AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

(Approved by AICTE | Accredited by NAAC | Affiliated to JNTUA)

Gudur, Nellore Dist - 524101, A.P (India)

OUTCOME BASED EDUCATION

WITH

CHOICE BASED CREDIT SYSTEM

BACHELOR OF TECHNOLOGY

ACADEMIC REGULATIONS

UNDER AUTONOMOUS STATUS

DEPARTMENT OF

CIVIL ENGINEERING

B.Tech Regular Four Year Degree Programme

(For the batches admitted from the academic year 2016 - 2017)

B.Tech (Lateral Entry Admission)

(For the batches admitted from the academic year 2017 - 2018)

FAILURE TO READ AND UNDERSTAND THE REGULATIONS

IS NOT AN EXCUSE

One best book is equal to hundred good friends, but one good friend is equal to a library.

All of us do not have equal talent, but all of us have an equal opportunity to develop our talents

“This is the way to success”

Dr.A.P.J.Abdul Kalam

VISION AND MISSION OF THE INSTITUTE

VISION

To make Audisankara College of Engineering & Technology a centre for academic excellence where 21st century innovative minds manage with novel ideas & spreadout new technologies relevant to the social needs with increased employment opportunities and changed lifestyle.

MISSION

To provide the students with technological direction and support, acclaimed in latest cutting edge technologies with a blend of academic concepts and practical nuances in hot areas of engineering and technology so that they develop all the resourcefulness, competence and confidence to takeon the technological challenges of tomorrow.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

Academic Council: The Academic Council is the highest academic body of the institute and is responsible for the maintenance of standards of instruction, education and examination within the institute. Academic Council is an authority as per UGC regulations and it has the right to take decisions on all academic matters including academic research.

Academic Autonomy: It's a privilege conferred to an institute by UGC following meticulous evaluation process to manage its academic programmes independently for promoting excellence.

Academic Year: An academic year consists of two semesters each lasting 21 weeks i.e., (one odd + one even). It is the period necessary to complete an actual course of study within a year.

AICTE: All India Council for Technical Education, New Delhi.

Autonomous Institute: An institute designated as autonomous by University Grants Commission (UGC), New Delhi in concurrence with affiliating University (Jawaharlal Nehru Technological University, Ananthapuramu) and State Government.

Backlog Course: A course is considered to be a backlog course if the student has not cleared and due to which obtained a failure grade (F) in that course.

Basic Sciences: Basic sciences are Mathematics, Physics, Chemistry, English etc., They provide the basic knowledge of all Engineering sciences.

Betterment: Betterment is a way that contributes towards improvement of the student's grade in any course(s). It can be done by either (a) re-appearing or (b) re-registering for the course.

Board of Studies (BoS): BoS is an authority as defined in UGC regulations, constituted by Head of the Organization for each of the departments separately. They are responsible to update and design curricula in respect of all the programs offered by the department.

Branch: It's specialization in an Engineering discipline like Electronics & Communication Engineering, Computer Science & Engineering, Electical & Electronics Engineering, Mechanical Engineering, Civil Engineering etc.

Certificate Course: It is a course that makes a student gain hands-on expertise and skills required for holistic development in a specific area/field.

Choice Based Credit System: The credit based semester system is one which provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching along with provision of choice for the student in the course selection.

Compulsory Course: Course required to be undertaken for the award of the degree as per the program.

UGC: University Grants Commission (UGC), New Delhi.

Continuous Internal Examination: It's an examination that evaluates a student's progress throughout the prescribed course.

Course: A course is a unit of teaching that typically lasts one academic term. Courses explore the practice of teaching from both applied and theoretical perspective.

Course Outcomes: Learning outcomes are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course or program.

Credit: A credit is a unit that gives weight to the value, level or time requirements of an academic course. The number of 'Contact Hours' in a week of a particular course determines its credit value. One credit is equivalent to one lecture/tutorial hour per week.

Credit Point: It is the product of grade point and number of credits for a course.

Cumulative Grade Point Average (CGPA): It is a measure of cumulative performance of a student over all the completed semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed upto two decimal places.

Curriculum: Curriculum incorporates the planned interaction of students with instructional content, materials, resources, and processes for evaluating the attainment of Program Educational Objectives.

Department: An academic entity that conducts relevant curricular and co-curricular activities, involving both teaching and non-teaching staff and other resources in the process of study for a degree.

Dropping from the Semester: A student who doesn't want to register for any semester can apply in writing in prescribed format before commencement of that semester.

Elective Course: A course that can be chosen from a set of courses. An elective can be Professional Elective and/or Open Elective.

Evaluation: Evaluation is the process of judging the academic performance of the student in her/his courses. It is done through a combination of continuous internal assessment and semester end examinations.

Grade: Standardized measurements of achievement in a course. It is an index of the performance of the students in a said course. Grades are indicated by alphabets.

Grade Point: It is a numerical weight allotted to each letter grade on a 10 - point scale.

ASCET: AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY, Gudur, Nellore Dist, Andhra Pradesh.

Massive Open Online Course (MOOC): MOOC courses inculcate the habit of self learning. MOOC courses would be additional choices in all the elective group courses.

Pre-requisite: A course, the knowledge of which is required for registration into higher level course.

Core: The courses that are essential constituents of each engineering discipline are categorized as professional core courses for that discipline.

Professional Elective: It indicates a course that is discipline centric. An appropriate choice of minimum number of such electives as specified in the program will lead to a degree with specialization.

Program: Bachelor of Technology (B.Tech) degree program / PG degree program: Master of Technology (M.Tech)/ Master of Business Administration (MBA) / Master of Computer Applications (MCA).

Program Educational Objectives: The broad career, professional and personal goals that every student will achieve through a strategic and sequential action plan.

Project Work: It is a design or research based work to be taken up by a student during his/her final year to achieve a particular aim. It is a credit based course and is to be planned carefully by the student.

Re-appearing: A student can reappear only in the semester end examination for the theory component of a course, subject to the regulations contained herein.

Registration: Process of enrolling into a set of courses in a semester of a Program.

Regulations: The regulations, common to all B.Tech programs offered by Institute are designated as "ASCET Regulations R-16" and are binding on all the stakeholders.

Semester: It is a period of study consisting of 15 to 18 weeks of academic work equivalent to normally 90 working days. The odd Semester starts usually in July and even semester in December.

Semester End Examinations: It is an examination conducted for all courses offered in a semester at the end of the semester.

S/he: A written representation of 'he or she' used as a neutral alternative to indicate someone of either sex.

Student Outcomes: The essential skill sets that need to be acquired by every student during her/his program of study. These skill sets are in the areas of employability, entrepreneurial, social and behavioral.

JNTUA: Means the Jawaharlal Nehru Technological University Anantapur, Ananthapuramu.

FOREWORD

The autonomy is conferred to **AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY**(ASCET), Gudur, Nellore Dist, Andhra Pradesh by the University Grants Commission (UGC), New Delhi based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like J N T University Anantapur (JNTUA), Ananthapuramu and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a followup, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the institute and recommendations of the JNTUA to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the institute to order to produce a quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time with a Principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

PRINCIPAL

AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY

(AUTONOMOUS)

Gudur, Nellore Dist - 524101, A.P (India)

ACADEMIC REGULATIONS

B.Tech. Regular Four Year Degree Programme

(For the batches admitted from the academic year 2016 - 17)

&

B.Tech. (Lateral Entry Scheme)

(For the batches admitted from the academic year 2017 - 18)

For pursuing four year undergraduate Bachelor Degree programme of study in Engineering (B.Tech) offered by AUDISANKARA COLLEGE OF ENGINEERING & TECHNOLOGY under Autonomous status and herein after referred to as ASCET.

1.0 CHOICE BASED CREDIT SYSTEM

The Indian Higher Education Institutions (HEI's) are changing from the conventional course structure to Choice Based Credit System (CBCS) along with introduction to semester system at first year itself. The semester system helps in accelerating the teaching-learning process and enables vertical and horizontal mobility in learning.

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning.

Choice Based Credit System (CBCS) is a flexible system of learning and provides choice for students to select from the prescribed elective courses. A course defines learning objectives and learning outcomes and comprises of lectures / tutorials / laboratory work / field work / project work / comprehensive examination / seminars / assignments / alternative assessment tools / presentations / self-study etc. or a combination of some of these.

Under the CBCS, the requirement for awarding a degree is prescribed in terms of number of credits to be completed by the students.

The CBCS permits students to:

- Choose electives from a wide range of elective courses offered by the departments.
- Undergo additional courses of interest.
- Adopt an interdisciplinary approach in learning.
- Make the best use of expertise of the available faculty.

2.0 ELIGIBILITY FOR ADMISSION

The total seats available as per the approved intake are grouped into two categories viz. category A and category B with a ratio of 70:30 as per the state government guidelines.

2.1 The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

- Under category A: 70% of the seats are filled through EAMCET counseling.
- Under category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE.

2.2 Admission eligibility-Under Lateral Entry Scheme Students with diploma qualification have an option of direct admission into 2nd year B. Tech. (Lateral entry scheme). Under this scheme 10% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three year B Tech later entry programme will be through ECET. The maximum period to complete B. Tech. under lateral entry scheme is six consecutive academic years from the date of joining.

3.0. DURATION OF PROGRAMME

The course duration for the award of the Degree in **Bachelor of Technology** will be four academic years, with two semesters in each year. However if a student is unable to complete the course within 4 years, he/ she can do so by giving more attempts but within 8 consecutive academic years from the date of admission.

Academic Calendar

For all the eight semesters a common academic calendar shall be followed in each semester by having sixteen weeks of instruction, one week for the conduct of practical exams and with three weeks for theory examinations and evaluation. Dates for registration, sessional and end semester examinations shall be notified in the academic calendar of every semester. The schedule for the conduct of all the curricular and co-curricular activities shall be notified in the planner.

4.0.MEDIUM OF INSTRCTION

The medium of instruction shall be English for all courses, examinations, seminar presentations and project work. The curriculum will comprise courses of study as given in course structure, in accordance with the prescribed syllabi.

5.0 BRANCHES OF STUDY

- Civil Engineering (CE)
- Electrical & Electronics Engineering (EEE)
- Mechanical Engineering (ME)
- Electronics & Communication Engineering (ECE)
- Computer Science & Engineering (CSE)

6.0 TYPES OF COURSES

6.1 Foundation / Skill Course

Foundation courses are the courses based upon the content leads to enhancement of skill and knowledge as well as value based and are aimed at man making education. Skill subjects are those areas in which one needs to develop a set of skills to learn anything at all. They are fundamentals to learn any subject.

6.2 Core Course

There may be a core course in every semester. This is the course which is to be compulsorily studied by a student as a core requirement to complete the requirement of a programme in a said discipline of study.

6.3 Elective Course

Electives provide breadth of experience in respective branch and applications areas. Elective course is a course which can be chosen from a pool of courses. It may be:

- Supportive to the discipline of study
- Providing an expanded scope
- Enabling an exposure to some other discipline/domain
- Nurturing student's proficiency/skill.

An elective may be discipline centric (Professional Elective) focusing on those courses which add generic proficiency to the students or may be chosen from an unrelated discipline called as "Open Elective".

There are four professional elective groups; students can choose not more than two courses from each group. Overall, students can opt for four professional elective courses which suit their project work in consultation with the faculty advisor/mentor. Nevertheless, one course from each of the two open electives has to be selected.

7.0 SEMESTER STRUCTURE

Each academic year is divided into two semesters, TWO being Main Semesters (one odd + one even). Main Semesters are for regular class work. However, the following cases are exempted:

7.1 Students admitted on transfer from JNTUA affiliated institutes, Universities and other institutes in the subjects in which they are required to earn credits so as to be on par with regular students as prescribed by concerned 'Board of Studies'.

7.2 Each main semester shall be of 21 weeks (Table 1) duration and this period includes time for registration of courses, course work, examination preparation and conduct of examinations.

7.3 Each main semester shall have a minimum of 90 working days; out of which number of contact days for teaching / practical are 75 and 15 days for conduct of exams and preparation.

7.4 The academic calendar shown in Table 1 is declared at the beginning of the academic year.

Table 1: Academic Calendar

FIRST SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation and Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Semester Break and Supplementary Examinations			2 weeks
SECOND SEMESTER (21 weeks)	I Spell Instruction Period	8 weeks	19 weeks
	I Mid Examinations	1 week	
	II Spell Instruction Period	8 weeks	
	II Mid Examinations	1 week	
	Preparation & Practical Examinations	1 week	
	Semester End Examinations		2 weeks
Summer Vacation and Supplementary Examinations			8 weeks

8.0 REGISTRATION

8.1 Each student has to compulsorily register for course work at the beginning of each semester as per the schedule mentioned in the Academic Calendar. It is absolutely compulsory for the student to register for courses intime. The registration will be organized departmentally under the supervision of the Head of the Department.

8.2 INABSENTIA registration will not be permitted under any circumstance.

8.3 At the time of registration, students should have cleared all the dues of Institute and Hostel in the previous semesters, paid the prescribed fees for the current semester and not been debarred from institute for a specified period on disciplinary or any other ground.

9.0 UNIQUE COURSE IDENTIFICATION CODE

Every course of the B.Tech program will be placed in one of the four groups of courses as listed in the Table 2. The various courses and their two-letter codes are given below;

S. No	Branch	Code
1	Civil Engineering	01
2	Electrical & Electronics Engineering	02
3	Mechanical Engineering	03
4	Electronics & Communication Engineering	04
5	Computer Science & Engineering	05

10.0 CURRICULUM AND COURSE STRUCTURE

The curriculum shall comprise Foundation/ Skill Courses, Core Courses, Elective Courses, Open Electives, Laboratory Courses, Technical Seminar, Term Paper, Communication Skills Practice, Soft Skills Practice, Professional Society Activities, Mini Project, Internship and Major Project and Comprehensive Viva-Voce. The list of elective courses may include subjects from allied disciplines also.

Contact Periods: Depending on the complexity and volume of the course, the number of contact periods per week will be assigned. Each Theory and Laboratory course carries credits based on the number of hours/week as follows:

- Contact Classes (Theory): 1credit per lecture hour per week.
- Tutorial Classes (Theory): 1credit per 2 lecture hours per week.
- Laboratory Hours (Practical): 1 credit for 2 practical hours.

10.1Credit distribution for courses offered is shown in Table 3.

Table 3: Credit distribution

S. No	Course	Hours	Credits
1	Theory Course (Core/Foundation/Elective)	3	3
2	Theory Course (Core/Foundation/Elective)	2+2	3
3	MOOC Courses	-	3
4	Laboratory Courses/Drawing Courses	3	2
5	Technical Seminar	3	1
6	Term Paper	3	2
7	Mini Project	3	2
8	Internship	3	2
9	Major Project And Comprehensive Viva-Voce	8	12
10	Communication Skills Practice	3	1
11	Soft Skills Practice	3	1
12	Quantitative Aptitude	3	1
13	Technical Aptitude	3	1
14	Professional Society Activities	3	1
15	Full Semester Internship	-	21
16	Audit Course	-	-

10.2 Course Structure

Every program of study shall be designed to have 42 theory courses and 21 laboratory courses. Every course of the B.Tech program will be placed in one of the eight categories with minimum credits as listed in Table 4.In addition, a student has to carry out a mini project, project work and comprehensive examination.

Table 4: Category Wise Distribution of Credits

S. No	Category	Subject Area and % of Credits	Average No. of Credits
1	Humanities and Social Sciences (HS), including Management.	HS (05% to 10%)	**13**
2	Basic Sciences (BS) including Mathematics, Physics and Chemistry.	BS (10% to 15%)	**22**
3	Engineering Sciences (ES), including Workshop, Drawing, Basics of Electrical / Electronics / Mechanical / Computer Engineering.	ES (10% to 15%)	**18**
4	Professional Subjects - Core (PC), relevant to the chosen specialization/branch.	PC (40% to 50%)	**99**
5	Professional Subjects - Electives (PE), relevant to the chosen specialization/branch.	PE (10% to 15%)	**15**
6	Open Subjects - Electives (OE), from other technical and/or emerging subject areas.	OE (01% to 5%)	**03**
7	Project Work and Comprehensive Viva-Voce, Mini Project and Internship	10% to 15%	**16**
8	Technical Seminar, Term Paper, Quantitative Aptitude, Technical Aptitude and Professional Society Activities	CRT	**10**
		TOTAL	**196**

10.3 Semester-wise course break-up

Following are the TWO models of course structure out of which any student shall choose or will be allotted with one model based on their academic performance.

i. Full Semester Internship (FSI) Model and

ii. Non Full Semester Internship (NFSI) Model.

10.4 Four year regular program (FSI Model):

In the FSI Model, selected/eligible students shall undergo Full Semester Internship in B.Tech 7^{th} Semester. In the Non FSI model, the remaining students shall carry out the course work and project work as specified in the course structure. A student who secures a minimum CGPA of 7.5 upto 4^{th}

Semester with no backlogs and maintains the CGPA of 7.5 till 6th Semester shall be eligible to opt for FSI

10.5 For Four year regular program (FSI Model):

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
1st Semester	5 Foundation	3	21
2nd Semester	5 Foundation	3	21
3rd Semester	1 Foundation + 5 Core	3+CSP+PSA+Audit Course	24+1+1=26
4th Semester	1 Foundation + 5 Core	3+TS+SSP+PSA	24+1+1+1=27
5th Semester	6 Core	3+TP+QA+PSA	24+2+1+1=28
6th Semester	5 Core + 1 Elective	3+Mini Project +TA+PSA	24+2+1+1=28
7th Semester	3 Core + 1 Elective + 1 Open Elective	3+Internship+PSA	21+2+1=24
8th Semester	Full Semester Internship (FSI)		21
Total	39	21+TP+TS+Internship+ Mini Project+ CSP+ SSP+ QA+TA+PSA+FSI	196

10.6 For Four year regular programme (Non FSI Model)

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
1st Semester	5 Foundation	3	21
2nd Semester	5 Foundation	3	21
3rd Semester	1 Foundation + 5 Core	3+CSP+PSA+Audit Course	24+1+1=26
4th Semester	1 Foundation + 5 Core	3+TS+SSP+PSA	24+1+1+1=27
5th Semester	6 Core	3+TP+QA+PSA	24+2+1+1=28
6th Semester	5 Core + 1 Elective	3+Mini Project +TA+PSA	24+2+1+1=28
7th Semester	3 Core + 1 Elective + 1 Open Elective	3+Internship+PSA	21+2+1=24
8th Semester	3 Electives	Major Project +Viva	9+12=21
Total	42	21+TP+TS+Internship+Mini Project + CSP + SSP + QA+TA + PSA+Major Project	196

10.7 For Three year lateral entry program (FSI Model):

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
3rd Semester	1 Foundation + 5 Core	3+CSP+PSA+Audit Course	24+1+1=26
4th Semester	1 Foundation + 5 Core	3+TS+SSP+PSA	24+1+1+1=27
5th Semester	6 Core	3+TP+QA+PSA	24+2+1+1=28
6th Semester	5 Core + 1 Elective	3+Mini Project +TA+PSA	24+2+1+1=28
7th Semester	3 Core + 1 Elective + 1 Open Elective	3+Internship+PSA	21+2+1=24
8th Semester	Full Semester Internship (FSI)		21
Total	29	15+TP+TS+Internship+Mini Project+ CSP+ SSP +QA +TA +PSA + FSI	154

10.8 For Three year lateral entry program (Non FSI Model)

Year/Sem	No. of Theory Courses	No. of Lab Courses	Total Credits
3rd Semester	1 Foundation + 5 Core	3+CSP+PSA	24+1+1=26
4th Semester	1 Foundation + 5 Core	3+TS+SS+PSA	24+1+1+1=27
5th Semester	6 Core	3+TP+QA+PSA+Audit Course	24+2+1+1=28
6th Semester	5 Core + 1 Elective	3+Mini Project +TA+PSA	24+2+1+1=28
7th Semester	3 Core + 1 Elective + 1 Open Elective	3+Internship+PSA	21+2+1=24
8th Semester	3 Electives	Major Project +Viva	9+12=21
Total	32	15+TP+TS+Internship+Mini Project+ CSP +SSP + QA + TA +PSA + Major Project	154

Note: PSA - Professional Society Activities

CSP - Communication Skills Practice

SSP – Soft Skills Practice

TS – Technical Seminar

TP – Term Paper

QA – Quantitative Aptitude

TA - Technical Aptitude

10.9 Course-wise break-up for Four year Regular program (FSI Model):

Total Theory Courses - 39 (36 Foundation and Core + 2 Professional Electives + 1 Open Elective)	39 @ 3credits each	117
Laboratory Courses – 21	21 @ 2 credits each	42
Term Paper with self study report	1@ 2 credit	02
Mini Project with self study report	1 @ 2credits	02
Internship	1 @ 2credits	02
Technical Seminar	1 @ 1credit	01
Communication Skills Practice	1 @ 1credit	01
Soft Skills Practice	1 @ 1credit	01
Quantitative Aptitude	1 @ 1credit	01
Technical Aptitude	1 @ 1credit	01
Professional Society Activities	5 @ 1credit each	05
Full Semester Internship	1 @ 21credit	21
	TOTAL CREDITS	**196**

10.10 Course-wise break-up for Four year Regular program(Non FSI Model)

Total Theory Courses - 42 (36 Foundation and Core + 5 Professional Electives + 1 Open Elective)	42 @ 3credits each	126
Laboratory Courses – 21	21 @ 2 credits each	42
Term Paper with self study report	1@ 2 credit	02
Mini Project with self study report	1 @ 2credits	02
Internship	1 @ 2credits	02
Technical Seminar	1 @ 1credit	01
Communication Skills Practice	1 @ 1credit	01
Soft Skills Practice	1 @ 1credit	01
Quantitative Aptitude	1 @ 1credit	01
Technical Aptitude	1 @ 1credit	01
Professional Society Activities	5 @ 1credit each	05
Major Project and Comprehensive Viva-Voce	1 @ 12credits	12
TOTAL CREDITS		**196**

10.11 Course-wise break-up for three year lateral entry program(FSI Model)

Total Theory Courses - 29 (26 Foundation and Core + 2 Professional Electives + 1 Open Elective)	29 @ 3credits each	87
Laboratory Courses – 15	15 @ 2 credits each	30
Term Paper with self study report	1@ 2 credit	02
Mini Project with self study report	1 @ 2credits	02
Internship	1 @ 2credits	02
Technical Seminar	1 @ 1credit	01
Communication Skills Practice	1 @ 1credit	01
Soft Skills Practice	1 @ 1credit	01
Quantitative Aptitude	1 @ 1credit	01
Technical Aptitude	1 @ 1credit	01
Professional Society Activities	5 @ 1credit each	05
Full Semester Internship	1 @ 21credit	21
	TOTAL CREDITS	**154**

10.12 Course-wise break-up for three year lateral entry program (Non FSI Model):

Total Theory Courses - 32 (26 Foundation and Core + 5 Professional Electives + 1 Open Elective)	32 @ 3credits each	96
Laboratory Courses – 15	15 @ 2 credits each	30
Term Paper with self study report	1@ 2 credit	02
Mini Project with self study report	1 @ 2credits	02
Internship	1 @ 2credits	02
Technical Seminar	1 @ 1credit	01
Communication Skills Practice	1 @ 1credit	01
Soft Skills Practice	1 @ 1credit	01
Quantitative Aptitude	1 @ 1credit	01
Technical Aptitude	1 @ 1credit	01
Professional Society Activities	5 @ 1credit each	05
Major Project and Comprehensive Viva-Voce	1 @ 12credits	12
TOTAL CREDITS		**154**

11.0 DIVISION OF MARKS FOR INTERNAL AND EXTERNAL ASSESSMENT

Name of the Course	Continuous Internal Assessment (CIA)	Semester End Examination (SEE)
Theory	40	60
Laboratory	25	50
Technical Seminar	100	-
Term Paper	-	50
Mini Project	25	50
Internship	25	50
Communication Skills Practice	25	25
Soft Skills Practice	-	25
Quantitative Aptitude	-	50
Technical Aptitude	-	50
Professional Society Activities	-	-
Major Project and Comprehensive Viva-Voce	40	160

12.0 EVALUATION METHODOLOGY

The performance of a student in each semester shall be evaluated through Continuous Internal Assessment (CIA) and / or an Semester End Examination (SEE) conducted semester wise.

