Short & long beam column, effect of slenderness ratio and axial force on modes of failure, beam column under biaxial bending, strength of beam column, local section failure & overall member failure.
- 6. Beam subjected to torsion and bending:** Introduction, pure torsion and warping, combined bending and torsion, capacity check, buckling check, design method for lateral torsional buckling.
- 7. Connection design:** Complexities of steel connections, type of connection, connection design philosophies, welded and bolted connection: truss connection, portal frame connection, beam & column splices, beam to beam and beam to column connections.

Books recommended:

- 1 Teaching resource for Structural Steel Design Vol. 1 to 3, Institute for steel development & growth (INSDAG), Calcutta.
- 2 Morsis L.J., Plum, D.R "Structural Steel Work Design".
- 3 Yu, W.W., "Cold Formed Steel Structures Design".
- 4 Arya A.S. and Ajmani, J.L., "Design of Steel Structures".
- 5 Sihna D.A. "Design of Steel Structures".

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-312B	Industrial Structures	3-1-0	4

Unit 1

Industrial steel building frames: Types of frames, bracing, crane girders and columns, workshop sheds, trussed bents, Pressed steel tank, circular tank; Transmission and Communication towers: Types and configuration.

Unit 2

Analysis and design; Chimneys; Loads and stresses in chimney shaft, Earthquake and wind effect, Stresses due to temperature difference, combined effect of loads and temperature, temperature. Design of chimney; Silos and Bunkers.

Unit 3

Jassen's theory, Airy's theory, Shallow and deep bins, Rectangular bunkers with slopping bottom, Rectangular bunkers with high side walls; Steel stacks; introduction, force acting on a steel stack, design consideration, design example of stacks.

Unit 4

Concrete Shell Structures: Folded plate and cylindrical shell structures; Introduction, structural behaviour of long and short shells, beam and arch action, analysis and design of cylindrical shell structures, Analysis and design of folded plates.

Unit 5

Machine foundations; introduction, machine vibration, structural design of foundation to rotary machines, impact machines, vibration characteristics, design consideration of foundation to impact machine, grillage, pile and raft foundation.

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SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 3rd Year/6th Semester
(Specialization: Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-312B	Structural Dynamics	3-1-0	4

Analysis of the dynamic response of structures and structural components to transient loads and foundation excitation; single-degree-of-freedom and multi-degree-of-freedom systems; response spectrum concepts; simple inelastic structural systems; and introduction to systems with distributed mass and flexibility.

- 1. Introduction:** Objective, difference between static and dynamic analysis, loading, essential characteristics of a dynamic problem, principles of dynamics, formulation of equation of motion.
- 2. Single Degree Of Freedom System:** analysis for free and forced vibration, Duhamels integral, Damping – types and evaluation, Response of SDOF system to harmonic excitation, Periodic excitation, Impulsive loading, arbitrary, step, pulse excitation, Response to General Dynamic loading, Numerical evaluation of dynamic response-superposition and step by step methods, generalized SDOF system.
- 3. Multi degree of freedom:** equation of motion, equation of structural property matrices, problem statement and solution methods, free vibration, forced harmonic vibration, damped motion for MDOF, Generalized co-ordinates, principle of orthogonality of modes, Eigenvalue problem, model response, approximate methods: Stodalla-Vanaello, Modified Reyleigh's method, Holzer's Method, Holzer Myklested method, Matrix method, Energy method, Lagrange's equation, model analysis, stochastic response of linier SDOF and MDOF system to Gaussian inputs.

Books recommended:

1. Clough and Penzien, 'Dynamics of Structures' McGraw Hill Book co.
2. Chopra, A.K., 'Dynamics of Structures', Theory and Application to Earthquake Engineering', Prentice Hall of India, New Delhi. 1995.
3. Glen V. Berg, 'Element of Structural Dynamic', Prentice Hall, Engewood Cliffs, NJ.
4. Grover L. Rogers, 'Dynamics of Framed Structures', John Wiley and Sons Inc., New York.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 4th Year/7th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-401B	Railway Engineering	3-1-0	4

Unit 1

Railway track gauge, alignment of railway lines, engineering surveys and construction of new lines, tracks and track stresses.