12.1 Theory Course

The performance of a student in every theory course shall be evaluated for total of 100 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 40 marks and 60 marks respectively.

12.2 Practical Course

The performance of a student in every practical course shall be evaluated for total of 75 marks each, of which the relative weightage for Continuous Internal Assessment and Semester End Examination shall be 25 marks and 50 marks respectively.

12.3 Internal Evaluation for Theory Course

The total internal weightage for theory courses is 40 marks with the following distribution.

- 30 marks for Mid-Term Examination
- 10 marks for Assignment Test

While the first mid-term examination shall be conducted on the 50% of the syllabus (Unit-I & Unit-II), the second mid-term examination shall be conducted on the remaining 50% of the syllabus (Unit III & Unit-IV).

10 marks are allocated for assignment test (as specified by the subject teacher concerned). The first assignment should be conducted after completion of Unit-I for 5 marks and the second assignment should be conducted after completion of Unit-III for 5 marks. The final Assignment Test marks will be the addition of these two.

Two midterm examinations each for **30 marks** with the duration of 90 minutes each will be conducted for every theory course in a semester. The midterm examination marks shall be awarded giving a weightage of 80% in the midterm examination in which the student scores better performance and 20% in the remaining midterm examination.

The final mid-term marks obtain by the addition of these two (80% + 20%).

Example: If a student scores 23 marks and 24 marks in the first and second mid-term examinations respectively,

then Weighted Average Marks = 24 x 0.8 + 23 x 0.2 = 23.8, rounded to 24 Marks.

Note: The marks of any fraction shall be rounded off to the next higher mark.

12.4 Pattern of the midterm examination question paper is as follows

- A total of two Sections (Section-I & Section-II)
- Section-I contains five two marks questions. Two questions from each unit and a student has to be answered all five questions ($5 \times 2 = 10$ Marks)
- Section-II contains four questions are to be designed taking two questions from each unit and a student has to be answered three questions. ($3 \times 10 = 30$ Marks)
- Then its converted to 30 marks.

Pattern of the Assignment Test is as follows

- Five assignment questions are given in advance, out of which two questions given by the concerned teacher has to be answered during the assignment test
- Sum of Assignment Tests marks is considered.

Note: A student who is absent for any Mid-Term Examination/ Assignment Test, for any reason whatsoever, shall be deemed to have scored zero marks in that Mid-Term Examination/ Assignment Test and no make-up test shall be conducted.

12.5 Internal Evaluation for Practical Course

For practical subjects there shall be a Continuous Internal Evaluation during the semester for 25 internal marks. Out of the 25 marks for internal evaluation, day-to-day assessment in the laboratory shall be evaluated for 10 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned.

12.6 Internal Evaluation for Design/ Drawing Courses

For the subject having design and/or drawing, (such as engineering graphics, engineering drawing, machine drawing, production drawing and building drawing) the internal marks distribution shall be 10 marks for day-to-day performance and 20 marks for Mid-Term Examinations.

12.7 Internal Evaluation for Technical Seminar

There shall be a Technical seminar presentation in 4th Semester. A Technical Seminar shall have two components, one chosen by the student from the course work as an extension and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before a committee consisting of Head of the department, seminar supervisor and a senior faculty member. Each Technical Seminar shall be evaluated for 100 marks. Technical Seminar component-I for 50 marks and component-II for 50 marks making total 100 marks. (**Distribution of marks for 50:** 10 marks for report, 10 marks for subject content, 20 marks for presentation and 10 marks for queries).

12.8 Internal Evaluation for Communication Skills Practice

For communicational skills practice subject, there shall be a Continuous Internal Assessment during the semester for 25 internal marks. Out of the 25 marks for internal evaluation, day-to-day assessment in the laboratory shall be evaluated for 10 marks and internal practical examination shall be evaluated for 15 marks conducted by the laboratory teacher concerned.

12.9 Mini Project

The Mini Project shall be carried out during 6th Semester along with other lab courses by having regular weekly slots. Students will take mini project batch-wise and the batches will be divided as per the guidelines issued. The topic of mini project should be so selected that the students are enabled to complete the work in the stipulated time with the available resources in the respective laboratories. The scope of mini project could be handling part of the consultancy work, maintenance of the existing equipment, development of new experiment setup or can be a prelude to the main project with specific outcome.

Mini Project report will be evaluated for 75 marks. 25 marks for internal evaluation and 50 marks for external evaluation.

Assessment will be done by the supervisor/guide for 25 marks based on the work and presentation/ execution of the mini project.

The remaining 50 marks is based on report, presentation, execution and viva-voce. Evaluation is done by a committee comprising the mini project supervisor, Head of the Department and external examiner appointed by the Principal from the panel of experts recommended by Chairman, BOS in consultation with Head of the Department.

12.10 Internal Evaluation for Internship

Internship course is 25 marks for continuous internal assessment and will be evaluated based on day-to-day assessment by concern industry.

12.11 Internal Evaluation for Major Project Work: 8th Semester

The major project shall be carried out during the 8th Semester in the **Non FSI Model** and shall be evaluated for 200 marks out of which 60 marks for internal evaluation and 140 marks for semester end evaluation. Major project will be taken up batch wise and batches will be divided as per the guidelines. The object of major project is to enable the student to extend further the investigative study takenup as the project in Mini project under the guidance of the supervisor/ guide from the department.

The assignment normally includes:

- Preparing an action plan for conducting the investigation including the team work.
- In depth study of the topic assigned.
- Review and finalization of the approach to the problem relating to the assigned topic.
- Final development of product/process, testing, results, conclusions and further direction.
- Preparing a paper for conference presentation/ publication in journal, if possible.
- Preparing a dissertation in the standard format for being evaluated by the department.
- Final presentation of the work done before the Project Review Committee (PRC).

Major Project is allocated 60 internal marks. Out of 60, 30 marks are allocated for the supervisor/guide and head of the department to be evaluated based on two seminars given by each student on the topic of the project. The other 30 marks shall be evaluated on the basis of his presentation on the work done on his project by the Departmental Committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.

12.12 External Evaluation for Theory Course - Semester End Examination

The Semester End Examination in each theory subject shall be conducted for 3 hours duration at the end of the semester for 60 marks.

Pattern of the Semester End Examination question paper is as follows:

- A total of two Sections (Section-I & Section-II)
- Section-I contains six two mark questions. One question from each unit and a student has to be answered all the six questions compulsory ($6 \times 2 = 12$ Marks)
- Section-II contains eight questions are to be designed taking two questions from each unit (Unit Wise - Either or type) of the total four units. ($4 \times 12 = 48$ Marks)

A student has to secure not less than a minimum of 40% of marks (24 marks) exclusively at the Semester End Examinations in each of the theory subjects in which the candidate had appeared. However, the candidate shall have to secure a minimum of 40% of marks (40 marks) in both external and internal components put together to become eligible for passing in the subject.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept
30 %	To test the analytical skill of the concept
20 %	To test the application skill of the concept

12.13 External Evaluation for Practical Course

Out of 50 marks **35** marks are allocated for experiment (procedure for

conducting the experiment carries 15 marks & readings, calculation and result-20) and 10 marks for viva-voce examination with **5** marks for the record.

Each Semester External Lab Examination shall be evaluated by an Internal Examiner along with an External Examiner appointed by the Principal.

A candidate shall be declared to have passed in individual lab course if he secures a minimum of 50% aggregate marks (38 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (25 marks) in the semester external examination.

12.14 External Evaluation for Communication Skills Practice

25 marks to be conducted after 10 weeks of training to assess the training outcomes. Semester End Evaluation shall be done for 25 marks by the skilled soft Skill Trainer nominated by the Principal.

A candidate shall be declared to have passed in individual lab course if he secures a minimum of 50% aggregate marks (25 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (13 marks) in the semester external examination.

12.15 External Evaluation for Soft Skills Practice

25 marks to be conducted after 10 weeks of training to assess the training outcomes. Semester End Evaluation shall be done for 25 marks by the skilled soft Skill Trainer nominated by the Principal.

A candidate shall be declared to have passed in individual lab course if he secure/es a minimum of 50% marks (13 marks) in the semester external examination.

12.16 External Evaluation for Quantitative Aptitude

The external examination will be conducted for 50 Marks with 1 credit, examination type is Multiple Choice Question (MCQ) – Offline/Online.

12.17 External Evaluation for Technical Aptitude

The external examination will be conducted for 50 Marks with 1 credit, examination type is Multiple Choice Question (MCQ) – Offline/Online.

12.18 External Evaluation for Term Paper

The Term Paper is a self study report and shall be carried out either during

5th Semester along with other lab courses. Every student will takeup this term paper individually and submit a report. The scope of the term paper could be an exhaustive literature review choosing any engineering concept with reference to standard research papers or an extension of the concept of earlier course work in consultation with the term paper supervisor. The term paper reports submitted by the individual students during the 5th Semester shall be evaluated for a total of 50 marks for external evaluation, it shall be conducted by two Examiners, one of them being term paper supervisor as internal examiner and an external examiner nominated by the Principal from the panel of experts recommended by HOD.

12.19 External Evaluation for Major Project

The major project shall be carried out during the 8th Semester in the **Non FSI Model** and shall be evaluated for 200 marks. The Semester End Examination for major project work done during 8th Semester and for 140 marks shall be conducted by a Project Review Committee (PRC). The committee comprises of an External Examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor. The evaluation of project work shall be conducted at the end of the 8th Semester. The above committee evaluates the project work report with weightages of 50% of the marks (50 marks) awarded by external examiner, 20% of marks (20 marks) awarded by HOD & 30% of the marks (30 marks) by Project Guide/ Supervisor respectively for a total of 100 marks. Of the 40 marks for Presentation & Viva-Voce examination, HOD evaluates for 10 marks and external examiner for 30 marks. The evaluation of 140 marks is distributed as given below:

Distribution of Project Work Marks

Sl. No.	Criterion	Marks
1	Report	100
2	Presentation & Viva – Voce	40

A candidate shall be declared to have passed in major project if he secures a minimum of 50% aggregate marks (100 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (70 marks) in the major project end examination.

12.20 Massive Open Online Courses (MOOCs)

Meeting with the global requirements, to inculcate the habit of self learning

and incompliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute.
- There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses.
- Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration.

12.21 Internship

There shall be 60 hours duration to complete summer internship during summer vacations. The total internal weightage for internship course is 25 marks and will be evaluated based on day-to-day assessment by concern industry.

The external examination shall be evaluated by the two senior faculties (i.e one faculty act as external examiner and other one as internal examiner) for 50 marks based on the his/her report and presentation.

12.22 Full Semester Internship (FSI)

Full Semester Internship (FSI) programme carries 21 credits. During the FSI, student has to spend one full semester in an identified industry /firm / organization and has to carry out the internship as per the stipulated guidelines of that industry / firm / organization and the institute.

Following are the evaluation guidelines

- Profile and abstract –Student has to submit the industry profile and abstract of the project within four weeks from date of commencement of internship through mail or post.

  Weightage: 10%.

- Seminar 1 -at 9^{th} week from date of commencement of internship weightage: 10%
- Seminar 2 -Pre-submission at 17^{th} week from date of commencement of internship– Weightage: 10%
- Internship Diary, weightage: 15 %
- Project Report, weightage: 15%
- Viva-voce & Final Presentation, weightage: 40%

The internship shall be evaluated for 200 marks out of which 60 marks for internal evaluation and 140 marks for external evaluation.

The external evaluation based on the report submitted and viva-voce exam for 140 marks by a committee comprising the HOD, Project supervisor and external examiner (Industry/ Academia).A minimum of 60% of maximum marks shall be obtained to earn the corresponding credits.

FSI shall be open to all the branches in the VII semester. The selection procedure is:

- Choice of the students
- CGPA (> 7.5) upto IV semester with no current arrears and maintains the CGPA of 7.5 till VI Semester

13.0 GRADING PROCEDURE

Grades will be awarded to indicate the performance of students in each theory subject, laboratory / practicals, Technical Seminar, Term Paper, Mini Project, Communication Skills Practice, Soft Skills Practice, Quantitative Aptitude, Technical Aptitude and Major Project. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 11 above, a corresponding letter grade shall be given.

13.1 As a measure of the performance of a student, a 10-point absolute grading system using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks shall be followed

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	S (Superior)	10
80 and less than 90%	A (Excellent)	9
70 and less than 80%	B (Very Good)	8
60 and less than 70%	C (Good)	7
50 and less than 60%	D (Average)	6
40 and less than 50%	E (Pass)	5
Below 40%	F (FAIL)	0
Absent	AB	0

13.2 A student who has obtained an 'F' grade in any subject shall be deemed to have 'failed' and is required to reappear as a 'supplementary student' in the semester end examination, as and when offered. In such cases, internal marks in those subjects will remain the same as those obtained earlier

13.3 To a student who has not appeared for an examination in any subject, 'Ab' grade will be allocated in that subject, and he is deemed to have 'failed'. A student will be required to reappear as a 'supplementary

student' in the semester end examination, as and when offered next. In this case also, the internal marks in those subjects will remain the same as those obtained earlier.

13.4 A letter grade does not indicate any specific percentage of marks secured by the student, but it indicates only the range of percentage of marks.

13.5 A student earns grade point (GP) in each subject/ course, on the basis of the letter grade secured in that subject/ course. The corresponding 'credit points' (CP) are computed by multiplying the grade point with credits for that particular subject/ course.

Credit points (CP) = grade point (GP) x credits …. For a course

13.6 A student passes the subject/ course only when GP 5 ('E' grade or above)

13.7 A student obtaining Grade F shall be considered failed and will be required to reappear for that subject when the next supplementary examination offered.

For Mandatory courses "Satisfactory? or "Unsatisfactory? shall be indicated instead of the letter grade and this will not be counted for the computation of SGPA/CGPA.

13.8 Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

i. The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \sum(C_i \times G_i) / \sum C_i$$

where, C_i is the number of credits of the i^{th} subject and G_i is the grade point scored by the student in the i^{th} course.

ii. The Cumulative Grade Point Average (CGPA) will be computed in the same manner taking into account all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \sum(C_i \times S_i) / \sum C_i$$

where "S_i" is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.

iii. Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

iv. While computing the SGPA the subjects in which the student is awarded Zero grade points will also be included.

Grade Point: It is a numerical weight allotted to each letter grade on a 10-point scale.

Letter Grade: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D, E and F.

Example: Computation of SGPA and CGPA

Illustration for SGPA

Course	Credit	Grade Letter	Grade Point	Credit Point
Course-I	3	S	10	3x10=30
Course-II	3	A	9	3x9=27
Course-III	3	B	8	3x8=24
Course-IV	3	D	6	3x6=18
Course-V	2	B	8	2x8=16
Course-VI	1	C	7	1x7=7
	15			122

Thus, SGPA $= \frac{122}{15} = 8.13$

Illustration for CGPA

1st Semester	2nd Semester	3rd Semester	4th Semester
Credit: 21 SGPA: 8.13	Credit: 21 SGPA: 6.9	Credit: 26 SGPA: 7.3	Credit: 27 SGPA: 6.8
5th Semester	**6th Semester**	**7th Semester**	**8th Semester**
Credit: 28 SGPA: 8.2	Credit: 28 SGPA: 7.4	Credit: 24 SGPA: 7.2	Credit: 21 SGPA: 7.8

Thus, CGPA

$$\frac{(21\times 8.13)+(21\times 6.9)\times(26\times 7.3)+(27\times 6.8)+(28\times 8.2)(28\times 7.2)(24\times 7.2)(21\times 7.8)}{196}$$

=7.432

14.0 AWARD OF CLASS

14.1 After a student has satisfied the requirement prescribed for the completion of the program and is eligible for the award of B.Tech. Degree he/she shall be placed in one of the following four classes:

CGPA ≥ 7.5	CGPA ≥ 6.5 and < 7.5	CGPA ≥ 5.0 and < 6.5	CGPA ≥ 4.0 and < 5.0	CGPA < 4.0
First Class with Distinction	**First Class**	**Second Class**	**Pass Class**	**Fail**

A student with final CGPA is < 4.00 will not be eligible for the Award of the Degree.

15.0 CONDUCT OF SEMESTER END EXAMINATIONS AND EVALUATION

15.1 Semester end examination shall be conducted by the Controller of Examinations (CoE) by inviting Question Papers from the External Examiners

15.2 Question papers may be moderated for the coverage of syllabus, pattern of questions by a Semester End Examination Committee chaired by CoE and senior subject expert before the commencement of semester end examinations. Internal Examiner shall prepare a detailed scheme of valuation.

15.3 The answer papers of semester end examination should be evaluated by the first examiner immediately after the completion of exam and the award sheet should be submitted to CoE in a sealed cover before the same papers are kept for second evaluation by external examiner.

15.4 In case of difference is more than 15% of marks, the answer paper shall be re-evaluated by a third examiner appointed by the Examination Committee and the marks awarded by third examiner is compared with first and second evaluation marks and higher marks of minimum difference pair will be considered as final marks.

15.5 CoE shall invite required number of external examiners to evaluate all the end-semester answer scripts on a prescribed date(s). Practical laboratory exams are conducted involving external examiners.

15.6 Examinations Control Committee shall consolidate the marks awarded by both the examiners and award grades.

16.0 SUPPLEMENTARY EXAMINATIONS

Apart from the regular End Examinations the institute may also schedule and conduct supplementary examinations for all subjects for the benefit of students with backlogs. Such students writing supplementary examinations as supplementary candidates may have to write more than one examination per day.

17.0 ATTENDANCE REQUIREMENTS AND DETENTION POLICY

17.1 A candidate shall putin a minimum required attendance of 75 % in that semester. Otherwise, s/he shall be declared detained and has to repeat semester.

17.2 For cases of medical issues, deficiency of attendance in a semester to the extent of 10% may be condoned by the College Academic Committee (CAC) on the recommendation of Head of the department if their attendance is between 75% and 65% in a semester, subjected to submission of medical certificates, medical case file and other needful documents to the concerned departments. The condonation is permitted maximum of two times during the entire course of study.

17.3 A prescribed fee shall be payable towards condonation of shortage of attendance.

17.4 A student shall not be promoted to the next semester unless he/she satisfies the attendance requirement of the present semester, as applicable. They may seek readmission into that semester when offered next. If any candidate fulfills the attendance requirement in the present semester, he/she shall not be eligible for readmission into the same class.

17.5 Any student against whom any disciplinary action by the institute is pending shall not be permitted to attend any SEE in that semester.

18.0 PROMOTION POLICIES

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no. 17.

18.1 In four year B.Tech program, a student shall be promoted from 2nd year to 3rd year only if s/he fulfills the academic requirements and earning of minimum 50% of credits upto 2nd year.

18.2 In four year B.Tech program, a student shall be promoted from 3rd year to 4th year only if s/he fulfills the academic requirements and earning of minimum 50% credits upto 3rd year.

18.3 A student shall register for all the 196 credits and earn all the 196 credits. Marks obtained in all the 196 credits shall be considered for the award of the Grade.

18.4 In three year lateral entry B.Tech program, a student shall be promoted from 3rd year to 4th year only if s/he fulfills the academic requirements and earning of minimum 50% credits upto 3rd year.

18.5 In three year lateral entry, a student shall register for all the 154 credits and earn all the 154 credits. Marks obtained in all the 154 credits shall be considered for the award of the Grade.

19.0 GRADUATION REQUIREMENTS

The following academic requirements shall be met for the award of the B.Tech degree.

19.1 Student shall register and acquire minimum attendance in all courses and secure 196 credits for regular program and 154 credits for lateral entry program.

19.2 A student of a regular program, who fails to earn 196 credits within eight consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

19.3 A student of a lateral entry program who fails to earn 154 credits within six consecutive academic years from the year of his/her admission with a minimum CGPA of 4.0, shall forfeit his/her degree and his/her admission stands cancelled.

20.0 REVALUATION

A student, who seeks the re-evaluation of the answer script, is directed to apply for the photocopy of his/her semester examination answer paper(s) in the theory course(s), within 5 working days from the declaration of results in the prescribed format with prescribed fee to the Controller of Examinations through the Head of the department. On receiving the photocopy, the student can consult with a competent member of faculty and seek the opinion for revaluation. Based on the recommendations, the student can register for the revaluation with prescribed fee. The Controller of Examinations shall arrange for the revaluation and declare the results. Revaluation is not permitted to the courses other than theory courses.

21.0 TEMPORARY BREAK OF STUDY FROM THE PROGRAMME

21.1 A candidate is normally not permitted to break the study. However, if a candidate intends to temporarily discontinue the program in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the program after the break from the commencement of the respective semester as and when it is offered, s/he shall apply to the Principal in advance. Such application shall be submitted before the commencement of the semester in question and forwarded through the Head of the department stating the reasons for such withdrawal together with supporting documents and endorsement of his / her parent / guardian.

21.2 The institute shall examine such an application and if it finds the case to be genuine, it may permit the student to rejoin. Such permission is accorded only to those who do not have any outstanding dues like tuition fee etc.

21.3 The total period for completion of the program reckoned from the commencement of the semester to which the candidate was first admitted shall not exceed the maximum period specified in clause 19.0. The maximum period includes the break period.

22.0 TERMINATION FROM THE PROGRAMME

The admission of a student to the program may be terminated and the student is asked to leave the institute in the following circumstances:

22.1 The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.

22.2 A student shall not be permitted to study any semester more than three times during the entire Program of study.

22.3 The student fails to satisfy the norms of discipline specified by the institute from time to time.

23.0 WITH-HOLDING OF RESULTS

If the candidate has any dues not paid to the institute or if any case of indiscipline or malpractice is pending against him/her, the result of the candidate shall be withheld and he/she will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

24.0 STUDENT TRANSFERS

Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

25.0 GRADUATION DAY

The institute shall have its own annual Graduation Day for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute. The college shall institute prizes and medals to meritorious students and award them annually at the Graduation Day. This will greatly encourage the students to strive for excellence in their academic work.

26.0 CONDUCT AND DISCIPLINE

- Students shall conduct themselves within and outside the premises of the Institute in a descent and dignified manner befitting the students of Audisankara College of Engineering & Technology.
- As per the order of the Honorable Supreme Court of India, ragging in any form is considered a criminal offence and is totally banned. Any form of ragging will be severely dealt with the following acts of omission and / or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.

(i) Lack of courtesy and decorum; indecent behavior anywhere within or outside the college campus.

(ii) Damage of college property or distribution of alcoholic drinks or any kind of narcotics to fellow students / citizens.

- Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.
- Mutilation or unauthorized possession of library books.
- Noisy and unruly behavior, disturbing studies of fellow students.
- Hacking in computer systems (such as entering into other person's areas without prior permission, manipulation and / or damage of computer hardware and software or any other cyber crime etc.
- Usage of camera /cell phones in the campus.
- Plagiarism of any nature.
- Any other act of gross indiscipline as decided by the college academic council from time to time.
- Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute/ hostel, debarring from examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.
- For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief Warden, the concern Head of the Department and the Principal respectively, shall have the authority to reprimand or impose fine.
- Cases of adoption of unfair means and/ or any malpractice in an examination shall be reported to the principal for taking appropriate corrective action.
- All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the Academic council of the college.
- The Institute Level Standing Disciplinary Action Committee constituted by the academic council shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.

- The Principal shall deal with any problem, which is not covered under these rules and regulations.

27.0 GRIEVANCE REDRESSAL COMMITTEE

Grievance and Redressal Committee constituted by the Principal shall deal with all grievances pertaining to the academic / administrative / disciplinary matters. All the students must abide by the code and conduct rules prescribed by the college from time to time.

28.0 TRANSITORY REGULATIONS

Transitory Regulations required to do all the courses in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such courses in the earlier semester(s) s/he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

28.1 Four Year B.Tech Regular course

A student who is following Jawaharlal Nehru Technological University Anantapur (JNTUA) curriculum and detained due to shortage of attendance at the end of the first semester shall join the autonomous batch of first semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUA curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the

supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.2 Three Year B.Tech program under Lateral Entry Scheme

A student who is following JNTUA curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of third semester. Such students shall study all the courses prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

A student who is following JNTUA curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in place of them as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.3 Transfer candidates (from non-autonomous college affiliated to JNTUA)

A student who is following JNTUA curriculum, transferred from other college to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of

Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute courses are offered in their place as decided by the Board of Studies. The student has to clear all his backlog courses up to previous semester by appearing for the supplementary examinations conducted by JNTUA for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester under JNTUA regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

28.4 Transfer candidates (from an autonomous college affiliated to JNTUA)

A student who has secured the required credits upto previous semesters as per the regulations of other autonomous institutions shall also be permitted to be transferred to this institute. A student who is transferred from the other autonomous colleges to this institute in third semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the courses in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the courses of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The total number of credits to be secured for the award of the degree will be the sum of the credits upto previous semester as per the regulations of the college from which he is transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous status. The class will be awarded based on the academic performance of a student in the autonomous pattern.

29.0 REVISION OF REGULATIONS AND CURRICULUM

The Institute from time to time may revise, amend or change the regulations, scheme of examinations and syllabi if found necessary and on approval by the Academic Council and the Governing Body shall come into force and shall be binding on the students, faculty, staff, all authorities of the Institute and others concerned.

FAILURE TO READ AND UNDERSTAND
THE REGULATIONS IS NOT AN EXCUSE

B.TECH - PROGRAM OUTCOMES (POS)

PO-1: Apply the knowledge of Mathematics, Science, Engineering fundamentals, and Engineering specialization to the solution of complex Engineering problems (**Engineering Knowledge**).

PO-2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences **(Problem Analysis).**

PO-3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations **(Design/ Development of Solutions).**

PO-4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions **(Conduct Investigations of Complex Problems).**

PO-5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations **(Modern Tool Usage).**

PO-6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice **(The Engineer and Society).**

PO-7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development **(Environment and Sustainability).**

PO-8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice **(Ethics).**

PO-9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings **(Individual and Team Work).**

PO-10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions **(Communication).**

PO-11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO-12: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change **(Life-long learning).**

FREQUENTLY ASKED QUESTIONS AND ANSWERS ABOUT AUTONOMY

1. Who grants Autonomy? UGC, Govt., AICTE or University

In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy but only after concurrence from the respective state Government as well as UGC. The State Government has its own powers to grant autonomy directly to Govt. and Govt. aided Colleges.

2 Shall Audisankara College of Engineering & Technology award its own Degree?

No. Degree will be awarded by Jawaharlal Nehru Technological University Anantapur, Ananthapuramu with a mention of the name Audisankara College of Engineering & Technology on the Degree Certificate.

3 What is the difference between a Deemed to be University and an Autonomy College?

A Deemed to be University is fully autonomous to the extent of awarding its own Degree. A Deemed to be University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4 How will the Foreign Universities or other stake – holders know that we are an Autonomous College?

Autonomous status, once declared, shall be accepted by all the stake holders. The Govt. of Andhra Pradesh mentions autonomous status during the First Year admission procedure. Foreign Universities and Indian Industries will know our status through our website.

5 What is the change of Status for Students and Teachers if we become Autonomous?

An autonomous college carries a prestigious image. Autonomy is actually earned out of our continued past efforts on academic

performances, our capability of self- governance and the kind of quality education we offer.

6 Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?

There is a builtin mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee, which will keep a watch on the academics and keep its reports and recommendations every year. In addition the highest academic council also supervises the academic matters. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7 Will the students of Audisankara College of Engineering & Technology as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. Audisankara College of Engineering & Technology has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural on co-curricular organized by the University the students shall qualify.

8 Can Audisankara College of Engineering & Technology have its own Convocation?

No. Since the University awards the Degree the Convocation will be that of the University, but there will be Graduation Day at Audisankara College of Engineering & Technology.

9 Can Audisankara College of Engineering & Technology give a provisional degree certificate?

Since the examinations are conducted by Audisankara College of Engineering & Technology and the results are also declared Audisankara College of Engineering & Technology, the college sends a list of successful candidates with their final Grades and Grade Point Averages including CGPA to the University. Therefore with the prior

permission of the University the college will be entitled to give the provisional certificate.

10 Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment. Also the autonomous status is more responsive to the needs of the industry. As a result therefore, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11 What is the proportion of Internal and External Assessment as an Autonomous College?

Presently, it is 60 % external and 40% internal. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12 Is it possible to have complete Internal Assessment for Theory or Practicals?

Yes indeed. We define our own system. We have the freedom to keep the proportion of external and internal assessment component to choose.

13 Why Credit based Grade System?

The credit based grade system is an accepted standard of academic performance the world over in all Universities. The acceptability of our graduates in the world market shall improve.

14 What exactly is a Credit based Grade System?

The credit based grade system defines a much better statistical way of judging the academic performance. One Lecture Hour per week of Teaching Learning process is assigned One Credit. One hour of laboratory work is assigned half credit. Letter Grades like S,A+,A, B+,B,C,F etc. are assigned for a Range of Marks. (e.g. 90% and above is S, 80 to 89 % could be A+ etc.) in Absolute Grading System while grades are awarded by statistical analysis in relative grading system. We thus dispense with sharp numerical boundaries. Secondly, the grades

are associated with defined Grade Points in the scale of 1 to 10. Weighted Average of Grade Points is also defined Grade Points are weighted by Credits and averaged over total credits in a Semester. This process is repeated for all Semesters and a CGPA defines the Final Academic Performance

15 What are the norms for the number of Credits per Semester and total number of Credits for UG/PG programme?

These norms are usually defined by UGC or AICTE. Usually around 24 Credits per semester is the accepted norm.

16 What is a Semester Grade Point Average (SGPA)?

The performance of a student in a semester is indicated by a number called SGPA. The SGPA is the weighted average of the grade points obtained in all the courses registered by the student during the semester.

Where, C_i is the number of credits of the i^{th} course and G_i is the grade point scored by the student in the i^{th} course and i represent the number of courses in which a student registered in the concerned semester. SGPA is rounded to two decimal places.

17 What is a Cumulative Grade Point Average (CGPA)?

An up-to-date assessment of overall performance of a student from the time of his first registration is obtained by calculating a number called CGPA, which is weighted average of the grade points obtained in all the courses registered by the students since he entered the Institute.

$$CGPA = \sum_{j=1}^{m} \left(C_j S_j \right) / \sum_{j=1}^{m} C_j$$

Where, S_j is the SGPA of the j^{th} semester and C_j is the total number of credits upto the semester and *m*represent the number of semesters completed in which a student registered upto the semester. CGPA is rounded to two decimal places.

18 Is there any Software available for calculating Grade point averages and converting the same into Grades?

Yes, the institute has its own MIS software for calculation of SGPA, CGPA, etc.

19 Will the teacher be required to do the job of calculating SGPAs etc. and convert the same into Grades?

No. The teacher has to give marks obtained out of whatever maximum marks as it is. Rest is all done by the computer.

20 Will there be any Revaluation or Re-Examination System?

No. There will double valuation of answer scripts. There will be a makeup Examination after a reasonable preparation time after the End Semester Examination for specific cases mentioned in the Rules and Regulations. In addition to this, there shall be a 'summer term' (compressed term) followed by the End Semester Exam, to save the precious time of students.

21 How fast Syllabi can be and should be changed?

Autonomy allows us the freedom to change the syllabi as often as we need.

22 Will the Degree be awarded on the basis of only final year performance?

No. The CGPA will reflect the average performance of all the semester taken together.

23 What are Statutory Academic Bodies?

Governing Body, Academic Council, Examination Committee and Board of Studies are the different statutory bodies. The participation of external members in every body is compulsory. The institute has nominated professors from IIT, NIT, University (the officers of the rank of Pro-vice Chancellor, Deans and Controller of Examinations) and also the reputed industrialist and industry experts on these bodies.

24 Who takes Decisions on Academic matters?

The Governing Body of institute is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like Boards of Studies. Decisions taken at the Board of Studies level are to be ratified at the Academic Council and Governing Body.

25 What is the role of Examination committee?

The Examinations Committee is responsible for the smooth conduct of internal, End Semester and makeup Examinations. All matters involving the conduct of examinations spot valuations, tabulations preparation of Grade Cards etc, fall within the duties of the Examination Committee.

26 Is there any mechanism for Grievance Redressal?

The institute has grievance redressal committee, headed by Dean Student affairs and Dean - IQAC.

27 How many attempts are permitted for obtaining a Degree?

All such matters are defined in Rules & Regulation

28 Who declares the result?

The result declaration process is also defined. After tabulation work wherein the SGPA, CGPA and final Grades are ready, the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the Examinations and Result Committee for its approval. The result is then declared on the institute notice boards as well put on the web site and Students Corner. It is eventually sent to the University.

29 Who will keep the Student Academic Records, University or Audisankara College of Engineering & Technology?

It is the responsibility of the Dean, Academics of the Autonomous College to keep and preserve all the records.

30 What is our relationship with the JNT University?

We remain an affiliated college of the JNT University. The University has the right to nominate its members on the academic bodies of the college.

31 Shall we require University approval if we want to start any New Courses?

Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

32 Shall we get autonomy for PG and Doctoral Programmes also?

Yes, presently our PG programmes also enjoying autonomous status..

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

S.No	Nature of Malpractices/Improper conduct	Punishment
	If the candidate:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the Controller of Examinations.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.

4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Controller of Examinations /Additional Controller of Examinations/any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the COE or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the COE or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the Institute premises or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all semester end examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

Course Structure for

B.Tech (Civil Engineering)

Regular Programme

Applicable for students admitted from 2016-17 Academic Year

B.Tech 1st Semester – Civil Engineering

S.No	Code	Course	L	T	P	Drg	C
1	16HS1101	Professional English-I	3	0	0	0	3
2	16HS1102	Calculus and Differential Equations	3	1	0	0	3
3	16HS1103	Applied Physics	3	1	0	0	3
4	16HS1105	Environmental Studies	3	0	0	0	3
5	16ME1101	Engineering Mechanics	3	1	0	0	3
6	16HS2106	Professional English Lab	0	0	3	0	2
7	16HS2107	Applied Physics Lab	0	0	3	0	2
8	16ME2104	Engineering Workshop and IT Workshop	0	0	3	0	2
		TOTAL	**15**	**3**	**9**	**0**	**21**

B.Tech 2nd Semester – Civil Engineering

S.No	Code	Course	L	T	P	Drg	C
1	16HS1201	Professional English-II	3	0	0	0	3
2	16HS1202	Integral Transforms	3	1	0	0	3
3	16HS1104	Applied Chemistry	3	1	0	0	3
4	16CS1101	Computer Programming	3	0	0	0	3
5	16EE1101	Basic Electrical and Electronics Engineering	3	1	0	0	3
6	16HS2108	Applied Chemistry Lab	0	0	3	0	2
7	16CS2102	Computer Programming Lab	0	0	3	0	2
8	16ME2103	Engineering Drawing Practice	0	0	0	3	2
		TOTAL	**15**	**3**	**6**	**3**	**21**

B.Tech 3rd Semester – Civil Engineering

S.No	Code	Course	L	T	P	Oth	C
1	16HS1302	Probability and Statistics	3	1	0	0	3
2	16CE1301	Fluid Mechanics	3	0	0	0	3
3	16CE1302	Strength of Materials-I	3	1	0	0	3
4	16CE1303	Building Materials, Planning and Construction	3	1	0	0	3
5	16CE1304	Surveying-I	3	1	0	0	3
6	16CE1305	Engineering Geology	3	0	0	0	3
7	16CE2306	Strength of Materials Lab	0	0	3	0	2
8	16CE2307	Surveying Lab-I	0	0	3	0	2
9	16CE2308	Engineering Geology Lab	0	0	3	0	2
10	16AS3301	Communication Skills Practice	0	0	0	3	1
11	16AS3302	Professional Society Activities-I	0	0	0	3	1
12		Audit Course					
		TOTAL	**18**	**4**	**9**	**6**	**26**

B.Tech 4th Semester – Civil Engineering

S.No	Code	Course	L	T	P	Oth	C
1	16HS1401	Matrices and Numerical Methods	3	0	0	0	3
2	16CE1401	Hydraulics and Hydraulic Machinery	3	1	0	0	3
3	16CE1402	Strength of Materials-II	3	1	0	0	3
4	16CE1403	Concrete Technology	3	1	0	0	3
5	16CE1404	Surveying-II	3	1	0	0	3
6	16CE1405	Environmental Engineering	3	0	0	0	3
7	16ME2306	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	0	2
8	16CE2406	Concrete Technology Lab	0	0	3	0	2
9	16CE2407	Surveying Lab-II	0	0	3	0	2
10	16AS3401	Technical Seminar	0	0	0	3	1
11	16AS3402	Soft Skills Practice	0	0	0	3	1
12	16AS3403	Professional Society Activities-II	0	0	0	3	1
		TOTAL	**18**	**4**	**9**	**9**	**27**

B.Tech 5th Semester – Civil Engineering

S.No	Code	Course	L	T	P	Oth	C
1	16CE1501	Basics of Structural Analysis	3	0	0	0	3
2	16CE1502	Basic Reinforced Concrete Design	3	1	0	0	3
3	16CE1503	Soil Mechanics-I	3	1	0	0	3
4	16CE1504	Transportation Engineering-I	3	1	0	0	3
5	16CE1505	Hydrology and Irrigation Structures	3	1	0	0	3
6	16CE1506	Estimation, Costing and Valuation	3	0	0	0	3
7	16CE2507	Soil Mechanics Lab	0	0	3	0	2
8	16CE2508	Environmental Engineering Lab	0	0	3	0	2
9	16CE2509	Computer Aided Drafting Lab	0	0	3	0	2
10	16AS3501	Term Paper	0	0	0	3	2
11	16AS3502	Quantitative Aptitude	0	0	0	3	1
12	16AS3503	Professional Activities-III	0	0	0	3	1
		TOTAL	**18**	**4**	**9**	**9**	**28**

B.Tech 6th Semester – Civil Engineering

S.No	Code	Course	L	T	P	Oth	C
1	16CE1601	Methods of Structural Analysis	3	1	0	0	3
2	16CE1602	Design of Steel Structures-I	3	1	0	0	3
3	16CE1603	Soil Mechanics-II	3	1	0	0	3
4	16CE1604	Transportation Engineering-II	3	0	0	0	3
5	16CE1605	Environmental Impact Assessment and Audit	3	0	0	0	3
6	**ELECTIVE-I**						
	16CE1606	Municipal Solid Waste Management	3	1	0	0	3
	16CE1607	Steel-Concrete Composite Structures					
	16CE1608	Urban Transportation Planning					
	16CE1609	Available Selected MOOCs					
7	16CE2610	Building Planning and Drawing Practice	0	0	3	0	2
8	16CE2611	Design and Computer Aided Drafting of Irrigation Structures Lab	0	0	3	0	2
9	16CE2612	Design and Drawing of Environmental Engineering Lab	0	0	3	0	2
10	16CE2613	Mini Project	0	0	0	3	2
11	16AS3601	Technical Aptitude	0	0	0	3	1
12	16AS3602	Professional Society Activities-IV	0	0	0	3	1
		TOTAL	**18**	**4**	**9**	**9**	**28**

B.Tech 7th Semester – Civil Engineering

S.No	Code	Course	L	T	P	Oth	C
1	16MB1411	Engineering Economics and Project Management	3	0	0	0	3
2	16CE1701	Advanced Reinforced Concrete Design	3	1	0	0	3
3	16CE1702	Design of Steel Structures-II	3	1	0	0	3
4	**ELECTIVE-II (OPEN ELECTIVE)**		3	1	0	0	3
5	**ELECTIVE-III**						
	16CE1703	Prestressed Concrete	3	1	0	0	3
	16CE1704	Advanced Foundation Engineering					
	16CE1705	Earthquake Engineering					
	16CE1706	Available Selected MOOCs					
6	16CE2709	Computer Aided Analysis and Design Lab	0	0	3	0	2
7	16CE2710	Transportation Engineering Lab	0	0	3	0	2
8	16CE2711	MAT Lab	0	0	3	0	2
9	16AS3701	Internship	0	0	0	3	2
10	16AS3702	Professional Society Activities-V	0	0	0	3	1
		TOTAL	**15**	**4**	**9**	**6**	**24**

B.Tech 8th Semester – Civil Engineering

S.No	Code	Course	L	T	P	Oth	C
1		**ELECTIVE-IV**					
	16CE1801	Water Resource Engineering	3	1	0	0	3
	16CE1802	Systems Approach to Civil Engineering					
	16CE1803	Repair and Rehabilitation of Structures					
	16CE1804	Construction and Law					
2		**ELECTIVE-V**					
	16CE1805	Bridge Engineering	3	1	0	0	3
	16CE1806	Geographic Information and Remote Sensing					
	16CE1807	Ground Improvement Techniques					
	16CE1808	Available Selected MOOCs					
3		**ELECTIVE-VI**					
	16CE1809	Finite Element Methods in Civil Engineering	3	1	0	0	3
	16CE1810	Construction Project Management					
	16CE1811	Pollution Control and Monitoring					
	16CE1812	Available Selected MOOCs					
4	16CE2813	Major Project and Comprehensive Viva-Voce	0	0	8	0	12
		TOTAL	**9**	**3**	**8**	**0**	**21**

ELECTIVE-II (OPEN ELECTIVE)

S.No	Code	Course
1	16CE1707	Disaster Management
2	16CE1708	Infrastructure Systems Planning
3	16EE1707	Renewable Energy Sources
4	16EE1708	Energy Auditing
5	16ME1708	Industrial Robotics
6	16ME1709	Nano Material Applications
7	16EC1707	Digital Image Processing
8	16EC1708	Electronic Product Design and Packaging
9	16EC1709	Bio-Medical Instrumentation
10	16CS1708	Internet of Things
11	16CS1709	Python Programming Language
12	16MB1302	Entrepreneurship Development

B.Tech 5th Semester

Civil Engineering

Syllabus

BASICS OF STRUCTURAL ANALYSIS

B.Tech5th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1501	Core	3	0	0	3	40	60	100
Contact Classes: 60	Tutorial Classes: - Nil	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES

The course should enable the students to:

I. Gain knowledge on fixed and continuous beams and their behaviour under support conditions

II. Analyze indeterminate structures and understand the concept of strain energy theorems

III. Analyze beams by using slope deflection and Moment distribution methods

UNIT-I — Classes:15

FIXED BEAMS: Introduction to statically indeterminate beams with U.D.L, Central Point load, eccentric Point load, no. of point loads, U. V. L, Couple and combination of loads, S.F.D and B.M.D for above conditions, Deflection of fixed beams effect on sinking supports and rotation support.