Unit 2

Rails, sleepers; ballast; subgrade and formation, rack fittings and fastenings, creep of rails.

Unit 3

Geometric design of track, curves and super-elevation, points and crossings, track junctions and simple track layouts; rail joints and welding of rails.

Unit 4

Track maintenance, track drainage; modern methods of track maintenance, rehabilitation and renewal of track; tractive resistance and power, railway stations and yards.

Unit 5

Railway tunneling; signaling and interlocking; maintenance of railways and high speed trains.

Text Book:

Railway Engineering by S.C. Saxena.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 4th Year/7th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-403B	Docks & Harbour Engineering	3-0-0	3

Unit 1

Harbour Planning: Types of water transportation, water transportation in India, requirements of ports and harbours, classification of harbours, selection of site and planning of harbours, location of harbour, traffic estimation, master plan, ship characteristics, harbour design, turning basin, harbour entrances, type of docks, its location and number.

Unit 2

Site investigations – hydrographic survey, topographic survey, soil investigations, current observations, tidal observations; Docks and Repair Facilities: Design and construction of breakwaters, berthing structures - jetties, fenders, piers, wharves, dolphins, trestle, moles,

Unit 3

Harbour docks, use of wet docks, design of wet docks, repair docks, lift docks, dry docks, keel and bilge blocking, construction of dry docks, gates for dry docks, pumping plant, floating docks, slipways, locks, size of lock, lock gates, types of gates; Navigational Aids: Requirements of signals, fixed navigation structures, necessity of navigational aids, light houses, beacon lights, floating navigational aids, light ships, buoys, radar.

Unit 4

Dredging and Coastal Protection: Classification, types of dredgers, choice of dredger, uses of dredged materials, coastal erosion and protection, sea wall, revetment, bulkhead, coastal zone and beach profile; Port facilities: Port development, port planning, port building facilities, transit sheds, warehouses, cargo handling facilities, container handling terminal facilities, shipping terminals, inland port facilities.

Unit 5

Inland waterways, Inland water transportation in India, classification of waterways, economics of inland waterways transportation, national waterways.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 4th Year/7th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-405B	Transportation & Environment	3-0-0	3

Unit I

The Nature of Road Safety : Defining Road Safety, Road Safety – a Complex Field, Science-based Road Safety Research, Road Safety Demographics, Crash Contributing Factors and Interactions, Road User Decisions, Intervention Tools and Countermeasures

The History of Road Safety Management : The Foundation for Road Safety Management Policy, Safety Management Roles and Responsibilities, The Influence of Interest Groups, Road Safety Education Opportunities, Road Safety and Other Transportation Priorities

Road Safety Program Management : The Importance of Scientific Management Techniques, Strategies for Integrating and Amplifying Safety in the Transportation Planning Processes, Organizational Leadership and Support Needs, Current Research Supporting Road Safety Management

Unit II

Crash estimation methods : Observed crash frequency and crash rate methods, Crash estimation using statistical method, Indirect safety measures

Unit III

The Origins, Characteristics, and Uses of Crash Data : Using Data to Identify Safety Problem, State and Local Data Systems, Crash Data Collection, National Road Safety Databases

Unit IV

Environment and its interaction with human activities : Environmental imbalances, Concept of Environmental Impact Assessment, Environmental Impact Statement, Objectives of EIA, Advantages and Limitations of EIA, Attributes, Impacts, Indicators and Measurements

Environmental Impact Assessment For Transportation Projects : Basic Concepts, Transportation Related Environmental Impacts, Roadway Impacts, Objectives, Construction Impacts, Environmental Impact Asses, Environment Audit, Typical case studies, Statement, Vehicular Impacts, Safety & Capacity Impacts

Unit V

Environmental Indicators : Indicators for climate - Indicators for terrestrial subsystems, Indicators for aquatic subsystems, Selection of indicators – Socioeconomic indicators, Indicators for economy, Indicators for health and nutrition - Cultural

Environmental Issues in Industrial Development : On-site and Off-site impacts during various stages of industrial development, Long term climatic changes, Environmental impact of Highways, Green house effect, Industrial effluents and their impact on natural cycle

Unit VI

Methodologies for Carrying Environmental Impact Assessment : Overview of Methodologies, Checklist, Overlays, Benefit Cost Analysis, Choosing A Methodology.