CONTINUOUS BEAMS: Introduction to continuous beams, Chaperon's theorem of 3 moments, Analysis of continuous beams with constant moment of inertia with one or both end fixed & simply supported, Continuous beams with over Hang, sinking of supports.

UNIT-II — Classes:15

STRAIN ENERGY: Introduction, Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces, Castigliano's first theorem, Deflections of simple beams and pin jointed trusses.

ANALYSIS OF INDETERMINATE STRUCTURES: Indeterminate Structural Analysis, Determination of static and kinematic indeterminacies, Solution of trusses with up to two degrees of internal and external indeterminacies, Castigliano's theorem.

UNIT-III	Classes:15

SLOPE DEFLECTION METHOD: (FOR CONTINUOUS BEAMS): Introduction to slope deflection method, Derivation of Slope Deflection Equation, application to continuous beam with and without settlement of supports.

MOMENT DISTRIBUTION METHOD (M. D. M): Introduction to M. D. M., Definition of carry over moment, carry over factor, Stiffness, Distribution factor, Problems in M.D.M with and without settlement of Supports.

UNIT-IV	Classes:15

MOVING LOADS: Introduction, Max SF & BM at a given section and absolute max SF & BM due to a single concentrated load, UDL load longer than the span, UDL load shorter than the span, two point loads with fixed distance b/w them and several point loads , equivalent UDL load.

INFLUENCE LINES FOR DETERMINATE STRUCTURES: Definition of influence line for SF, influence line for BM, load position for max SF at a section, load position for max BM at a section, point loads, UDL longer than the span, UDL shorter than the span,

Text Books

1. Analysis of Structures vols. 1 & 2 by Vazirani&Ratwani; Khanna Publishers; Delhi.
2. S.Ramamrutham and R.Narayan “Theory of structures “ Dhanpatrai Publishing Company (p).Ltd,New delhi,9th edition,2012
3. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, “ Theory of structures”, Laxmi Publications Pvt. Ltd., New Delhi, 2004

Reference Books

1. Reddy. C.S., “Basic Structural Analysis”, Tata McGraw Hill Education Pvt. Ltd., New Delhi,2013
2. L.S. Negi& R.S. Jangid, “Structural Analysis”, Tata McGraw Hill Publications, New Delhi,6th Edition, 2003.
3. Structural analysis by R. C. Hibbeler, Pearson Education

Web References

1. https://nptel.ac.in/downloads/105101085/
2. https://nptel.ac.in/courses/105106050/2
3. https://nptel.ac.in/courses/105105166/

E-Text Books

1. https://books.google.co.in/books?isbn=0070702764
2. https://books.google.co.in/books?isbn=8125942696

Outcomes

At the end of the course student will be able to:

1. Determine the reactions at supports in a propped cantilever/fixed beam with number of point loads, uniformly varying load, couple and combination of loads/settlements of supports/ rotation supports and plotting SFD and BMD
2. Analyze continuous beam with constant or varying moment of inertia, with one or both ends fixed/overhang, with and without sinking of supports and plotting SFD and BMD
3. Determine the strain energy due to axial load, shear force, and bending moment and apply the strain energy method for finding the deflections in a simply supported beams, and pin jointed trusses using Castigliano's theorem-I
4. Determine static and kinematic indeterminacy in continuous beams and trusses and apply the Castigliano'stheorem-II for finding the deflection in a simple indeterminate truss.
5. Determine kinematic indeterminacy in continuous beams and trusses and apply the Castigliano'stheorem-II for finding the deflection in a simple indeterminate truss
6. Analyze design forces at any section in a simply supported beam/simple trusses for various moving load combinations such as single, multiple point loads, U.DL and their

BASIC REINFORCED CONCRETE DESIGN

B.Tech 5th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
16CE1502	Core	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to :

I. Gain knowledge on working stress method and its applications

II. Understand the concept of Limit State Design

III. Understand the design criteria for beams and slabs

UNIT-I **Classes: 12**

INTRODUCTION: Objectives of structural design , stability, strength and serviceability; Design codes and handbooks; Design philosophies, working stress method, ultimate load method and limit state method, Grades of steel and cement, Stress, Strain characteristics of concrete and steel.

WORKING STRESS METHOD: General Introduction, Fundamental Assumptions, Method of Transformed Sections, Stress, Strain relationship, Rectangular Sections in Bending with Tension Reinforcment only, Under, reinforced, Ideally reinforced (Balanced) and Over-reinforced Sections, Design of Rectangular sections in Bending with Tension Reinforcement only and with both Tension & Compression reinforcement.

UNIT-II **Classes: 12**

Limit State Method (L.S.D.) of design: Limit State of Collapse in Flexure Introduction and Principles of L.S.D., Characteristic load and strengths, Design values, Partial safety factors, Factored loads.

Flexure of R.C.C. beams of rectangular section: Under reinforced, Balanced and over reinforced sections.Compression stress block, Estimation of ultimate moment by strain compatibility. Guide lines for choosing width, depth and percentage of reinforcements in beams.Design of singly reinforced rectangular beams and doubly reinforced beams.

Design of flanged beams (T and L): Effective flange width, Basis of analysis and design, Minimum and Maximum steel in flanged beams. Settlement of Supports.

UNIT-III	**Classes: 12**

Design of one way, two way slabs & Continuous slabs in Limit State Method: Different kinds of loads on slabs including partition walls ,Simply supported slabs on all four sides, Moment in two way slabs with corners held down. Choosing slab thickness. Design of restrained slabs (with torsion at corners) I.S. code provisions. Detailing of reinforcement. Load from slabs on supporting beams. Shear in slabs. Design of one way continuous slab.

UNIT-IV	**Classes:12**

SHEAR, TORSION AND BOND: Limit state of collapse in shear, types of shear failures, Truss analogy, shear span / depth ratio, Calculation of shear stress, types of shear reinforcement. General procedure for design of beams for shear. Enhanced shear near supports, Shear in slabs, steel detailing. Analysis for torsional moment in a member. Torsional shear stress in rectangular sections. Reinforcement for torsion in RC beams. Principles of design for combined bending shear and torsion. Detailing of torsion reinforcement, Concept of bond, development length, anchorage bond, flexural bond.

Text Books

1. Punmia.B.C., Ashok Kumar Jain,Arun Kumar Jain,"Limit State Design of Reinforced Concrete",Laxmi PublicationPvt. Ltd.,NewDelhi,2007
2. Varghese, P.C.," LimitState DesignofReinforced Concrete", Prentice Hallof India Pvt.Ltd., NewDelhi, 2002

Reference Books

1. Jain, A.K.,"Limit State Design of RCStructures", Nemchand Publications, Roorkee, 1998
2. Subramanian, N., "Design of Reinforced Concrete Structures",Oxford UniversityPress, NewDelhi, 2013

Web References

1. https://nptel.ac.in/courses/105105105/
2. https://nptel.ac.in/downloads/105105105/

E-Text Books

1. https://books.google.co.in/books?isbn=8122414605

2.https://books.google.co.in/books?isbn=007014110X

3. https://books.google.co.in/books?isbn=812033048X

Outcomes

At the end of the course student will be able to:

1. Design a singly reinforced RC beam by using Working Stress Design philosophy.
2. Design beams subjected to shear, torsion and bond.
3. Design the one way and two way slabs in as per IS: 456-2000.
4. Compute deflection and crack depths following serviceability criterion.
5. Understand the concept of Working Stress Method.
6. Design continuous slabs in Limit State Method.

SOIL MECHANICS-I

B.Tech 5th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1503	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on soil structure and their properties

II. Understand various mechanical properties of soil

III. Understand the concept of compaction and consolidations

UNIT-I — Classes:12

Introduction: Soil formation, soil structure and clay mineralogy, Adsorbed water, Mass, volume relationship, Relative density.

Index Properties of Soils: Moisture Content, Specific Gravity, Insitu density, Grain size analysis , Sieve and Hydrometer methods , consistency limits and indices , I.S. Classification of soils

UNIT-II — Classes:12

Permeability: Soil water, capillary rise, flow of water through soils, Darcy's law, permeability, Factors affecting, laboratory determination of coefficient of permeability, Permeability of layered systems. Seepage through Soils: Total, neutral and effective stresses, quick sand condition, Seepage through soils, Flownets- Characteristics and Uses.

Stress Distribution in Soils: Boussinesq's and Westergaard's theories for point loads and areas of different shapes, Newmark's influence chart.

UNIT-III — Classes:12

Compaction: Mechanism of compaction, factors affecting, effects of compaction on soil properties. Field compaction Equipment, compaction control.

Consolidation : Types of compressibility, Immediate Settlement, primary consolidation and secondary consolidation, e, p and e log p curves, normally consolidated soil, over consolidated soil and under consolidated soil, preconsolidation pressure and its determination, Terzaghi's 1-D consolidation theory, coefficient of consolidation- square root time and logarithm of time fitting methods , computation of total settlement and time rate of settlement

UNIT-IV	**Classes:12**

Shear Strength of Soils : Importance of shear strength , Mohr's, Coulomb Failure theories, Types of laboratory tests for strength parameters, strength tests based on drainage conditions, strength envelops, Shear strength of sands, critical void ratio, Liquefaction, shear strength of clays.

Text Books

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002)

Reference Books

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Publications.
2. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition.
3. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.

Web References

1. https://nptel.ac.in/courses/105103097/
2. https://nptel.ac.in/courses/105105168/
3. https://nptel.ac.in/downloads/105103097/

E-Text Books

1. https://books.google.co.in/books?isbn=8170087910
2. https://books.google.co.in/books?isbn=8122412238
3. https://books.google.co.in/books?isbn=0415327024

Outcomes

At the end of the course student will be able to:

1. Understand the basics of soil mechanics.
2. Understand soil properties and classify them.
3. Understand the process of compaction, consolidation etc.,
4. Understand the concept of permeability of soils and their role
5. Determining various properties & strength of soil.
6. Understand the importance of shear strength and concept of various failure theories

TRANSPORTATION ENGINEERING-I

B.Tech 5th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1504	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on Highway development and planning

II. Understand the geometric design of highways and identify various components in it

III. Gain knowledge on highway materials, tests to be carried out on materials

IV. Understand the design of flexible and rigid pavement

UNIT-I — Classes:12

Highway Development and Planning: Highway development in India, Necessity for Highway Planning, Different Road Development Plans Classification of Roads, Road Network Patterns, Planning Surveys, Highway Alignment, Factors affecting Alignment, Engineering Surveys.

UNIT-II — Classes:12

Highway Geometric Design: Cross sectional elements; design speed, passing and non, passing sight distances; PIEV theory, requirements and design principles of horizontal alignment including radius of curvature, super elevation, extra widening, design of transition curves, curve resistance, set back distance, grade compensation and vertical alignment.

UNIT-III	Classes:12

Highway Materials: Subgrade soil: classification, Soil compaction and its importance, Subgrade soil strength, California Bearing Ratio, Modulus of Subgrade Reaction. Stone aggregates- Desirable properties, Tests for Road Aggregates. Bituminous Materials: Types desirable properties, Tests on Bitumen, Bitumen Grading System, Bituminous paving mixes: Requirements, Marshall Method of Mix Design.

Introduction to Highway Construction: Cleaning and grubbing, Earthwork, Suitable materials for embankment and Subgrade, construction of embankment and Subgrade, checking field densities

UNIT-IV	Classes:12

Highway Pavement Design: Flexible Pavements, Objects & Requirements of pavements, Types, Functions of pavement components, Design factors,Flexible Pavement Design as per IRC 37:2012. Rigid Pavement, Types, Westergaard's principles, wheel load stresses, Temperature stresses, Design of Rigid Pavement as per IRC58: 2011, Design of Joints.

Text Books

1. Highway Engineering, S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Traffic Engineering & Transportation Planning, Dr.L.R.Kadyali, Khanna Publications, 6th Edition, 1997.

Reference Books

1. IRC: 37, 2012 Tentative Guidelines for the Design of Flexible Pavements
2. IRC: 58, 2011 Guidelines for Design of Plain Jointed Rigid Pavements for Highways.
3. MoRTH: Specifications for Road and Bridge Works, V, Edition
4. Principles of Traffic and Highway Engineering, Garber &Hoel, Cengage Learning.
5. Highway Engineering, S.P.Bindra, DhanpatRai& Sons. , 4th Edition (1981).

Web References

1.https://nptel.ac.in/downloads/105101087/

2.https://nptel.ac.in/courses/105101087/

E-Text Books

1. https://books.google.co.in/books?isbn=9382609857

2.https://books.google.co.in/books?isbn=078440464X

3. https://books.google.co.in/books?isbn=9332587647

Outcomes

At the end of the course student will be able to

1. Explain road development plans and history of highways in India

2. Design for individual elements of highway geometry.

3. Conduct experiments for ascertaining the quality of highway materials

4. Identify various stages in construction of pavements.

5. Identify functions of pavement and design flexible pavements

6. Identify functions of pavement and design flexible pavements

HYDROLOGY AND IRRIGATION STRUCTURES

B.Tech 5th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1505	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on hydrology and hydrographs and their importance.

II. Understand ground water and irrigation requirement and their importance

III. Understand canal regulation works and cross drainage works

UNIT-I | Classes:12

Hydrology: Hydrologic cycle; precipitation, types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data, PMP, DAD, IDF analysis. Evaporation, factors affecting evaporation, measurement of evaporation; Infiltration, factors affecting infiltration, measurement of infiltration, infiltration indices; Run-off, Factors affecting run off, Computation of run off; Design Flood; Estimation of maximum rate of run off; SCS curve number method , separation of base flow.

Hydrographs: Hydrograph analysis; Unit Hydrograph, construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

UNIT-II	Classes:12

Ground Water: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters, porosity, Specific yield, Specific retention; Divisions of sub-surface water; Water table; Types of aquifers; storage coefficient, coefficient of permeability and transmissibility; well hydraulics, Darcy's law; Steady radial flow to a well, Tube well; Open well; Yield of an open well, Constant level pumping test, Recuperation test; Introduction to well losses.

Irrigation: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

UNIT-III	Classes:12

Irrigation Channels - SILT Theories: Classification; Canal alignment; Inundation canals; Cross section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Maintenance of irrigation channels; Silt theories, Kennedy's theory, Kennedy's method of channel design; Silt supporting capacity according to Kennedy's theory; Use of Garret's diagram in channel design, Comparison of Kennedy's and Lacey's theory.

Diversion Head Works: Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on permeable foundations.

UNIT-IV	Classes:12

Canal Regulation Works: (Theory only) Canal Falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; roughening devices; design of sarada type fall. Canal Regulators: off-take alignment; head regulators and cross regulators; design of cross regulator and distributary head regulator. Canal outlets: Introduction; Requirements of a good module; types of outlets; flexibility, proportionality, setting, hyper proportional outlet, sub-proportional outlet, sensitivity, efficiency of an outlet, drowning ratio, modular limit; canal escapes, types; Metering flumes, types.

Cross Drainage Works: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

Text Books

1. Irrigation and water power engineering by Punmia&Lal, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi
3. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi

Reference Books

1. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
2. Engineering Hydrology by Srinivasan , Oxford Pubilishers, New Delhi

Web References

1. https://nptel.ac.in/courses/105105107/
2. https://nptel.ac.in/courses/105101087/

E-Text Books

1. https://books.google.co.in/books?isbn=1842654217
2. https://books.google.co.in/books?isbn=0074624490

Out comes

At the end of the course student will be able to:

1. Explain hydrological cycle and its components
2. Understand the measurement of rainfall and analysis of hydrographs
3. Understand various layers and types of waters available under earth surface
4. Understand irrigation water requirement, crop rotation concepts, duty delta
5. Understand various headworks.
6. Explain canal regulation works and cross drainage works.

ESTIMATION, COSTING AND VALUATION

B.Tech 5th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1506	Core	3	0	0	3	40	60	100
Contact Classes: 60	Tutorial Classes: - Nil		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on estimation procedures and methods of estimation

II. Estimate RCC, road and canal works

III. Gain knowledge on SSR and general specifications

IV. Understand the procedures of contract and tenders

UNIT-I — Classes:15

Procedure of estimating: Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

Types of estimates: Estimate, preliminary estimate; Plinth area estimate; Cube rate estimate; detailed estimate; revised estimate; Supplementary and revised estimate, Annual repair or maintenance estimate; Contingencies; L.S.I tem.

Methods of building estimates: Individual wall method; Centre line method; Arch masonry calculation; Estimating of steps. Estimate Of Buildings: Estimate of residential building; Estimate of a building from line plan.

UNIT-II — Classes:15

Estimate of RCC works: Standard hooks and cranks; Estimate of RCC roof slab; estimating of RCC beam; RCC T, beam slab and RCC column with foundation.

Road Estimating: Lead and Lift; Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road from longitudinal sections; Estimate of earthwork in hill roads; Estimate of metalled road.

Canal estimate: Earthwork in canals, different cases; Estimate of earthwork in irrigation channels.

UNIT-III	Classes:15

Specifications: Purpose and method of writing specifications; General specifications, general specifications of first class building; Detailed Specifications, Detailed specifications for Brick work; cement concrete; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonry; white washing; distempering.

Analysis of Rates: Task or out , turn work; Labour and materials required for different works; Rates of materials and labour; Preparing analysis of rates for the following items of work: i)cement concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) Cement concrete flooring vi) White washing. vii) Earth work excavation.

UNIT-IV	Classes:15

PWD Accounts and Procedure of Works: Organization of Engineering department; Work charged establishment; Contract; Tender; Tender notice; Tender Schedule; Earnest money; Security money; Measurement book; Administrative approval; Technical sanction; Plinth area; Floor Area; Carpet area; Approximate Estimate; Plinth area estimate; Revised Estimate; Supplementary estimate.

Valuation: Cost; Price & value; Methods of valuation; Out goings; Depreciation; Methods for estimating cost depreciation; Valuation of building.

Miscellaneous Topics :Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

Text Books

1. Estimating & Costing in Civil Engineering by B.N. Dutta; U. B. S. Publishers & Distributors, New Delhi
2. Valuation of Real properties by S. C. Rangwala; Charotar Publishing House, Anand.

Reference Books

1. Civil Estimating, Costing, and Valuation in Civil Engineering, Agarwal, Kumar, Chaudary, DhanpatRai Publications
2. Estimation and costing, G.S.Biridie, DhanpatRai Publications.

Web References

1. https://nptel.ac.in/courses/105103093/14
2. https://nptel.ac.in/courses/105104161/6
3. https://nptel.ac.in/courses/105103023/35

E-Text Books

1. https://books.google.co.in/books?isbn=8185273685
2. https://books.google.co.in/books?isbn=8121903327

Outcomes

At the end of the course student will be able to:

1. Understand the methods of estimation, types of estimates.
2. Estimate the residential building from a building line plan.
3. Estimate roads covering culverts and bridges.
4. Understand the process of rate analysis
5. Understand the procedure of works and PWD Accounts
6. Explain the process of tenders and contracts

SOIL MECHANICS LABORATORY

B.Tech 5th Semester – Civil Engineering								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
16CE2507	**Core**	-	-	3	2	25	50	75
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		

OBJECTIVES

The course should enable the students to:

I. Understand the procedures for determining properties of soil

II. Carryout experiments to determine various mechanical properties of soil.

LIST OF EXPERIMENTS

Expt. 1 **SIEVE ANALYSIS AND HYDROMETER ANALYSIS**

Determine grain size distribution of cohessionless soil by sieving & fine-grained soil by hydrometer analysis

Expt. 2 **DETERMINATION OF ATTERBERG'S LIMITS**

Determine the liquid limit, Plastic Limit, Plastic Index and shrinkage limit of soil.

Expt. 3 **DETERMINATION OF SPECIFIC GRAVITY OF CO HESIONLESS SOIL**

Determine the specific gravity of cohesionless soils using specific gravity bottles

Expt. 4 **DETERMINATION OF IN-SITU DENSITY**

Determine In-Situ Density of soil by core cutter and sand replacement method

Expt. 5	**DETERMINATION OF COEFFICIENT OF PER MEABILITY BY CONSTANT HEAD & VARIABLE HEAD METHODS.**

To study and plot the transient response of series and parallel RL and RC circuits using MATLAB and PSPICE.

Expt. 6	**DETERMINATION OF COMPACTION CHARACTER ISTICS OF SOIL**

Determine the compaction characteristics of soil by proctor test

Expt.7	**UNCONFINED COMPRESSION TEST**

Determine unconfined compressive strength of cohesive soil

Expt. 8	**CBR TEST**

Determine the bearing capacity of soil

Expt. 9	**TRIAXIAL COMPRESSION TEST.**

Determine the mechanical properties of soil

Expt.10	**DIRECT SHEAR TEST& DIFFERENTIAL FREE SWELL**

Determine the shear strength and free swell index.

Reference Books

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi publications Pvt. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt. Ltd, (2002)

Web References

1. https://www.youtube.com/watch?v=n_q1rmwCqfM
2. https://www.youtube.com/watch?v=XRlFvjG_6AY
3. https://nptel.ac.in/courses/105101160/

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS

SOFTWARE: NIL

HARDWARE: Soil Moisture Content Testing Apparatus, Specific Gravity Determination Apparatus, Standard Sieve sets, Hydrometer Analysis (Hydrometer, Mixer), Liquid Limit Test Apparatus, Plastic Limit Test Apparatus, Modified Proctor's Compaction Test Equipment, Sand Cone method Tools, Ottawa sand, Balance, Unconfined Compression Test Machine, Direct Shear Test Machine, Triaxial Shear Test Machine, Consolidation Test Machine.

Course Outcome

At the end of the course student will be able to:

1. Classify soils as per IS standards
2. Determine compressive and shear of soil
3. Determine bulk density and dry density of soil
4. Determine the bearing capacity of soil
5. Determine the liquid limit, plastic limit and shrinkage limit of soil
6. Determine unconfined compressive strength of soil

ENVIRONMENTAL ENGINEERING LABORATORY

B.Tech 5th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16CE2508	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES

The course should enable the students to:

I. Perform various test on water to determine its properties like B.O.D, C.O.D, DO, pH etc.,

II. Understand the precautions to be taken while working with chemicals and preparing titration process.

LIST OF EXPERIMENTS

Expt. 1	**DETERMINATION OF pH AND TURBIDITY**

To determine the pH and turbidity of water

Expt.2	**DETERMINATION OF CONDUCTIVITY AND TO TAL DISSOLVED SOLIDS**

To estimate the total dissolved solids and conductivity of water sample

Expt.3	**DETERMINATION OF ALKALINITY/ACIDITY**

To determine the alkalinity and acidity of water sample

Expt.4	**DETERMINATION OF CHLORIDES**

To determine the content of chlorides in water sample

Expt.5	**DETERMINATION AND ESTIMATION OF TO TAL SOLIDS, ORGANIC SOLIDS AND INORGANIC SOLIDS**

To estimate the total solids including organic and inorganic solids in water

Expt. 6	**DETERMINATION OF IRON**
To estimate the Iron content in water sample	
Expt.7	**DETERMINATION OF DISSOLVED OXYGEN**
To determine the dissolved oxygen content in water	
Expt. 8	**DETERMINATION OF NITROGEN**
To determine the nitrogen content in water	
Expt. 9	**DETERMINATION OF TOTAL PHOSPHOROUS**
To determine the phosphorous content in water	
Expt. 10	**DETERMINATION OF B.O.D**
To determine the Biological Oxygen Demand	
Expt. 11	**DETERMINATION OF C.O.D**
To determine the Chemical Oxygen Demand	
Expt. 12	**DETERMINATION OF OPTIMUM COAGULANT DOSE.**
To estimate the optimum coagulant dosage	
Expt. 13	**DETERMINATION OF CHLORINE DEMAND**
To determine the chlorine demand for water sample	
Expt. 14	**PRESUMPTIVE COLIFORM TEST**
To carry out presumptive coliform test	

Reference Books

1. web.iitd.ac.in/~arunku/files/CVL212_Y15/Lab_CVL212v1.pdf

2. https://nptel.ac.in/courses/105107176/

Web References

1. https://cittumkur.org/ads/ENV.pdf

2. https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce3040

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: Nil

HARDWARE: Digital pH meter, Digital conductivity meter, Turbidity meter, Digital colony counter, Hot air oven, Distilled water still, B.O.D incubator, C.O.D Digestor, Jar test apparatus

Course Outcome

At the end of the course student will be able to

1. Determine the pH of water and its suitability of usage

2. Determine B.O.D, C.O.D, DO of water

3. Determine Chlorine demand

4. Determine Nitrogen content

5. Estimate optimum coagulant dosage

6. Determine the phosphorous content

COMPUTER AIDED DRAFTING LABORATORY

B.Tech 5th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16CE2509	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES

The course should enable the students to:

I. Gain knowledge on Auto Cad and its applications

II. Use Auto Cad to draw various components of buildings and trusses

LIST OF EXPERIMENTS

Expt. 1	**DRAW CONVENTIONAL SIGNS AS PER I.S. STANDARDS, SYMBOLS USED IN CIVIL ENGINEERING DRAWING**

Draw and outline the various signs and symbols used in civil engineering drawing as per I.S. Standards

Expt. 2	**DRAW THE IMPORTANT JOINERY COMPONENTS OF THE BUILDING**

Draw the elevation of: a) Single leaf door b) Double leaf door c) Partially glazed and partially paneled window.

Expt. 3	**DRAW THE IMPORTANT BUILDING COMPONENTS LIKE SECTION OF A LOAD BEARING WALL FOUNDATION TO PARAPET.**

Draw the section of load bearing wall foundation to parapet

Expt. 4	**PREPARE THE KING POST & QUEENPOST TRUSS AND LABLE THE VARIOUS PARTS.**

Draw and outline the various parts of king and queen post trusses

Expt. 5	PLAN, ELEVATION, SECTION OF SINGLE STREYED RESIDENTIAL BUILDING

Draw the plan, elevation and section of a two bed room house single-storyed framed structure type residential building

Expt. 6	PLAN,ELEVATION, SECTION OF MULTI STREYED STOREYED FRAMED STRUCTURE TYPE RESIDENTIAL BUILDING

Draw the plan, elevation and section of a two bed room house multi-storyed framed structure type residential building

Expt.7	STRUCTURAL DETAILING DRAWINGS

Draw the structural detailing of a) Lintel cum sunshade b) Continuous beam c) Simply supported two way slab

Expt. 8	LAYOUTS OF ELECTRICAL LINES IN BUILINGS

Draw the layouts of electrical line in a) One bed room house b) Two bed room house

Reference Books

1. https://www.autodesk.com/products/autocad/overview

2. https://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/.../index.htm

Web References

1. https://www.youtube.com/watch?v=EgKc9L7cbKc
2. https://www.youtube.com/watch?v=iZTq3hNJ2Pc

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: Auto Cad (Auto Desk Product)

HARDWARE: Desktop Computers (36nos)

Course Outcome

At the end of the course student will be able to

1. Use Auto Cad for drafting various building components
2. Draw the elevation, cross-section and plan of a building
3. Draw the electrical layout of a building
4. Draw the structural detailing of a building
5. Draw the elevation single leaf and double leaf door
6. Draw the elevation of partially gazed and partially paneled windows

TERM PAPER

B.Tech 5th Semester: Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16AS3501	-	-	-	-	2	0	50	50
Contact Classes: 24	Tutorial Classes: Nil		Practical Classes: Nil			Total Classes: 24		

OBJECTIVES

The course should enable the students to:

I. Guide students through the process of planning and executing a substantial project.

II. Allow students the opportunity to teach themselves.

III. Improves the power of designing, organizing, communication, coordination and judgment.

The Term Paper is a self study report and shall be carried out either during 5th Semester along with other lab courses. Every student will take up this term paper individually and submit a report. The scope of the term paper could be an exhaustive literature review choosing any engineering concept with reference to standard research papers or an extension of the concept of earlier course work in consultation with the term paper supervisor. The term paper reports submitted by the individual students during the 5th Semester shall be evaluated for a total of 50 marks for external evaluation, it shall be conducted by two Examiners, one of them being term paper supervisor as internal examiner and an external examiner nominated by the Principal from the panel of experts recommended by HOD.

Outcomes

1. Prepare comprehensive report based on literature survey related to considered area
2. Select the paper to be solved and analyze the extension possibilities
3. Identify the applicability of modern software tools and technology
4. Correct himself to improve write-up skills
5. Exhibit the professional behavior

QUANTITATIVE APTITUDE

B.Tech 5th Semester: Civil Engineering								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
16AS3502	-	-	-	-	1	0	50	50
Contact Classes: 12	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 12**		

The external examination will be conducted for 50 Marks with 1 Credit; examination type is Multiple Choice Question (MCQ) – Offline/Online.

OBJECTIVES

The course should enable the students to :

1. Formulate the problem quantitatively and use appropriate arithmeti cal methods to solve the problem.
2. Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
3. Solve campus placements aptitude papers covering Quantitative Ability
4. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

UNIT-I **Classes:3**

Calendars, Clocks, L. C. M & H. C. F, Problems on Numbers, Averages.

UNIT-II **Classes:3**

Percentages, Profit, Loss & Discount, Simple Interest & Compound Interest.

UNIT-III **Classes:3**

Ratio & Proportion, Mixture and Alligation, Partnership, problems on ages.

UNIT-IV **Classes:3**

Time & Work, Pipes and Cisterns, Time & Distance, Problem on Trains, Boats and Streams, Mensuration.

Text Books

1. Dr. R.S. Aggarwal, "Quantitative Aptitude", S.Chand Publication, New Delhi.

Reference Books

1. Quantitative Aptitude - G. L BARRONS
2. Abhijit Guha, "Quantitative Aptitude for Competitive Examinations", 4th Edition.

Web References

1. www.indiabix.com
2. https://www.campusgate.co.in
3. https://m4maths.com

PROFESSIONAL ACTIVITIES-III

B.Tech 5th Semester: Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
16AS3503	-	L	T	P	C	CIA	SEE	Total
		-	-	-	1	-	-	-
Contact Classes: 12	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 12			

OBJECTIVES

The course should enable the students to:

1. Improve communication skills
2. Develop leadership qualities

Professional Society Activities (PSA) course is aimed at enhancing the self-learning, communication, managerial skills of the students by engaging them in various Co & Extra Curricular activities during their course of study. Activities in each of the department shall be designed and conducted by the Professional Society Executive Committee whose composition is:

1. Faculty Mentors- 2 No.
2. Student Chairman: 1 No.- Final year Student
3. Student General Secretary: 1 No.- Third year Student
4. Treasurer: 1 No.- Third year Student

Student Members: 2 No's from each class

PSA related activities would be of the following nature but not limited to:

Activity#1	Just A Minute
Activity#2	Technical Quiz
Activity#3	Open House- Lab Demo
Activity#4	Technical Paper Presentation- Preliminary
Activity#5	Technical Paper Presentation- Final
Activity#6	Poster Presentation
Activity#7	Collage- A theme based event
Activity#8	Debate Competition
Activity#9	Group Discussion Competition
Activity#10	Mock Interviews
Activity#11	Model Exhibition
Activity#12	Valedictory Function

METHODS OF STRUCTURAL ANALYSIS

B.Tech6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1601	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to :

I. Understand application of slope deflection and moment distribution method to frames

II. Gain knowledge on 3 & 2 Hinged arches

III. Understand Kani's method and matrix methods of analysis

UNIT-I	Classes:12

SLOPE DEFLECTION METHOD FOR FRAMES: Analysis of single bay, single storey, portal frame including side sway.

MOMENT DISTRIBUTION METHOD FOR FRAMES : Stiffness and carry over factors, Distribution factors ,Analysis of single storey portal frames , including Sway

CABLES: Analysis of cables under UDL and concentrated loads.Shape of cable under self-weight

UNIT-II	Classes:12

THREE HINGED ARCHES: Elastic theory of arches, Eddy's theorem, determination of horizontal thrust, BM, NT& RSF, effect of temperature.

TWO HINGED ARCHES: Determination of horizontal thrust, BM, NT & RSF, Rib shortening and temperature stresses, Tied arches. Fixed arches (theory only).

UNIT-III	Classes:12

KANI'S METHOD: Introduction, Application to continuous beams without and with yielding of supports, Analysis of single bay, single storey portal frames (vertical legs only) including side sway.

PLASTIC ANALYSIS: Introduction, Idealized stress, Strain diagram, shape factors for various sections, Moment curvature relationship, ultimate moment, Plastic hinge, lower and upper bound theorems, ultimate strength of fixed and continuous beams.

UNIT-IV	**Classes:12**

FLEXIBILITY MATRIX METHOD: Introduction, Application to continuous beams including support yielding.

STIFFNESS MATRIX METHOD: Introduction, Application to continuous beams including support yielding. Application to Analysis of single bay, single storey portal frames (vertical legs only) including side sway. Relationship b/w flexibility matrix and stiffness matrix.

Text Books

1. Analysis of Structures vols. 1 & 2 by Vazirani&Ratwani; Khanna Publishers; Delhi
2. S.Ramamrutham and R.Narayan "Theory of structures " Dhanpatrai Publishing Company

   (p).Ltd,New delhi,9th edition,2012
3. Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2004
4. Pandit G.S. & Gupta S.P. "Structural Analysis , A Matrix Approach", Tata McGraw Hill 2004.

Reference Books

1. BhavaiKatti, S.S, "Structural Analysis , Vol. 1 & Vol. 2", Vikas Publishing Pvt Ltd., NewDelhi,2008
2. Reddy. C.S., "Basic Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi,2013.

Web References

1. https://nptel.ac.in/downloads/105105109/
2. https://nptel.ac.in/courses/105105180/
3. https://nptel.ac.in/courses/105106050/20

E-Text Books

1. https://books.google.co.in/books?isbn=9381141355
2. https://books.google.co.in/books?isbn=9325968800

Outcomes

At the end of the course student will be able to:

1. Analyze three hinged arches and obtain internal forces at any cross section
2. Analyze two hinged arches and obtain internal forces at any cross section.
3. Determine the forces in indeterminate frames subjected to lateral loads
4. Solve statically indeterminate beams and frames using classical methods
5. Apply matrix methods to analyze frames and beams
6. Analyze beams and frames using Kani's Method

DESIGN OF STEEL STRUCTURES-I

B.Tech6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1602	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to :

I. Gain knowledge on design criteria of various steel components

II. Understand the process of designing steel beams, tension and compression members

III. Understand the process of designing welded and bolted connection

UNIT-I — Classes:12

Welded Connections: Introduction, advantages and disadvantages of welding, Strength of welds, fillet weld; Permissible stresses, IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

Bolted and Riveted Connections: Introduction, advantages and disadvantages of bolting and riveting, General terminology, Strength of bolts and rivets, bearing stress and shear stress, Permissible limits, IS Code requirements

UNIT-II — Classes:12

Laterally Supported Beams: Design of simple and compound beams, Plated beams.

Laterally Unsupported Beams: Design of laterally unsupported beams

UNIT-III — Classes:12

Tension Members: General Design of members subjected to direct tension and bending, effective length of columns; Slenderness ratio, permissible stresses.

Compression Members: Design of axially loaded compression members, Splicing of columns.

UNIT-IV	Classes:12

Design of Lacings: Design principles as per IS Code. Design of single and double lacing system using bolting for channel and angle sections.

Design of Battens: Design principles and specifications as per IS Code. Design of batten systems using bolting for channel and angle sections.

Text Books

1. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005
2. Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS: 800, 2007, IK International Publishing House Pvt. Ltd., 2009.
3. Subramanian.N, "Design of Steel Structures", Oxford University Press, New Delhi, 2013

Reference Books

1. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt. Ltd., 2013
2. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2 nd Edition, 2013.

Codes/Tables

IS: CODES-STEEL TABLES:

1) IS -800, 2007
2) IS - 875, Part III
3) Steel Tables.
4) IS 1367 (PART 3)

Web References

1. https://nptel.ac.in/courses/105106112/
2. https://nptel.ac.in/noc/individual_course.php?id=noc17-ce21

E-Text Books

1. https://books.google.co.in/books?isbn=9380026617
2. https://books.google.co.in/books?isbn=0074630954

Outcomes

At the end of the course student will be able to

1. Design a welded and riveted connection between plates and brackets of simple cases
2. Determine the strength of welded and bolted connections
3. Design a simply supported beam simple loading conditions
4. Design a tension member and compression member as per IS Codes
5. Determine the strength of a tension member
6. Design Built up members

SOIL MECHANICS-II

B.Tech 6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1603	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to :

I. Gain knowledge on soil exploration techniques

II. Understand earth slope stability and earth pressure theories

III. Understand the concept of stability of retaining walls, types of foundation and their selection

UNIT-I — Classes:12

Soil Exploration: Need, Methods of soil exploration, Boring and Sampling methods, Field tests, Penetration Tests, Plate load test, Pressure meter, planning of Programme and preparation of soil investigation report.

Earth Slope Stability: Infinite and finite earth slopes, types of failures , factor of safety of infinite slopes, culmann's method for safe height,stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method, Taylor's Stability Number.

UNIT-II — Classes:12

Earth Pressure Theories: Rankine's theory of earth pressure,Coulomb's earth pressure theory,andCulmann's graphical method.

Retaining Walls: Types of retaining walls, stability of retaining walls.

UNIT-III — Classes:12

Shallow Foundations: Types, choice of foundation, Location of depth, Safe Bearing Capacity, Types of shear failures,Effect of bearing capacity of soil under water table fluctuations, Terzaghi's, Meyerhoff's and Skempton's Methods.

Allowable Bearing Pressure: Safe bearing pressure based on N, value, allowable bearing pressure; safe bearing capacity and settlement from plate load test, allowable settlements of structures, Settlement Analysis.

UNIT-IV	**Classes:12**

Pile Foundation: Types of piles, Pile load tests, Load carrying capacity of pile groups in sands and clays, Settlement of pile groups.

Well Foundations: Types, Different shapes of wells, Components of wells, functions and Design Criteria, Sinking of wells, Tilts and shifts.

Text Books

1. Geotechnical Engineering by C.Venkataramaiah, New Age Publications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi.

Reference Books

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Publications.
2. Foundation Engineering by Varghese, P.C., Prentice Hall of India., New Delhi.
3. Arora K.R. "Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, New Delhi, 2005
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.

Web References

1. nptel.ac.in/courses/114106015/2
2. www.nptelvideos.in/2012/11/soil-mechanics.html

E-Text Books

1. https://books.google.co.in/books?isbn=8120326520
2. https://books.google.co.in/books?isbn=8122417930

Outcomes

At the end of the course student will be able to:

1. Understand various soil exploration techniques
2. Analyze the stability of slopes
3. Understand various earth pressure theories
4. Explain the types of shear failures, Terzaghi's, Meyerhoff's and Skempton's Methods
5. Estimate safe bearing pressure based on N value
6. Identify and design components of well foundations

TRANSPORTATION ENGINEERING-II

B.Tech6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1604	Core	3	0	0	3	40	60	100
Contact Classes: 60	Tutorial Classes: -Nil	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES

The course should enable the students to

I. Gain knowledge on basic parameters and relationships of traffic like volume, speed, density etc.,

II. Understand various components of railway track

III. Know the importance of site selection for airport, Wind rose diagram and components of runway

UNIT-I — Classes:15

Traffic Engineering: Basic Parameters of Traffic, Volume, Speed and Density and their relationships, Traffic Volume Studies, Data Collection and Presenstation, Speed studies.

Intersections: Types of Intersections, Conflicts at Intersections, Types of at Grade Intersections,

Channelization: Objectives, Traffic Islands and Design criteria, Design of Traffic Signals, Webster Method, IRC Method. Types of Grade Separated Intersections, Rotary Intersection, Concept of Rotary and Design Criteria, Advantages and Disadvantages of Rotary Intersection.

UNIT-II — Classes:15

Introduction to Railway: Permanent way components, Cross Section of Permanent Way,Functions of various Components like Rails, Sleepers and Ballast, Gauge, Creep of Rails, Theories related to Creep, Sleeper density.

Geometric Design of Railway Track: Gradients, Grade Compensation, Cant and Negative

Super elevation, Cant Deficiency, Degree of Curve, Points and Crossing, Rail Joints & Welding of Joints.

UNIT-III	**Classes:15**

Airport Engineering: Airport Site selection, Wind rose diagram,Runway Orientation, Basic Runway Length, Corrections for Elevation, Temperature, Airport Classification, Factors Controlling Taxiway Layout, Terminal Area, Building and Building Area, Vehicular circulation and Parking Area, Apron , Hangar ,Typical Airport Layouts, Runway Lightening system & Marking.

UNIT-IV	**Classes:15**

Port and Harbour Engineering: Requirements of Port and Harbour, Classification of Ports &Harbours, Features of a Harbour, Planning of Harbour, Breakwaters, Dry docks and slipways, Quays, Jetties, Wharves, Dolphins, Moorings, Aprons, Transit shed and Warehouses, Navigational aids, Maintenance of Port and Harbours, Dredging.

Text Books

1. Principles and Practice of Highway Engineering, L.R.Kadiyali and N.B.Lal, Khanna Publications.
2. Traffic Engineering and Transportation Planning, L.R.Kadiyali, Khanna Publications.
3. Highway Engineering, C.E.G.Justo and S.K.Khanna, Nem Chand and Brothers.

Reference Books

1. Text Book of Railway Engineering, S.C.Saxena and S.Arora, Dhanpatrai and Sons, New Delhi
2. Highway, railway, Airport and Harbour Engineering, K.P. Subramanian.

Web References

1. https://nptel.ac.in/courses/105107123/
2. https://nptel.ac.in/courses/114106025/

E-Text Books

1. https://books.google.co.in/books?id=-etRAAAAMAAJ
2. https://books.google.co.in/books?isbn=8180140091
3. https://books.google.co.in/books?isbn=1351909916
4. textofvideo.nptel.ac.in/114106025/lec45.pdf

Outcomes

At the end of the course student will be able to:

1. Understand the parameters of traffic and their relationship
2. Understand the process of channelization by Webster, IRC methods
3. Understand the design criteria of traffic Island and traffic signals
4. Identify various components of railway track and their functions
5. Understand the basic concepts of airport, port and Harbor engineering
6. Outline the various components of runway and airport layout

ENVIRONMENTAL IMPACT ASSESSMENT AND AUDIT

B.Tech6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1605	Core	3	0	0	3	40	60	100
Contact Classes: 60	Tutorial Classes: -Nil	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to :

I. Gain knowledge on EIA methodologies and their criteria for selection

II. Understand the impact of environment on air, soil, surface water, ground water and wild life

III. Aware of various environmental acts

UNIT-I — Classes:15

Introduction: Basic concept of EIA - Initial environmental examination - Elements of EIA – Factors affecting EIA- Impact evaluation and analysis- Preparation of environmental base map Classification of environmental parameters.

EIA Methodologies: Criteria for the selection of EIA Methodology – EIA methods - Adhoc methods, matrix methods, network method - Environmental medium quality index method, overlay methods and cost/benefit analysis

UNIT-II — Classes:15

Environmental Impact on Soil and Ground Water: Prediction and assessment-Soil qualityMethodology for the assessment of soil and groundwater - Delineation of study area – Identification of activities.

Environmental Impact Assement of Surface Water and Air: Impact prediction - Assessment of impact significance - Identification and incorporation of mitigation measures - EIA in surface water, air and biological environment: Methodology for the assessment of impacts on surface water environment - Air pollution sources - Generalized approach for assessment of air pollution Impact.

UNIT-III	Classes:15

Assement of Impact on Vegetation and Wildlife: Assessment of impact of developmental activities on vegetation and wildlife - Environmental impact of deforestation – Causes and effects of deforestation.

Environmental Audit: Environmental audit and environmental legislation-Objectives of Environmental audit - Types of environmental audit - Audit protocol - Stages of environmental audit -Onsite activities - Evaluation of audit data and preparation of audit report.

UNIT-IV	Classes:15

Environmental Acts: Post audit activities - The Environmental protection act - The water act - The air act - Wild life act.