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 4th Year/7th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-407B	Analysis & Design of Pavement	3-1-0	4

Unit I

Component of pavement : Soil properties on pavement performance, Importance of Sub-Grade soil properties on pavement performance., Functions of Sub-Grade, sub-base, base course and wearing course.

Unit II

Stresses in flexible pavements : Stresses in homogeneous masses and layered system, deflections, shear failures, equivalent wheel and axle loads., Stresses in homogeneous masses and layered system, Deflections, Shear failures, Equivalent wheel and axle loads

Elements in design of flexible pavement : Loading characteristics-Static, impact and repeated loads, Affects of dual wheels and tandem axles, Area of contact and tyre pressure, CBR value of different layers, Equivalent single wheel load, Equivalent stress equivalent deflection criterion, Equivalent wheel load factors, Climatic and environmental factors

Unit III

Design methods for flexible pavement : Group Index method, California bearing ratio (CBR), Triaxial method, Mcleod Method, Benkelman Beam method, Boussiusqs and Burmisters analysis and design method

Unit IV

Elements in design of Rigid pavements : Wheel load, Westergaards analysis, Basic properties of concrete elasticity, shrinkage & creep, rigid pavement design, concrete mix design

Method of rigid pavement design : IRC method of rigid pavement design, Importance of joint in rigid pavement, Types of joints, Use of tie bar and dowell bar

Unit V

Pavement evaluation : Benkleman beam method, Pavement Maintenance Measures, Implementation of Maintenance management programs

Unit VI

Types of distress : Structural and functional, Fatigue, Factors affecting performance

Temperature stresses : Thermal properties of aggregates and concrete, Effect of temperature variations on concrete pavements, Combination of stresses due to different causes

Pavement failures : Failures in flexible pavements-type and causes, Rigid pavement failures- type and causes

Text Books:

1. HIGHWAY ENGINEERING by SK KHANNA AND CJ JUSTO, NEM CHAND & BROS, 8th Edition, (2001)

SCHEME & SYLLABUS 2017 BATCH
SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 4th Year/7th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-409B	Traffic Engineering	3-1-0	4

Unit I

Traffic engineering administration and functions. : Traffic engineering., Functions., Organisation of traffic engineering department., Importance of traffic engineering under Indian conditions., 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., Poisson and binomial distributions., Normal distribution., Linear regression and correlation., Multiple linear regression., 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., Classification and occupancy., Types of counts., Methods available for traffic counts., Planning and programming of 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., Location, height and maintenance of traffic signs., Road markings., Types of road markings., Traffic signals., Advantages and disadvantages of traffic signals., Fixed time signals and vehicle actuated signals., Coordinated control of signals., Area traffic control., Traffic control aids and street furnitures.

Traffic regulations and traffic safety. : Traffic regulations and traffic safety., Basic principles of traffic regulation., Regulation of speed and vehicles., Regulation concerning the driver., General rules concerning traffic., 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., Traffic management measures and their influence on accident prevention.

Unit V

Street lighting. : Need for street lighting., Definition of common term., Some laws of illumination., Discernment of artificial lighting., Appearance of lighted pavement., Types of surfaces., Types of lamps., Illumination of traffic rotaries., Lighting at bends., Lighting dual carriageways., Lighting 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, 1st Edition,

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Department of Civil Engineering
Year/Semester: 4th Year/7th Semester
(Specialization: Transportation Engineering)

Course Code	Course Name	L-T-P	Credit
CE-451B	Traffic & Transport Engg. Lab	0-0-2	1

List of Experiments:

1. To study the traffic flow characteristics.
2. To conduct traffic survey
3. To conduct spot speed study
4. To study the various types of intersections.
5. To study the ITS systems of world.
6. To study the ITS systems in India.
7. To study the congestions problem & solutions.
8. To generate road networks through Open Street Map.
9. To generate the road networks using SUMO Simulator.
10. To study & perform the traffic simulation using software.

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

Seminar:

Various transportation/structural problems will be discussed and presentations on the solutions of various types of Transportation/structural problem by the students.

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

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Course Code	Course Name	L-T-P	Credit
CE-411B	Composite Materials	3-0-0	3

Unit 1

Introduction: Definition, Classification, Constituents, Interfaces and Interphases, Distribution of constituents, Nano-composites

Performance of Structural Composites: Combination effects (Summation, Complementation and Interaction), Basic analytical concepts (Qualitative black box approach and Quantitative analytical approach), Strengthening mechanisms, Stress distribution in fibre and the matrix (shear stress and axial tensile stress in the fibre along its length), Nano-structured composites

Unit 2

Performance of Composite in Nonstructural Applications : Composites in Electrical, Superconducting and Magnetic Applications, Nano-composite devices

Fabrication Composites : Fabrication of Metal Matrix Composites, Basic Requirements in Selection of constituents, solidification processing of composites - XD process, Spray processes - Osprey Process, Rapid solidification processing, Dispersion Processes - Stir-casting, Screw extrusion, Synthesis of In situ Composites; Fabrication of Polymer Matrix Composites, Moulding method, Low pressure closed moulding, pultrusion, Fabrication of ceramic matrix composites, Fabrication of nano-composites

Unit 3

Characterisation Composites : Control of particle/fibre and porosity content, particle/fibre distribution, Coating of reinforcing component, Strength analysis

Composite : Forging and extrusion of composites – critical issues, mechanical properties; Induction Heating, Fusion Bonding, Ultrasonic welding, Gas tungsten arc welding, Gas metal arc welding, Resistance spot & seam welding, Resistance brazing, Resistance spot joining, Resistant spot brazing, Resistance welding of thermoplastic graphite composite, Weld bonding, Brazing of MMC.

Unit 4

Industrial Application of Composite Materials : Civil constructions of structures/panels, Aerospace industries, Automobile and other surface transport industries, Packaging industries, House hold and sports components etc.

Unit 5

Fracture & Safety of Composite : Fracture behaviour of composites, Mechanics and Weakest link statistics, Griffith theory of brittle fracture and modification for structural materials, Basic fracture mechanics of composite (Fracture toughness, COD and J-integral approaches, Fatigue crack growth rate), Fracture Mechanics of brittle matrix fibre composite, Fracture mechanics of metal matrix fibre composite, Experimental evaluation (composite), Elementary reliability analysis.

References:

1. Composite materials, K.K. Chawala, 2nd ed., (1987) Springer-Verlag, New York.
2. Nanocomposite Science and Technology, P. M. Ajayan, L. S. Schadler, P. V. Braun, (2003), Wiley-VCH Verlag GmbH Co. KGaA, Weinheim.

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Year/Semester: 4th Year/7th Semester
(Specialization: Structural Engineering)

Course Code	Course Name	L-T-P	Credit
CE-413B	Advanced Structural Analysis	3-1-0	4

Unit 1

Elasticity: Introduction, Components of strain and strain, Hooke's law, Plane stress and plane strain,

Unit 2

Equations of equilibrium and compatibility, Boundary conditions, Two dimensional problems in rectangular and polar coordinates, Bending of simple and cantilever beams.

Unit 3

Model Analysis: Structural similitude, Direct and indirect model analysis, Model material and model making.

Unit 4

Measurement for forces and deformations; Introduction to Finite element method for structural analysis; Review of principle of virtual work, Ritz method.

Unit 5

Discretization of domain, Basic element shape, Discretization process; Application of finite element method to one and two dimensional plane stress strain elements.

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Year/Semester: 4th Year/7th Semester
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Course Code	Course Name	L-T-P	Credit
CE-415B	Earthquake Analysis & Design of Structures	3-1-0	4

Unit 1

Theory of Vibrations; Concept of inertia and damping - Types of Damping - Difference between static forces and dynamic excitation.

Unit 2

Degrees of freedom – SDOF idealization - Equations of motion of SDOF system for mass as well as base excitation – Free vibration of SDOF system - Response to harmonic excitation - Impulse and response to unit impulse - Duhamel integral.

Unit 3

Multiple Degree of Freedom System; Two degree of freedom system – Normal modes of vibration - Natural frequencies - Mode shapes - Introduction to MDOF systems - Decoupling of equations of motion - Concept of mode superposition (No derivations).