Case Studies: Case studies and preparation of environmental impact assessment statement for

Various industries.

Text Books

1. Y. Anjaneyulu, Environmental Impact Assessment Methodologies, 2nd Edition, B.S. Publications, Hyderabad, 2010.
2. J. Glynn and Gary W. Heinke, Environmental Science and Engineering, 2nd Edition, Prentice Hall Inc., 1996.

Reference Books

1. Suresh K. Dhameja, Environmental Engineering and Management, S.K. Kataria and Sons, New Delhi, 2010.
2. H.S. Bhatia, A Text Book of Environmental Pollution and Control,Galgotia Publication (P) Ltd., Delhi, 2003

Web References

1. https://nptel.ac.in/courses/120108004/5
2. https://nptel.ac.in/courses/120108004/4

E-Text Books

1. https://nptel.ac.in/courses/120108004/module3/lecture3.pdf
2. https://nptel.ac.in/courses/120108004/module4/lecture4.pdf
3. https://books.google.co.in/books?isbn=0128112387

Outcomes

At the end of the course student will be able to:

1. Gain knowledge on basic concept of EIA, E I A Methodologies
2. Understand Impact of Developmental Activities and Land use
3. Assess the Impact of development Activities on Vegetation and wild life
4. Understand the environmental impact on air, water, soil and wild life
5. Outline various environmental acts
6. Explain case studies and understand the impact of environment by case studies

MUNICIPAL SOLID WASTE MANAGEMENT (Elective – I)

B.Tech6th Semester: Civil Engineering								
Course code	**Category**	**Hours/week**			**Credits**	**Maximum Marks**		
16CE1606	Core Elective	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**TOTAL**
		3	1	0	3	40	60	100
Contact Classes: 48	**Tutorial Classes: -12**		**Practical Classes: Nil**			**Total Classes: 60**		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on sources, types of municipal solid waste &elements of solid waste management

II. Understand the process of collection, storage, on site and off site-processing of solid waste

III. Understand the process of transportation of solid waste and its disposal methods

UNIT-I — Classes:12

Sources and types of municipal solid wastes: Sources & types, waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects.

Elements of solid waste management: Elements,Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO

UNIT-II — Classes:12

On-site storage methods:Effect of storage, materials used for containers – segregation of solidwastes – Public health and economic aspects of open storage – waste segregation and storage.

Processing: source reduction of waste – Reduction, Reuse and Recycling.

UNIT-III	Classes:12

Collection of solid waste: Methods of Residential and commercial waste collection, Collection vehicles – Manpower– Collection routes – Analysis of collection systems

Transportation of solid waste: Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Field problems- solving.

UNIT-IV	Classes:12

Off-site Processing: Physical Processing techniques and Equipment; Resourcerecovery from solid waste composting and biomethanation; Thermal processing

Disposal methods: Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor– Dumpsite Rehabilitation

Text Books

1. Tchobanoglous, G., Theisen, H. M., and Eliassen, R. "Solid. Wastes: Engineering Principles and Management Issues". McGraw Hill, New York, 199
2. Paul T Willams, "Waste Treatment and Disposal", John Wiley and Sons, 2000
3. Vesilind, P.A. and Rimer, A.E., "Unit Operations in Resource Recovery Engineering",

   Prentice Hall, Inc., 1981

Reference Books

1. Government of India, "Manual on Municipal Solid Waste Management", CPHEEO,Ministry of UrbanDevelopment, New Delhi, 2000
2. Bhide A.D. and Sundaresan, B.B. "Solid Waste Management Collection", Processing andDisposal, 2001

Web References

1. https://nptel.ac.in/courses/120108005/
2. https://nptel.ac.in/courses/104103020/42
3. https://nptel.ac.in/courses/105106056/

E-Text Books

1. https://books.google.co.in/books?isbn=8179931870
2. https://books.google.co.in/books?isbn=3642556361
3. https://books.google.co.in/books?isbn=1558653325

Outcomes

At the end of the course student will be able to:

1. Understand the nature and characteristics of municipal solid wastes
2. Plan waste minimization and design storage, collection, transport, processing anddisposal of municipal solid waste
3. Explain off-site and on-site processing of solid waste
4. Understand various disposal methods
5. Understand the regulatory requirements regarding municipal solid waste management
6. Outline the elements of solid waste management

STEEL-CONCRETE COMPOSITE STRUCTURES (Elective –I)

B.Tech6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
16CE1607	Core Elective	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Understand the concept of composite structures and connections

II. Understand the design criteria of composite beams, slabs, columns and box girders

III. Understand the design criteria for composite box girder

UNIT-I	Classes:12

Introduction to steel - concrete composite construction – Codes – Composite action – Serviceability and Construction issues in design.

DESIGN OF CONNECTIONS: Shear connectors – Types – Design of connections in composite structures – Design of shear connectors – Partial shear interaction.

UNIT-II	Classes:12

DESIGN OF COMPOSITE MEMBERS: Design of composite beams, slabs, columns, beam – columns - Design of composite trusses.

UNIT-III	Classes:12

COMPOSITE BOX GIRDER BRIDGES: Introduction - Behaviour of box girder bridges - design concepts.

UNIT-IV	Classes:12

Case studies on steel - concrete composite construction in buildings - seismic Behaviour of composite structures.

Text Books

1. Johnson R.P., "Composite Structures of Steel and Concrete Beams, Slabs, Columns and Frames for Buildings", Vol.I, Blackwell Scientific Publications, 2004.
2. Oehlers D.J. and Bradford M.A., "Composite Steel and Concrete Structural Members, Fundamental behaviour", Pergamon press, Oxford, 1995.

Reference Books

1. Owens.G.W and Knowles.P, "Steel Designers Manual", Steel Concrete Institute(UK), Oxford Blackwell Scientific Publications, 1992

Web References

1.https://nptel.ac.in/courses/105106118/35

2.skct.edu.in/SKCT-CIVIL/pdf/PG%20R-17.pdf

E-Text Books

1. https://www.academia.edu/.../Lecture Note_31 _Introduction _to_ Steel - Concrete_ Com...
2. https://books.google.co.in/books?isbn=148228636X
3. https://books.google.co.in/books?id=1-qzAQAACAAJ

Outcomes

At the end of the course student will be able to

1. Understand the concept of composite structures
2. Design the connection between composite structures
3. Design composite beam, slab, and column
4. Understand the concept of seismic behavior of composite structures
5. Understand the concept of composite box girder
6. Understand the concept of concrete composite construction in buildings

URBAN TRANSPORTATION PLANNING (Elective – I)

B.Tech 6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1608	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on trends of urbanization, development plans formulation and evaluation

II. Understand the constraints in implementation of plans and financing

III. Understand the principles of sustainable development and transportation

UNIT-I	Classes:12

Introduction: Definition of terms, Explanation of concepts, National policies and strategies on issues related to Urban development

Trends of Urbanization: Positive and Negative impacts of Urban development Principles of planning –Types and levels of Urban plans, Stages in the planning process.

UNIT-II	Classes:12

DEVELOPMENT PLANS FORMULATION & EVALUATION: Scope and content of Regional Plan, Master Plan, Detailed Development Plan, Structure Plan, Sub Regional Plan, DCR planning and developments of industrial estates, SEZ, Development strategies, formulation and evaluation.

UNIT-III	Classes:12

Constraints for plan implementation: Industrial, Financial and Legal Constraints, Institutional Arrangements for Urban Development

Financing of Urban Developments: Decision Support System for Urban Management – Involvement of public, private, NGO, CBO& Beneficiaries.

UNIT-IV	**Classes:12**

SUSTAINABLE URBAN AND TRANSPORT PRINCIPLES: Urban Environmental Sustainability, Urban Sustainable Development, Methods and Tools for Sustainable Appraisal, Sustainable Transportation – Principles, indicators and its implications Environment and Resources- Economic Benefits of Sustainable Transportation

URBAN REGION AND ENVIRONMENT: Sustainability Assessment, Future Scenarios, Shape of Urban Region, Managing the change, Integrated Planning, Sustainable Development- City Centre, Development Areas, Inner City Areas, Suburban Areas, Periurban and Country side, Economy and Society

Text Books

1. Goel .S.L Urban, "Development and Management", Deep and Deeppublications, New Delhi,2002
2. CMDA, "Second Master Plan for Chennai", Chennai 2008.
3. Singh .V.B, "Revitalized Urban Administration in India", Kalpaz publication,Delhi 2001

Reference Books

1. Joe Ravetz, "City Region 2020 – Integrated Planning for a Sustainable Environment", 2000
2. Sustainable Transportation and TDM – Planning the balances, "Economic, Social and Ecological objectives"; Victoria Transport Policy Institute, 2007

Web References

1. https://nptel.ac.in/courses/105107067/
2. www.nptelvideos.in/2012/11/urban-transportation-planning.html
3. www.civil.iitb.ac.in/~dhingra/ce751.htm

E-Text Books

1. https://books.google.co.in/books?isbn=125900273X
2. https://books.google.co.in/books?isbn=8131304418

Outcomes

At the end of the course student will be able to

1. Understand the stages in planning process and impact of urban development
2. Understand the formulation of development plans and evaluation
3. Explain the constraints in plan implementation and financing of urban developments
4. Understand the role of sustainable development
5. Understand the concept of sustainable development, integrated planning, economy of urban region
6. Understand formulation and evaluation of various development strategies

Available Selected MOOCs (Elective – I)

B.Tech 6th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1609	Core	3	1	0	3	40	60	100
Contact Classes: -	Tutorial Classes: -	Practical Classes: Nil				Total Classes: -		

Meeting with the global requirements, to inculcate the habit of self learning and incompliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute.
- There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses.
- Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration

BUIDLING PLANNING AND DRAWING PRACTICE

B.Tech 6th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16CE2610	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on Auto Cad and its applications

II. Use Auto Cad to draw various components of buildings and trusses

LIST OF EXPERIMENTS

Expt. 1 **SIGN CONVENTIONS AND BONDS**

Sign conventions for different materials used in civil engineering. Bonds: English bond & Flemish bond odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

Expt. 2 **DOORS, WINDOWS, VENTILATORS AND ROOFS**

Paneled Door, paneled and glazed door; glazed windows, paneled windows; Couple roof, Collar roof; Kind Post truss, Queen post truss.

Expt. 3 **PLAN, SECTION AND ELEVATION OF RESIDNETIAL BUILDINGS AS PER PRINCIPLES OF PLANNING AND LOCAL BUILDING BYE LAWS**

To draw the plan, section and elevation of following buildings

a) Residential Building

b) Primary Health Center

c) Primary School Building

Expt. 4	PLAN, SECTION AND ELEVATION of COMMERCIAL BUILDINGS AS PER PRINCIPLES OF PLANNING AND LOCAL BUILDING BYE LAWS

To draw the plan, section and elevation of following buildings

a) Hotel

b) Bank Building

c) Post Office

Reference Books

1. Planning and Designing and Scheduling ,Gurucharansingh and Jagadishsingh, Standard publishers.
2. Building drawing with an integrated approach to building environment,M.G.Saha, G.M.Kale, S.Y.patki,TataMcGraw Hill

Web References

1. https://www.autodesk.com/products/autocad/overview
2. https://nptel.ac.in/courses/Webcourse-contents/IIT-Delhi/.../index.htm
3. https://www.youtube.com/watch?v=EgKc9L7cbKc
4. https://www.youtube.com/watch?v=iZTq3hNJ2Pc

Course Outcome

At the end of the course student will be able to:

1. Use Auto Cad for drafting various building components
2. Draw the elevation, cross-section and plan of a residential buildings
3. Draw the elevation, cross-section and plan of a commercial buildings
4. Draw the plan, elevation and cross section of various types of roofs
5. Draw the elevation single leaf and double leaf door
6. Draw the elevation of partially gazed and partially paneled windows

DESIGN AND COMPUTER AIDED DRAFTING OF IRRIGATION STRUCTURES LAB

B.Tech 6th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16CE2611	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil		Practical Classes: 36			Total Classes: 36		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on Auto Cad and its applications

II. Understand the design criteria for various types of irrigation structures

III. Use Auto Cad to draw the plan, elevation and cross section of various irrigation structures

LIST OF EXPERIMENTS

Expt. 1 **SURPLUS WEIR**

Design and draw the plan, elevation and cross section of a surplus weir

Expt. 2 **CANAL DROP-NOTCH TYPE**

Design and draw the plan, elevation and cross section of a notch type canal drop

Expt. 3 **CANAL CROSS REGULATOR**

Design and draw the plan, elevation and cross section of a canal cross regulator

Expt. 4 **DIRECT SLUICE**

Design and draw the plan, elevation and cross section of a direct sluice

Expt. 5 **VERTICAL DROP WEIR**

Design and draw the plan, elevation and cross section of a vertical drop weir

Expt. 6	SYPHON AQUEDUCT (TYPE-III)

Design and draw the plan, elevation and cross section of a type-III siphon aqueduct

Reference Books

1. Design of Minor Irrigation and Canal Structures by C. Satyanarayana Murthy; Wiley Eastern Ltd.,New Delhi. 2006.
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi, 2006.

Web References

1. https://books.google.co.in/books?isbn=8174090479
2. https://www.scribd.com/document/349186495/9-Irrigation-Structures1

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS

SOFTWARE: Auto Cad (Auto Desk Product)

HARDWARE: Desktop Computers (36nos)

Course Outcome

At the end of the course student will be able to

1. Use Auto Cad for drawing plan, elevation and cross section of various irrigation structures
2. Understand the design criteria and principles of irrigation structures
3. Design a surplus weir and notch type canal drop
4. Design a canal cross regulator
5. Design a direct sluice and vertical drop weir
6. Design a type-III siphon aqueduct

DESIGN AND DRAWING OF ENVIRONMENTAL ENGINEERING LABORATORY

B.Tech 6th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16CE2612	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil		Practical Classes: 36			Total Classes: 36		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on Auto Cad and its applications

II. Understand the design criteria for various types of environmental structures

III. Use Auto Cad to draw the plan, elevation and cross section of environmental structures

LIST OF EXPERIMENTS

Expt. 1 **DESIGN AND DRAFTING OF RAPID SAND FIITER**

Design a rapid sand filter and draw its plan and longitudinal section

Expt. 2 **DESIGN AND DRAFTING OF COAGULATION CUM SEDEMENTATION TANK**

Design a coagulation cum sedimentation tank and draw its plan and longitudinal section

Expt. 3 **DESIGN AND DRAFTING OF SEPTIC TANK**

Design a septic tank for 120 persons and draw its plan and section

Expt. 4 **DESIGN AND DRAFTING OF RECTANGULAR GRIT CHAMBER**

Design a rectangular grit chamber and draw its plan and longitudinal section

Expt. 5 **DESIGN AND DRAFTING OF SCREEN CHAM BER FOR SEWAGE TREATMENT PLANT**

Design a screen chamber for a sewage treatment plant and draw its plan and longitudinal section

Expt. 6	DESIGN AND DRAFTING OF CONCRETE GRAV ITY DAM

Design a concrete gravity dam and draw its components

Expt. 7	DESIGN AND DRAFTING OF SLUDGE DIGES TION TANK

Design a sludge digestion tank and draw its cross section

Reference Books

1. Weber .W.J, "Physiochemical processes for water quality control", WileyInterscience, 2002.
2. Garg .S.K, "Environmental Engineering", Vol. I, Khannan Publishers, NewDelhi, 2004.
3. Duggal .K.N, "Elements of Environmental Engineering", S. Chand &Company Ltd., New Delhi, 2002

Web References

1. https://books.google.co.in/books?isbn=8121915473
2. https://nptel.ac.in/courses/105106119/
3. https://nptel.ac.in/courses/105107176/

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: Auto Cad (Auto Desk Product)

HARDWARE: Desktop Computers (36nos)

Course Outcome

At the end of the course, a student will be able to:

1. Use Auto Cad for drawing plan, elevation and cross section of environmental structures
2. Understand the design criteria and principles of environmental structures
3. Design a rapid sand filter, coagulation cum sedimentation tank
4. Design a septic tank and rectangular grit chamber
5. Design a screen chamber for sewage treatment plant and sludge digestion tank
6. Design a concrete gravity dam

MINI PROJECT

B.Tech 6th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16CE2613	Core	-	-	-	2	25	50	75
Contact Classes: 36	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 36		

OBJECTIVES

The course should enable the students to

I. Apply the programming knowledge into a real- world situation/problem and exposed the students how programming skills helps in developing a good engineer

II. The student should gain a thorough knowledge in the problem, he/she has selected and the language / software/Hardware, he/she is using.

The Mini Project shall be carried out during 6th Semester along with other lab courses by having regular weekly slots. Students will take mini project batch-wise and the batches will be divided as per the guidelines issued. The topic of mini project should be so selected that the students are enabled to complete the work in the stipulated time with the available resources in the respective laboratories. The scope of mini project could be handling part of the consultancy work, maintenance of the existing equipment, development of new experiment setup or can be a prelude to the main project with specific outcome.

Mini Project report will be evaluated for 75 marks. 25 marks for internal evaluation and 50 marks for external evaluation.

Assessment will be done by the supervisor/guide for 25 marks based on the work and presentation/ execution of the mini project.

The remaining 50 marks are based on report, presentation, execution and viva-voce. Evaluation is done by a committee comprising the mini project supervisor, Head of the Department and external examiner appointed by the Principal from the panel of experts recommended by Chairman, BOS in consultation with Head of the Department.

Outcomes

1. Acquire practical knowledge within the chosen area of technology for project development
2. contribute as an individual or in a team in development of technical projects
3. develop effective communication skills for presentation of project related activities
4. identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach

TECHNICAL APTITUDE

B.Tech 6th Semester – Civil Engineering								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
16AS3601	**-**	-	-	-	1	25	50	75
Contact Classes: 36	**Tutorial Classes: Nil**	**Practical Classes: Nil**			**Total Classes: 36**			

OBJECTIVES

The course should enable the students to

I. To ensure that students learn to think critically about mathematical models.

II. To ensure students in solving problems effectively and accurately.

III. Application of mathematical or statistical models to different real world contexts.

UNIT-I	**Classes:5**

Problem Solving in Commercial Mathematics

(Percentages, Profit and Loss, Discount and Interest)

UNIT-II	**Classes:5**

Problem Solving in advanced level of Mathematical Ability

(Ratio and Proportions, Mixtures, Time and Work, Time and Distance)

UNIT-III	**Classes:7**

C - language concepts:

C language basics, Structure of a C Program, C Tokens, Variables, Constants, C functions, types, recursion, Header files, Preprocessor Commands, Storage Classes, Arrays, types of Arrays, Strings, Pointers, Structures.

UNIT-IV	Classes:8

Data Structures:

Introduction, Stacks, Queues, types of Queues, Applications of Stacks and Queues, Linked Lists, Search Techniques: Linear Search, Binary Search, Sorting Techniques: Bubble Sort, Insertion Sort, Selection Sort, Merge Sort, Quick Sort, Trees: basic terminology, Binary Trees, Binary Search Trees.

UNIT-V	Classes:11

Personality Development- Personal Grooming-Dressing, Body, Language, Leadership Skills, Basic Etiquettes, Mannerism / Confidence Building - Positive Attitude/ Mind Power Training etc

HR Fundamentals- Practice of self concept.

Kinds of Interviews –Structured Interview. A structured interview is typically formal and organized and may include several interviewers, commonly referred to as a panel interview. ...

Unstructured Interview. ...

Stress Interview. ...

Behavioral Interview. ...

Problem Solving or Case Interview. ...

Panel Interview. Required Key Skills – Corporate culture

Interview Skills - Mock Interviews [One –One, Panel, Telephonic & Skype]

Outcomes

1. Student can attempt different technical competitive exams.
2. Student can enhance technical ability and logical thinking.

PROFESSIONAL SOCIETY ACTIVITIES-IV

B.Tech 6th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16AS3602	-	-	-	-	1	-	-	-
Contact Classes: 12	Tutorial Classes: Nil		Practical Classes: Nil			Total Classes: 12		

OBJECTIVES

The course should enable the students to:

I. Improve communication skills

II. Develop leadership qualities

Professional Society Activities (PSA) course is aimed at enhancing the self-learning, communication, managerial skills of the students by engaging them in various Co & Extra Curricular activities during their course of study. Activities in each of the department shall be designed and conducted by the Professional Society Executive Committee whose composition is:

1. Faculty Mentors- 2 No.
2. Student Chairman: 1 No.- Final year Student
3. Student General Secretary: 1 No.- Third year Student
4. Treasurer: 1 No.- Third year Student

Student Members: 2 No's from each class

PSA related activities would be of the following nature but not limited to:

Activity#1	Just A Minute
Activity#2	Technical Quiz
Activity#3	Open House- Lab Demo
Activity#4	Technical Paper Presentation- Preliminary

Activity#5	Technical Paper Presentation- Final
Activity#6	Poster Presentation
Activity#7	Collage- A theme based event
Activity#8	Debate Competition
Activity#9	Group Discussion Competition
Activity#10	Mock Interviews
Activity#11	Model Exhibition
Activity#12	Valedictory Function

B.Tech 7th Semester

Civil Engineering

Syllabus

ENGINEERING ECONOMICS AND PROJECT MANAGMENT

B.Tech 7th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16MB1411	Core	3	0	0	3	40	60	100
Contact Classes:65	Tutorial Classes: 0	Practical Classes: Nil				Total Classes:65		

OBJECTIVES

The course should enable the students to

Prepare engineering students to analyze cost/revenue data and carry out make economic analyses in the decision making process to justify or reject alternatives/projects on an economic basis.

UNIT-I	INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND ANALYSIS	Classes:15

Introduction to Managerial Economics: Definition, Nature and scope of Managerial Economics.

Demand Analysis: Determinants, Law of demand, Elasticity of demand- Types, Measurement and significance of Elasticity of demand, Demand forecasting- Methods.

UNIT-II	LAW OF SUPPLY, MARKET STRUCTURES & PRODUCTION FUNCTION:	Classes:18

Law of supply: Definition, determinants, Elasticity of supply,

Market structures: Types of Markets – Features – Price Out-put determination under Perfect Competition, Monopoly, Monopolistic and Oligopoly, Break even Analysis.

Production Function: ISO quant's and ISO Costs, MRTS, Least cost combination of inputs, economies of scale.