Unit 4

Elements of Seismology; Causes of Earthquake - Geological faults - Tectonic plate theory - Elastic rebound – Epicentre; Hypocentre - Primary, shear and Raleigh waves - Seismogram - Magnitude and intensity of earthquakes - Magnitude and Intensity scales - Spectral Acceleration - Information on some disastrous earthquakes;

Unit 5

Response of Structures to Earthquake; Response and design spectra – Design earthquake - concept of peak acceleration - Site specific response spectrum - Effect of soil properties and damping - Liquefaction of soils - Importance of ductility - Methods of introducing ductility into RC structures Design Methodology IS 1893, IS 13920 and IS 4326 - Codal provisions - Design as per the codes - Base isolation techniques.

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Course Code	Course Name	L-T-P	Credit
CE-417B	Advanced RCC Design	3-1-0	4

1. **Yield Line Theory:** Assumptions, location of yield lines, methods of analysis, analysis of one way and two way slabs.
2. **Flat slab:** Limitations of Direct Design Method, shear in flat slabs, equivalent frame method, opening in flat slabs.
3. **Redistribution of moments in beam:** conditions for moment redistribution, single span beams, multi-span beams and design of sections.
4. **Deep Beam:** minimum thickness, design by IS-456. Design as per British and American practice, beam with holes.
5. **Shear walls:** classification of shear wall, classification according to behavior and design of rectangular and flanged shear wall.
6. **Cast-in-situ Beam-column joint,** Force acting on joints, strength requirement of column, anchorage, confinement of core, shear strength of joint, corner joint and procedure for design.
7. **Computation of deflection and crack-width:** short term and long term deflection of beam and slab, calculation of deflection as per IS-456, Factors effecting crack width in beams, calculation of crack width in beams, calculation of crack width as per IS-456, shrinkage and thermal cracking.

Books recommended:

1. Varghese, P.C. (2001), 'Advanced Reinforced Concrete Design', Prentice Hall of India, New Delhi.
2. Jain, A.K. (1999), 'Reinforced Concrete Limit State Design' Nem Chand & Bros, Roorkee.
3. Krishna Raju (1986), 'Advanced Reinforced Concrete Design', C.B.S. Publication, New Delhi.
4. Ferguson P.M., Breen J.E. and Jirsa J.O. (1988), 'Reinforced Concrete Fundamentals', Johan wiley & sons, New York.

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Course Code	Course Name	L-T-P	Credit
CE-419B	Construction & Maintenance Management	3-0-0	3

Unit 1

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 2

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; 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 3

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 4

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.

Unit 5

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.

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Course Code	Course Name	L-T-P	Credit
CE-455B	Advanced Structural Engineering Lab	0-0-2	1

List of Experiments:

1. Study of various types of loads on structures.
2. Analysis of loading in portal frame.
3. Analysis of slope & deflection of a beam under certain loading.
4. Design of multistorey building using Staad pro.
5. Design of elevated water tank using Staad Pro.
6. Analysis & design of bridge deck.
7. Seismic analysis of multi storey building.
8. Analysis & design of steel truss.
9. Study of dynamic response of structures.
10. Seismic analysis of water tank.

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Department of Civil Engineering
Year/Semester: 4th Year/7th Semester
(Open Elective - I)

Course Code	Course Name	L-T-P	Credit
CE-423B	Building Construction & Materials	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

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Year/Semester: 4th Year/7th Semester
(Open Elective - I)

Course Code	Course Name	L-T-P	Credit
CE-423B	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
- Airport Planning & Design by S. K. Khanna, Nem Chand & Bros. Publications

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SCHOOL OF ENGINEERING & TECHNOLOGY
Department of Civil Engineering
Year/Semester: 4th Year/8th Semester

Course Code	Course Name	L-T-P	Credit
CE-402B	MOOC	3-0-0	3

On-line MOOC courses may contribute upto 20% of the credits. One MOOC course to be completed by the student from NPTEL and have to pass the examination conducted by the NPTEL.

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Year/Semester: 4th Year/8th Semester

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

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

Annexure-I

Project Title

Abstract

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)**

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