UNIT-III	INTRODUCTION TO MANAGEMENT	Classes:17

Introduction to Management: Concepts of Management – Nature, Importance – Functions of Management, Levels - Evolution of Management Thought.

Decision Making Process – Methods of Production (Job, Batch and Mass Production) - Inventory Control, Objectives, Functions – Analysis of Inventory – EOQ.

UNIT-IV	PROJECT MANAGEMENT	Classes:15

Project Management: Introduction – Project Life Cycle – Role of Project Manager - Project Selection – Technical Feasibility – Project Financing – Project Control and Scheduling through Networks –(PERT, CPM , CRASHING)– Human Aspects in Project Management.(simple problems)

Text Books

1. Aryasri, Managerial Economics, TMH, 2nd edition, 2005.
2. Varshney & Maheswari, Managerial Economics, Sultan chand, 2003.

Reference Books

1. Ambrish Gupta, Financial Accounting for Management, Pearson Education.
2. Prasanna Chandra, Project planning and Analysis, TATA MC graw hill, New Delhi

Web References

1. https://www.researchgate.net
2. https://www.aar.faculty.asu.edu/classes
3. https://www.facstaff.bucknell.edu/
4. https://www.electrical4u.com
5. https://www.iare.ac.in

E-Text Books

1. https://www.jntubook.com/
2. https://www.freeengineeringbooks.com

Outcomes

1. Understand the concepts in economics related to demand and supply.
2. Know about the market structures and production functions.
3. Comprehend various management concepts.
4. Will understand project management concept.
5. Solve simple problems in PERT, CPM and crashing.

ADVANCED REINFORCED CONCRETE DESIGN

B.Tech 7th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1701	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Learn design parameters of short and long columns subjected axial load, using SP:16 charts

II. Learn design parameters of short & long columns subjected axial load & moments

III. Know different types of footings and their design

UNIT-I	**Classes:12**

Columns (LimitStateMethod): Assumptions; Design of axially loaded columns; Design of axially loaded Circular columns with helical reinforcement; Interaction diagrams; Design of short Columns and slender columns of rectangular section in the following cases

(a)Axial compression and uniaxial bending.

(b)Axial compression and biaxial bending(UsingSP:16Charts)

UNIT-II	**Classes:12**

Foundations (Limit State Method):Types of Foundations ,Soil pressure under foundation, design and detailing of isolated column footings, combined footings (Rectangular&trapezoidalfootings) & strap footings.

UNIT-III	**Classes:12**

Designofstaircases: Introduction,Typesofstaircases,Loadsactingonstairslabs, dogleggedstaircasedesign (designofstairslabs spanningtransverselyandlongitudinally).

UNIT-IV	**Classes:12**

Limit State of Serviceability : Limit state design of serviceability fordeflection, cracking and codal provisions.

Text Books

1. Varghese, P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India, Pvt.Ltd., NewDelhi, 2002
2. Punmia.B.C.,AshokKumarJain,ArunKumarJain,“LimitStateDesignof ReinforcedConcrete”,LaxmiPublicationPvt. Ltd.,NewDelhi,2007

Reference Books

1. Jain, A.K., “Limit State Design of RC Structures”, Nemchand Publications, Roorkee, 1998.
2. Sinha, S.N., “Reinforced Concrete Design”, Tata Mc Graw Hill Publishing Company Ltd., New Delhi, 2002.
3. Bandyopadhyay.J.N., "DesignofConcreteStructures". ,Prentice Hall of India Pvt. Ltd.,New Delhi, 2008.

Web References

1. www.nptelvideos.in/2012/11/design-of-reinforced-concrete-structures.html
2. https://nptel.ac.in/courses/105105105/

E-Text Books

1. https://books.google.co.in/books?isbn=812032787X
2. https://books.google.co.in/books?isbn=8123912250
3. https://books.google.co.in/books?isbn=8120320395

Outcomes

At the end of the course student will be able to

1. Understand the design criteria of columns, footings and stair cases
2. Design axially loaded columns
3. Understand the use of SP16 charts in design of columns
4. Deign rectangular and trapezoidal footings
5. Classify types of stair cases and design a stair case
6. Understand the concept of limit state of serviceability

DESIGN OF STEEL STRUCTURES-II

B.Tech 7th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1702	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on different slab bases, types of roof trusses and their elements

II. Understand the design criteria of purlins and estimate loads acting on roof trusses

III. Understand the design criteria of late girder and gantry girder

UNIT-I **Classes:12**

Design of Column Foundations:

a) Design of slab base

b) Gusseted bases

c) Column bases subjected to moment

UNIT-II **Classes:12**

Roof Trusses: Different types of trusses, Design loads, Live load calculations, Load combinations IS CodeRecommendations, structural details, Design of Purlins

UNIT-III **Classes:12**

Plate Girder: Design consideration, IS Code recommendations, Design of plate girder (welded) Curtailment of flange plates, end stiffeners, intermediate stiffeners.

UNIT-IV **Classes:12**

Gantry Girder: Loads acting on girder, Gantry girder impact factors, longitudinal forces, Design ofGantry girders

Text Books

1. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005.
2. Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800 2007,IK international publishing house Pvt. Ltd., 2009.

Reference Books

1. Shiyekar. M.R., "Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2nd Edition, 2013.
2. Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India.

Web References

1. https://nptel.ac.in/courses/105106112/
2. https://nptel.ac.in/noc/individual_course.php?id=noc17-ce21

E-Text Books

1. https://books.google.co.in/books?isbn=9380026617
2. https://books.google.co.in/books?isbn=0074630954

Outcomes

At the end of the course student will be able to:

1. Deign a slab base and gusseted base
2. Design a slab base subject to moment
3. Identify various parts of roof truss
4. Estimate the load acting on roof truss and design purlins
5. Design plate girders with and without stiffeners
6. Design a gantry girder

Assignment

The students should prepare the following plates.

Plate 1 Detailing of Slab base

Plate 2 Detailing of Gusseted bases

Plate 3 Detailing of Plate girders with and without stiffeners

Plate 4 Detailing of Gantry girders

Codes/Tables: IS Codes

1) IS 800:2007
2) IS 875 (Part 3)
3) Steel Tables.

Railway Design Standards Code and steel tables to be permitted into the examination hall

DISASTER MANAGEMENT (Elective – II)

B.Tech 7th Semester: Civil Engineering (Open Elective)								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1707	Open Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES

The course should enable the students to

I. Gain knowledge disaster management and preparedness

II. Understand seismic vulnerability and response

III. Impart knowledge on various hazards

UNIT-I	Classes:12

Concept of disaster management. Types of disasters. Disaster mitigating agencies and their organization. Structure at different levels. Over view of disaster situations in India: Vulnerability profile of India and vulnerability mapping including disaster prone areas, communities and places

UNIT-II	Classes:12

Disaster preparedness, ways and means; skills and strategies; rescue, relief, reconstruction and rehabilitation

UNIT-III	Classes:12

Seismic vulnerability of urban areas. Seismic response of R.C frames buildings with soft first storey. Preparedness for natural disasters in urban areas. Preparedness and planning for an urban earthquake disaster. Urban settlements and natural hazards. Tsunami and its impact

UNIT-IV	Classes:12

Landslide hazards zonation mapping and geo, environmental problems associates with the occurrence of landslides. A statistical approach to study landslides. Land causal factors in urban areas organization of mock drills.

Text Books

1. "Natural Hazards in the urban habitat" by lyengar, CBRI, Tata McGraw Hill.
2. "Natural Disaster management", Jon Ingleton (Ed), Tulor Rose, 1999.

Reference Books

1. "Disaster Management", RB Singh (Ed), Rawat Publications, 2000
2. Anthropology of Disaster management", Sachindra Narayan, Gyan Publishing house, 2000

Web References

1. nidm.gov.in/PDF/Disaster_terminology.pdf
2. https://nptel.ac.in/courses/105104183/
3. https://iare.ac.in/sites/default/files/lecture_notes/dm%20notes.pdf

E-Text Books

1. https://books.google.co.in/books?isbn=8173714568
2. https://books.google.co.in/books?isbn=1259007367
3. https://books.google.co.in/books?isbn=812241835X

Outcomes

At the end of the course students able to

1. Identify various pollutants, sources and their effects.
2. Understand various dispersion models
3. Understand the plume behavior
4. Explain sources and control of particulate pollutants
5. Explain thermodynamics of air pollution
6. Understand air quality management

INFRASTRUCTURE SYSTEMS PLANNING (Elective – II)

B.Tech 7th Semester: Civil Engineering (Open Elective)								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1708	Open Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES

The course should enable the students to

I. Gain knowledge infrastructure systems and planning

II. Understand infrastructure for electricity

III. Understand the elements of aviation and railways infrastructures

UNIT-I	Classes:12

Infrastructure Development policy – meaning, components/contents, need, constitutional provisions, Central list, State list and Concurrent list in Indian Constitution, Legal framework for development policies, role of institutional setup, regulatory mechanism, role of government, private sector, public private partnerships in infrastructure development

UNIT-II	Classes:12

Electricity- infrastructure types, current status and issues, legal framework, regulatory mechanism, institutional framework, policy for generation, transmission and distribution of electricity, role of private sector, recent programmes, provisions in current five year plan, Oil and gas–infrastructure required, legal, regulatory and institutional framework, policy, major infrastructure and recent initiatives, Roads– legal, regulatory framework, National Road Transport Policy, National Urban Transport Policy, recent major projects

UNIT-III	Classes:12

Railways– role of railways, legal, institutional setup, Indian Railways, status and issues, dedicated freight corridors, urban railwaysincluding Metrorail, policies and provisions in current five year plan.

UNIT-IV	Classes:12

Civil aviation – airport types, role of civil aviation in development, legal, regulatory mechanism and institutional framework –AERA, DGCA, AAI,civil aviation policy,private sector participation, Ports - role of ports, port types, legal, regulatory mechanism, institutional setup, port policy, major ports and container terminals, private sector participation

Text Books

1. Jetti, K. Narinder and Vishal Sethi (2007), Infrastructure Development in India, New Century Publications, New Delhi.
2. India Infrastructure Reports (1996 to 2012), Oxford University Press, USA.

Reference Books

1. JNNURM Guidelines (2005), Ministry of Urban Development, Govt. of India.
2. Manual on Water Supply and Treatment (1999), Ministry of Urban Development, Govt. of India.

Web References

1. https://nptel.ac.in/courses/105106115/
2. https://nptel.ac.in/syllabus/105106115/

E-Text Books

1. https://books.google.co.in/books?isbn=0470411910
2. https://books.google.co.in/books?isbn=8122404111

Outcomes

At the end of the course students able to:

1. Understand the Infrastructure Systems & Planning development policy
2. Identify the components of Infrastructure Systems
3. Illustrate the urban railway-metrorail
4. Describe airport types and components
5. Understand the risk factors in construction process
6. Understand the economical Infrastructure Systems

PRESTRESSED CONCRETE (Elective – III)

B.Tech 7th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1703	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on concept of prestressing and its importance

II. Know different types of prestressing systems, losses in prestress

III. Understand the design principles of elastic design of prestressed concrete structures

UNIT-I — Classes:12

Introduction: Basic concepts of prestressing; Historical development; Need for High strength steeland high strength concrete; Advantages of prestressed concrete.

Materials For Prestressed Concrete: High strength concrete; High tensile steel

Prestressing Systems: Tensioning devices; Hoyer's long line system of pretensioning; Posttensioning systems; Detailed study of Freyssinet system , Lee, McCall System and Gifford , Udall system

Analysis of Prestress and Bending Stresses: Basic assumptions; Analysis of prestress; Resultantstresses at a section; Pressure (Thrust) line and internal resisting couple; Concept of Load balancing; Stresses in tendons; Cracking moment

UNIT-II — Classes:12

Losses of Prestress: Nature of losses of prestress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for design.

Deflections Of Prestressed Concrete Members: Importance of control of deflections; Factors influencing deflections; Short term deflections of uncracked members; Prediction of long term deflections due to creep and shrinkage

UNIT-III	**Classes:12**

Elastic Design of Prestressed Concrete Sections for Flexure: Permissible compressive stresses inconcrete as per IS 1343; Design of rectangular and I-sections of TYPE 1, TYPE 2 (Elastic Design only).

UNIT-IV	**Classes:12**

Shear Resistance: Shear and Principal Stresses; Ultimate shear resistance of prestressed concretemembers; Design of shear reinforcement.

Transfer of Prestress in Pretensioned Members: Transmission of prestressing force by bond; Transmission length; Bond stresses; Transverse tensile stresses; End zone reinforcement; Flexural bond stresses

Text Books

1. Krishna Raju N., "Prestressed concrete", 5th Edition, Tata McGraw Hill Company, New Delhi, 2012
2. Pandit.G.S. and Gupta.S.P., " Prestressed Concrete", CBS Publishers and Distributers Pvt. Ltd, 2012

Reference Books

1. Rajagopalan.N, "Prestressed Concrete", Narosa Publishing House, 2002
2. Dayaratnam.P., "Prestressed Concrete Structures", Oxford and IBH, 2013

Web References

1. https://nptel.ac.in/courses/105106117/
2. www.nptelvideos.in/2012/11/prestressed-concrete-structures.html
3. https://www.scribd.com/CURSO-NPTEL-Civil-Engineering-Pre-Stressed-Concrete

E-Text Books

1. https://books.google.co.in/books?isbn=0070634440
2. https://books.google.co.in/books?isbn=0471181137
3. https://theconstructor.org/concrete/prestressed-concrete

Outcomes

At the end of the course student will be able to

1. Distinguish between RCC and PSC members and understand importance of prestressing
2. Classify and understand principles in various types of prestressing systems
3. Evaluate the losses in pre and post tensioned members
4. Understand the principle stresses
5. Design a shear reinforcement
6. Understand the concept of transfer of prestrress in pretensioned members

ADVANCED FOUNDATION ENGINEERING (Elective – III)

B.Tech 7th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1704	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Understand the requirements of footing and their types

II. Understand and design RCC footings for simple cases

III. Gain knowledge on deep foundations and problematic soils

UNIT-I — Classes:12

Shallow Foundations-I: General requirements of foundations. Types of shallow foundations and the Factors governing the selection of a type of shallow Foundation. Bearing capacity of Shallow foundations by Terzaghi's theory and Meyerhof's theory (derivation of expressions and solution to problems based on these theories). Local shear and general shear failure and their identification.

Shallow Foundations-II: Bearing capacity of isolated footing subjected to eccentric and inclined loads. Bearing capacity of isolated footing resting on stratified soils, Button's theory and Siva Reddy analysis

UNIT-II — Classes:12

Analysis and Structural Design of R.C.C. Footings: Analysis and structural design of R.C.C. Isolated combined and strap footings.

Deep Foundations-I: Pile foundations, types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests

UNIT-III — Classes:12

Deep Foundations- II: Well foundations, elements of well foundation. Forces acting on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with well sinking.

Sheet Pile Walls: Cantilever sheet piles and anchored bulkheads, Earth pressure diagram, Determination of depth of embedment in sands and clays, Timbering of trenches, Earth pressure diagrams, Forces in struts.

UNIT-IV **Classes: 12**

Foundations in Problematic Soils: Foundations in black cotton soils, basic foundation problems associated with black cotton soils. Lime column techniques, Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

Design of Under Reamed Piles Foundations: Under reamed piles principle of functioning of under reamed piles, analysis and structural design of under reamed piles

Text Books

1. Geotechnical engineering by V.N.S.Murthy, CRC Press , New Delhi.
2. Foundations Design and Construction, Tomlinson

Reference Books

1. Foundation Design, Teng
2. Geotechnical Engg. , C.Venkataramaiah

Web References

1. nptel.ac.in/courses/114106015/2
2. www.nptelvideos.in/2012/11/soil-mechanics.html

E-Text Books

1. https://books.google.co.in/books?isbn=8120326520
2. https://books.google.co.in/books?isbn=8122417930

Outcomes

At the end of the course student will be able to:

1. Identify the types of footings
2. Understand the design principles of footings
3. Understand the problems in design of footings in problematic soils
4. Understand the principles of under reamed piles
5. Estimate the bearing capacity of pile foundation
6. Analyze and design RCC Isolated, combined and starp footings

EARTHQUAKE ENGINEERING (Elective – III)

B.Tech 7th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1705	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Know about theory of vibrations, single degree of freedom system.

II. Understand the concept of multiple degree of freedom system

III. Gain knowledge on seismology, response of steel & concrete structures due to earth quake

UNIT-I — Classes:12

Theory of Vibrations: Difference between static loading and dynamic loading , degree of freedom, idealisation of structure as single degree of freedom system, formulation of equations of motion for SDOF system, D'Alemberts principles , effect of damping , free and forced vibration of damped and undamped structures, Response to harmonic and periodic forces

UNIT-II — Classes:12

Multiple Degree of Freedom System: Two degree of freedom system, modes of vibrations ,formulation of equations of motion of multi degree of freedom (MDOF) system, Eigen values and Eigen vectors, Response to free and forced vibrations, damped and undamped MDOF system , Modal superposition methods

UNIT-III — Classes:12

Elements of Seismology: Elements of Engineering Seismology, Causes of Earthquake,plate Tectonic theory, elastic rebound theory, Characteristic of earthquake, Estimation of earthquake parameters, magnitude and intensity of earthquakes, spectral acceleration.

UNIT-IV	Classes:12

Response of Structures to Earthquake: Effect of earthquake on different type of structures,Behaviour of Reinforced Cement Concrete, Steel and Prestressed Concrete Structure under earthquake loading , Pinching effect, Bouchinger Effects, Evaluation of earthquake forces as per IS:1893, 2002, Response Spectra, Lessons learnt from past earthquakes

Text Books

1. Chopra, A.K., "Dynamics of Structures, theory and application to earthquake engineering", 4th Edition, Pearson Education, 2011
2. Agarwal. P and Shrikhande. M., "Earthquake resistant design of structures", Prentice Hall of India Pvt. Ltd. 2007

Reference Books

1. Biggs, J.M., "Introduction to Structural Dynamics", McGraw Hill Book Co., New York, 1964
2. Dowrick, D.J., "Earthquake Resistant Design", John Wiley & Sons, London, 2009.

Web References

1. https://nptel.ac.in/courses/105101004
2. https://nptel.ac.in/courses/105101134/

E-Text Books

1. https://books.google.co.in/books?isbn=1439883114
2. https://books.google.co.in/books?isbn=2553016492

Outcomes

At the end of the course student will be able to

1. Understand static and dynamic loading systems, single and multiple degree of freedom systems
2. Explain elements of seismology, causes, characteristics & parameters of earthquake
3. Understand modes of vibrations, damped & undamped MDOF systems
4. Understand the effect of earthquake on RCC, Steel and prestressed structures
5. Explain Pinching & Bouchinger effects
6. Evaluate earthquake forces as per IS codes

Available Selected MOOCs (Elective – III)

B.Tech 7th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1706	Core	3	1	-	3	40	60	100
Contact Classes: -	Tutorial Classes: -	Practical Classes: Nil				Total Classes: -		

Meeting with the global requirements, to inculcate the habit of self learning and incompliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute.
- There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses.
- Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration.

COMPUTER AIDED ANALYSIS AND DESIGN LABORATORY

B.Tech 7th Semester – Civil Engineering								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
16CE2709	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		-	-	3	2	25	50	75
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 36**				**Total Classes: 36**		

OBJECTIVES

The course should enable the students to:

I. Gain knowledge on Staad.Pro v8i software and its applications

II. Prepare and draw the model of structures

III. Understand the process of designing the structures in Staad.Pro

LIST OF EXPERIMENTS

Expt. 1	**ANALYSIS OF SIMPLY SUPPORTED CONTINOUS BEAM**

Find out support reactions, shear force and bending moment diagram in simply supported continuous beam

Expt. 2	**ANALYSIS OF FIXED END SUPPORTED CON TINUOUS BEAM**

Find out support reactions, shear force and bending moment diagram in fixed support continuous beam

Expt. 3	**ANALYSIS OF SINGLE STOREY UNSYM METRICAL PORTAL FRAME**

Find out support reactions, shear force and bending moment diagram in unsymmetrical portal frame

Expt. 4	**ANALYSIS OF PLANE ROOF TRUSS (DL+LL)**

Calculate axial forces in roof truss subjected to dead load and live load

Expt. 5	**ANALYSIS OF PLANE ROOF TRUSS (DL+WL).**

Calculate axial forces in roof truss subjected to dead load and wind load

Expt. 6	**DESIGN OF ONE WAY SLAB.**

Design one way slab

Expt.7	**DESIGN OF TWO WAY SLAB**

Design two way slab

Expt. 8	ANALYSIS AND DESIGN OF TWO STORIED RCC FRAMED BUILDING

Analyse and design two storeyed RCC framed building

Expt. 9	ANALYSIS AND DESIGN OF INDUSTRIAL STEEL BUILDING

Analyse and design industrial steel building

Expt. 10	DESIGN OF ISOLATED FOOTING

Design Isolated footing

Expt. 11	DESIGN OF COMBINED FOOTING

Design combined footing

Reference Books

1. Staad Pro v8i for beginnersBy T.S.Sarma
2. Exploring Bentley Staad. Pro V8i (Selectseries 6) by Prof Sham Purdue, University Northwest

Web References

1. https://books.google.co.in/books?isbn=9384381683
2. https://books.google.co.in/books?id=VShBDwAAQBAJ

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE:STAAD.Pro v8i

HARDWARE: Computers (36 nos)

Course Outcome

At the end of the course student will be able to:

1. Understand the applications of staad in civil engineering
2. Prepare the model of different components
3. Analyze beams under different loading and support conditions
4. Analyzetrusses
5. Design of multistoried buildings
6. Design of footings

TRANSPORTATION ENGINEERING LAB

B.Tech 7th Semester – Civil Engineering								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
		L	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
16CE2710	**Core**	-	-	3	2	25	50	75
Contact Classes: Nil	**Tutorial Classes: Nil**		**Practical Classes: 36**			**Total Classes: 36**		

OBJECTIVES

The course should enable the students to:

I. Gain knowledge on various tests conducted on aggregate

II. Understand the importance of evaluating properties of aggregates

LIST OF EXPERIMENTS

Expt. 1	**AGGREGATE CRUSHING VALUE**

To find Crushing value of aggregates

Expt. 2	**AGGREGATE IMPACT TEST**

To find Aggregate impact value

Expt. 3	**SPECIFIC GRAVITY AND WATER ABSORPTION OF COARSE AGGREGATE**

To find specific gravity and water absorption of coarse aggregate

Expt. 4	**ABRASION TEST ON COARSE AGGREGATE**

To find abrasion value of coarse aggregate

Expt. 5	**SHAPE TESTS: FLAKINESS, ELONGATION & ANGULAR**

To find flakiness and elongation index of coarse aggregates

Expt. 6	10% FINES VALUE TEST
To conduct fines value test on aggregates	
Expt.7	**PENETRATION TEST**
To find penetration value of bitumen	
Expt. 8	**DUCTILITY TEST**
To perform ductility test on bitumen	
Expt. 9	**SOFTENING POINT TEST**
To find softening point of bitumen	
Expt. 10	**FLASH AND FIRE POINT TESTS**
To calculate flash and fire point of bitumen	
Expt. 11	**MARSHALL STABILITY TEST**
To find marshal stability value of bitumen	

Reference Books

1. IRC: 37, 2012 Tentative Guidelines for the Design of Flexible Pavements
2. IRC: 58, 2011 Guidelines for Design of Plain Jointed Rigid Pavements for Highways.
3. MoRTH: Specifications for Road and Bridge Works, V, Edition
4. Principles of Traffic and Highway Engineering, Garber &Hoel, Cengage Learning. Highway Engineering, S.P.Bindra, DhanpatRai& Sons. , 4th Edition (1981).

Web References

1. https://nptel.ac.in/courses/105101087/
2. https://books.google.co.in/books?isbn=9382609857
3. https://books.google.co.in/books?isbn=078440464X
4. https://books.google.co.in/books?isbn=9332587647

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

HARDWARE: Electronic balance 10kg, Aggregate impact value apparatus, Abrasion testing apparatus, Flakiness and elongation testing apparatus, Flash and fire point apparatus, Sieves, Ductility testing apparatus

Course Outcome

At the end of the course, a student will be able to:

1. Determine impact value and crushing test on coarse aggregate
2. Perform abrasion test on aggregates
3. Perform sieve analysis, water absorption test on aggregate
4. Perform Flakiness, elongation & Angular test on coarse aggregate
5. Do tests on bitumen
6. Perform Marshall stability test on bitumen

MAT LAB

B.Tech 7th Semester – Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16CE2711	Core	-	-	3	2	25	50	75
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36				Total Classes: 36		

OBJECTIVES

The course should enable the students to:

I. Gain knowledge on MATLAB, its working and applications in civil engineering

II. Understand various operators used in MATLAB

III. Write and execute a program in MATLAB

LIST OF EXPERIMENTS

Expt. 1 **WRITE MATLAB COMMANDS TO ANALYZE ARITHMETIC, LOGICAL AND BOOLEAN OPERATIONS**

To write MATLAB commands to analyze arithmetic, logical and Boolean operations

Expt. 2 **WRITE MATLAB COMMANDS TO ANALYZE VECTOR OPERATIONS AND MAGIC MATRIX'S**

To Write MATLAB commands to analyze vector operations and magic matrix's

Expt. 3 **WRITE A MATLAB PROGRAM TO DEMON STRATE IF AND ELSE IF STATEMENT FOR COMPARING TWO NUMBERS**

To Write a MATLAB program to demonstrate if and else if statement for comparing Twonumbers

Expt. 4	ANALYZE THE FOLLOWING OPERATIONS IN MATLAB.

a) COLON OPERATOR b)LINE PLOTTING c) 2D PLOTTING

To Analyze the following operations in MATLAB.

a) Colon operator

b) Line Plotting

c) 2D plotting

Expt. 5	WRITE MATLAB CODE TO OBSERVE REGRES SION AND POLYNOMIAL FUNCTIONS

To Write MATLAB code to observe Regression and Polynomial functions

Expt. 6	GENERATE AN ARRAY OF RANDOM NUMBERS BETWEEN 1 TO 100. ARRANGE THEM IN a) ASCENDING AND DESCENDING ORDER b) PICK THE NUMBERS DIVISIBLE BY 2 USING SUITABLE COMMANDS.

To Generate an array of random numbers between 1 to 100. Arrange them in

a) Ascending and descending order

b) Pick the numbers divisible by 2 using suitable commands.

Expt.7	WRITE A PROGRAM TO MULTIPLY 3X3 MA TRIX AND OBTAIN INVERSE OF THE RESULT ANT MATRIX

To Write a program to multiply 3X3 matrix and obtain inverse of the resultant matrix

Expt. 8	GENERATE AN ARRAY OF RANDOM NUMBERS BETWEEN 1 TO 50 AND a) CONVERT THEM INTO BINARY NUMBER b) NORMALIZE THE NUMBERS BETWEEN 0 AND 1 USING SUITABLE FORMULA

To Generate an array of random numbers between 1 to 50 and

a) Convert them into binary numbers

b) Normalize the numbers between 0 and 1 using suitable formula

Expt. 9	WRITE A MATLAB PROGRAM TO GENERATE SECOND ORDER SYSTEM.

To Write a MATLAB program to generate second order system.

Expt. 10	WRITE A MATLAB PROGRAM TO OBTAIN SMALLEST AND LARGEST VALUES OF INTGERS

To Write a MATLAB program to obtain smallest and largest values of integers

Reference Books

1. https://books.google.co.in/books?isbn=8120330811
2. https://books.google.co.in/books?isbn=1139452533

Web References

1. https://nptel.ac.in/courses/103106118/ Week %20-%201/ 1_MATLAB_ Intro. pdf
2. https://nptel.ac.in/courses/103106118/2

Course Home Page

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: MATLAB Software

HARDWARE: Computers (36 nos)

Course Outcome

At the end of the course student will be able to

1. Understand the application of MATLAB in civil engineering
2. Understand the working of MATLAB
3. Understand and remember the various operators used in MATLAB
4. Apply computer methods for solving a wide range ofengineering problems
5. Use MATLAB to solve and presentproblem solutions in a technical format
6. Utilize computer skills to enhance learning &performance in other engineering & science courses

INTERNSHIP

B.Tech 7th Semester: Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16AS3701	Core	-	-	-	2	25	50	75
Contact Classes: -	Tutorial Classes: Nil	Practical Classes: -			Total Classes: -			

OBJECTIVES

The course should enable the students to

I. Assist the student's development of employer-valued skills such as teamwork, communications and attention to detail

II. Expose the student to the environment and expectations of performance on the part of accountants in professional accounting practice, private/public companies or government entities.

III. Expose the student to professional role models or mentors who will provide the student with support in the early stages of the internship and provide an example of the behaviors expected in the intern's workplace.

Internship course is 25 marks for continuous internal assessment and will be evaluated based on day to day assessment by concern industry.

There shall be 60 hours duration to complete summer internship during summer vacations. The total internal weightage for internship course is 25 marks and will be evaluated based on day to day assessment by concern industry.

The external examination shall be evaluated by the two senior faculties (i.e one faculty act as external examiner and other one as internal examiner) for 50 marks based on the his/her report and presentation.

Course Outcome

1. An internship motivate you to create opportunities, embrace new ideas, and give direction to positive change
2. Enhance some of the skills that are transferable to any professional work setting.
3. Applied your knowledge, skills, experience to a work environment
4. Developed self-understanding, self-discipline, maturity and confidence.
5. Reflected on the content and process of the learning experience

PROFESSIONAL ACTIVITIES-V

B.Tech 7th Semester: Civil Engineering								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
16AS3702	-	-	-	-	1	-	-	-
Contact Classes: 12	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 12			

OBJECTIVES

The course should enable the students to

1. Improve communication skills
2. Develop leadership qualities

Professional Society Activities (PSA) course is aimed at enhancing the self-learning, communication, managerial skills of the students by engaging them in various Co & Extra Curricular activities during their course of study. Activities in each of the department shall be designed and conducted by the Professional Society Executive Committee whose composition is:

1. Faculty Mentors- 2 No.
2. Student Chairman: 1 No.- Final year Student
3. Student General Secretary: 1 No.- Third year Student
4. Treasurer: 1 No.- Third year Student

Student Members: 2 No's from each class

PSA related activities would be of the following nature but not limited to:

Activity#1	Just A Minute
Activity#2	Technical Quiz
Activity#3	Open House- Lab Demo

Activity#4	Technical Paper Presentation- Preliminary
Activity#5	Technical Paper Presentation- Final
Activity#6	Poster Presentation
Activity#7	Collage- A theme based event
Activity#8	Debate Competition
Activity#9	Group Discussion Competition
Activity#10	Mock Interviews
Activity#11	Model Exhibition
Activity#12	Valedictory Function

WATER RESOURCE ENGINEERING (Elective – IV)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1801	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: 12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Impart knowledge on water requirement of crop and effect of water logging

II. Gain knowledge on planning of irrigation structures like reservoirs, dams etc.,

III. Gain knowledge on hydel power plants and its components

UNIT-I | Classes:12

Water Requirement of Crops: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil, water, plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; KOR depth and KOR period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water, factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

Water Logging And Canal Lining: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels , necessity, advantages and disadvantages; Types of lining; Design of lined canal. Economics of canal lining; Drainage and pressure release arrangements behind canal lining.

UNIT-II	Classes:12

Reservoir Planning: Introduction; classification; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing; Methods of flood routing, Graphical Method

(Inflow, storage discharge curves method).

DAMS : GENERAL: Introduction; Classification according to use; classification according to design; classification according to material, Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams, advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-III	Classes:12

Gravity Dams: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis, Gravity method; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam, High and low gravity dams; Design of gravity dams, single step method; Galleries.

Spillways: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Spillway crest gates, Types

UNIT-IV	Classes:12

Earth Dams: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam, graphical method.

Water Power Engineering: Development of hydro power in India; Classification of hydel plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes; Investigation and planning; components of hydel schemes , fore bay, intake structure, surge tanks, penstocks , power house, turbines, selection of suitable type of turbine, Scroll casing .draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; Flow duration curve; Power duration curve; Load duration curve; Load curve ; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

Text Books

1. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi
2. Irrigation and Water Power Engineering by Dr. B.C.Punmia& Dr. Pande B.B. Lal; LaxmiPublicationspvt. Ltd., New Delhi.

Reference Books

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication, New Delhi

Web References

1. https://nptel.ac.in/downloads/105105110/
2. https://nptel.ac.in/courses/105104103/
3. https://www.sciencedaily.com/terms/water_resources.htm

E-Text Books

1. https://books.google.co.in/books?isbn=0878800042
2. https://books.google.co.in/books?isbn=0470460644

Outcomes

At the end of the course students able to

1. Understand the regulation works, theories, outlets
2. Identify different drainage works
3. Differentiate types of dams
4. Understand the design principles of gravity dam
5. Classify and explain various types of hydel plants
6. Explain types of spillways

SYSTEMS APPROACH TOCIVIL ENGINEERING (Elective-IV)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks:		
		L	T	P	C	CIA	SEE	TOTAL
16CE1802	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on system approaches in civil engineering

II. Understand linear, Non-linear & dynamic programming

III. Understand stochastic programming

UNIT-I **Classes:12**

Introduction of systems approach: Introduction to System approach, Operations Research and Optimization Techniques, Use of systems approach in Civil Engineering, Methods, Introduction to Linear and Nonlinear programming methods (with reference to objective function, constraints), Local & Global optima, unimodal function, convex and concave function

UNIT-II **Classes:12**

Nonlinear programming: Single variable unconstrained optimization: Sequential Search Techniques-Dichotomous, Fibonacci, Golden section Multivariable optimization without constraints-The gradient vector and Hessian Matrix, Gradient techniques, steepest ascent/decent technique, Newton's Method Multivariable optimization with equality constraints - Lagrange Multiplier Technique

UNIT-III **Classes:12**

Stochastic Programming: Sequencing– n jobs through 2, 3 and M machines Queuing Theory : elements of Queuing system and its operating characteristics, waiting time and ideal time costs, Kendall's notation, classification of Queuing models, single chanel Queuing theory : Model I (Single channel Poisson Arrival with exponential services times, Infinite population (M/M/1) :(FCFS/ ¥ / ¥) Simulation : Monte Carlo Simulation

UNIT-IV	Classes:12

Dynamic programming: Multi stage decision processes, Principle of optimality, recursive equation, Applications of D.P.

Linear programming: Formulation of Linear optimization models for Civil engineering applications. The simplex method, Method of Big M, Two phase method, duality

Text Books

1. A systems approach to civil engineering planning and design by Thomas K. Jewell
2. Systems Approach in Civil Engineering by K. M. Bagwan**,** M. a Lulla (Pawar)**,** H. K. Gite

Reference Books

1. Systems Approach to Engineering DesignBy P. H. Sydenham
2. Systems analysis for civil engineers by Paul John Ossenbruggen

Web References

1. https://nptel.ac.in/courses/105103093/modules/overview/slide4.htm
2. https://onlinecourses.nptel.ac.in/noc18_mg06/course

E-Text Books

1. https://books.google.co.in/books?isbn=9351646912
2. https://books.google.co.in/books?id=g3tRAAAAMAAJ

Outcomes

At the end of the course students able to

1. Get idea on basics of system approaches
2. Understand the non-linear programming for civil engineering
3. Understand the stochastic programming for civil engineering
4. Understand the dynamic programming for civil engineering
5. Understand the linear programming for civil engineering
6. Understand the concept of stochastic programming

REPAIR AND REHABILITATION OF STRUCTURES (Elective – IV)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1803	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES

The course should enable the students to

I. Understand different maintenance and repair strategies and their importance

II. Know the factors effecting durability and strength of structures

III. Understand various repair, protection & retrofittingof structures

UNIT-I **Classes:12**

Maintenance and repair strategies: Maintenance, Repair and Rehabilitation, facets of maintenance, importance of maintenance, various aspects of inspection, assessment procedure for evaluating a damaged structure, causes of deterioration

UNIT-II **Classes:12**

Strength and Durability of Concrete: Quality assurance and quality control of concrete, strength , durability, thermal properties of concrete, Cracks, different types, causes , Effects due to climate, temperature, Sustained elevated temperature, Corrosion , Effects of cover thickness

UNIT-III **Classes:12**

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-IV **Classes:12**

Repair, Rehabilitation and Retrofitting of Structures: Strengthening of beams, strengthening of columns, Repair of structures distressed due to corrosion, fire, Leakage, earthquake, Demolition techniques , Engineered demolition methods, Jacketing and fiber raping ,Case studies

Text Books

1. Allen R.T. & Edwards S.C, Repair of Concrete Structures, Blakie and Sons, UK, 1987
2. Denison Campbell, Allen and Harold Roper, "Concrete Structures, Materials, Maintenance and Repair", Longman Scientific and Technical UK, 1991

Reference Books

1. Shetty M.S., "Concrete Technology, Theory and Practice", S.Chand and Company, 2008
2. DovKominetzky .M .S ., " Design and construction failures, Galgotia publications Pvt Ltd., 2001

Web References

1. https://easyengineering.net/ce6021-repair-and-rehabilitation-of/
2. https://www.academia.edu/4519837/ Maintenance_ and_ Rehabilitation_ of_ Structures

E-Text Books

1. https://books.google.co.in/books?isbn=0784470294
2. https://books.google.co.in/books?isbn=0128111844.

Outcomes

At the end of the course students able to

1. Understand the different strategies of repair and maintenance of structures
2. Understand the strength and durability of concrete
3. Explain various repair and rehabilitation methods
4. Enlist and explain various non-destructive methods
5. Explain the methods for strengthening the components of a structure
6. Explain demolition methods

CONSTRUCTION AND LAW (Elective – IV)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1804	Core	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES

The course should enable the students to

I. Impart knowledge on contracts, tenders and their procedures

II. Gain knowledge on legal requirements, tax laws & property laws

III. Understand arbitration and its conditions

UNIT-I **Classes:12**

CONSTRUCTION CONTRACTS: Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.

UNIT-II **Classes:12**

TENDERS: Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Tamilnadu Transparency in Tenders Act

UNIT-III **Classes:12**

ARBITRATION: Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs

UNIT-IV **Classes:12**

LEGAL REQUIREMENTS: Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations.

Text Books

1. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India
2. Jimmie Hinze, Construction Contracts, McGraw Hill, 2001.

Reference Books

1. Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, McGraw Hill, 2000.
2. Patil. B.S, Civil Engineering Contracts and Estimates, Universities Press (India) Private Limited, 2006.

Web References

1. https://nptel.ac.in/courses/105104161/27
2. https://nptel.ac.in/courses/105103093/21

E-Text Books

1. https://books.google.co.in/books?isbn=1317213416
2. https://books.google.co.in/books?isbn=1317391772
3. https://books.google.co.in/books?isbn=1317912659

Outcomes

At the end of the course students able to

1. Understand the legal procedure for construction
2. Outline various contracts and their procedures
3. Understand the various powers and duties of arbitrator
4. Explain various enforcement awards and rules
5. Understand the legal requirements and procedures
6. Understand the process of tenders

BRIDGE ENGINEERING (Elective – V)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
16CE1805	Core Elective	L	T	P	C	CIA	SEE	TOTAL
		3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on classification of bridges and their components

II. Understand design procedure of Deck slab bridge and T-Beam bridge

III. Understand design procedure for box culvert and plate girder bridge

UNIT-I — Classes:12

Introduction: History of Bridges, Components of a bridge and its definitions, Classification of Road bridges, Selection of site and initial decision process, survey and alignment; Geotechnical Investigations and Interpretations. River Bridge: Selection of bridge site and planning, collection of bridge design data, Hydrological calculation, Road Bridges , IRC codes , Standard loading for bridge design, Load combination for different working state and limit state designs;

Railway bridges: Loadings for railway bridges; Railroad data. Predesign considerations: Railroad vs. Highway bridges.

UNIT-II — Classes:12

Deck Slab Bridge: Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

Beam & Slab Bridge (T-Beam Bridge): General features – Design of interior panel of slab – Pigeauds method –Design of a T-beam bridge subjected to class AA tracked vehicle only

UNIT-III — Classes:12

Box Culvert: General aspects. Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only.

Plate Girder Bridge: Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line

UNIT-IV	Classes:12

Substructure, Bearings and Deck Joints, Parapets and Railings: Substructure,Pier;Abutment, wing walls, importance of soil, Structure Interaction, Types of foundations, Open foundation, pile foundation, well foundation, simply supported bridge, continuous bridge, Bearings and deck joints, different types of bridge bearings and expansion joints, parapets and railings for Highway bridges.

Text Books

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 1990
2. Jagadeesh .T.R. and Jayaram.M.A. "Design of Bridge Structures", Prentice Hall of India Pvt. Ltd, Learning Pvt. Ltd., 2013

Reference Books

1. Phatak D.R., "Bridge Engineering", SatyaPrakashan, New Delhi, 1990
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw Hill, New Delhi, 1996

Web References

1. https://nptel.ac.in/courses/105999906/
2. nptel.ac.in/syllabus/syllabus_pdf/105102011.pdf
3. https://www.aboutcivil.org/bridges.html

E-Text Books

1. https://books.google.co.in/books?isbn=0070656959
2. https://books.google.co.in/books?isbn=0071331646

Outcomes

At the end of the course students able to

1. Understand the design principles of bridge elements
2. Design the deck slab bridge by effective width method of analysis
3. Identify the various elements of plate girder ridges
4. Understand the concept of bridge bearings
5. Design a box culvert
6. Determine loading for railway bridges

GEOGRAPHIC INFORMATION AND REMOTE SENSING
(Elective – V)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1806	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on applications of remote sensing and GIS

II. Understand the process of analyzing and representing data

III. Understand various methods for analyzing data

UNIT-I **Classes:12**

Introduction: remote sensing: Applications and importance of remote sensing, GPS: Available GPS networks, Limitations and applications of GPS; GPS receivers.

Remote Sensing –I: Basic concepts and fundamentals of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units, over view of Indian Remote sensing satellites and sensors

UNIT-II **Classes:12**

Remote Sensing –II: Energy resources, energy interactions with earth surface features and atmosphere, resolution, visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

Geographic Information System: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS

UNIT-III **Classes:12**

Types of data representation: Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS - Advantages and disadvantages. File management, Spatial data – Layer based GIS, Feature based GIS mapping.

GIS Spatial Analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data

UNIT-IV	**Classes:12**

Applications of GIS: Application areas and user segments; Guide lines for preparation of GIS; Applications of GIS for land use and housing management; Assessment of physical transformation in an urban area.

Water Resources Applications: Land use/Land cover in water resources, Surface water mapping and inventory, Watershed management for sustainable development. Reservoir sedimentation, Ground Water Targeting, Identification of sites for artificial Recharge structures.

Text Books

1. Remote Sensing and its applications by LRA Narayana University Press 1999.
2. Principals of Geo physical Information Systems – Peter A Burragh and Rachael A. Mc Donnell, Oxford Publishers 2004.

Reference Books

1. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
2. Remote Sensing and Geographical Information systems by M.Anji Reddy, B.S.Publications.

Web References

1. https://nptel.ac.in/courses/105108077/
2. https://nptel.ac.in/courses/105102015/

E-Text Books

1. https://books.google.co.in/books?isbn=8126909099
2. https://books.google.co.in/books?isbn=0471954233

Outcomes

At the end of the course students able to

1. Understand the concept of remote sensing and its applications in civil engineering
2. Understand various energy resources
3. Identify the types of data representation
4. Understand the water resource applications
5. Understand and explain GIS and its components
6. Explain methods for analyzing GIS data

GROUND IMPROVEMENT TECHNIQUES (Elective – V)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1807	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on importance of ground improvement techniques

II. Understand various ground improvement techniques

III. Gains knowledge on grouting

UNIT-I — Classes:12

Ground Improvement: Definition, Objectives of ground improvement, Classification of ground improvement techniques, Factors to be considered in the selection of the best soil improvement technique. Ground modification for Black Cotton soil.

Compaction: Effect of grain size distribution on compaction for various soil types like lateritic soil, coarse-grained soil and micaceous soil. Effect of compaction on engineering behavior like compressibility, swelling and shrinkage, permeability, relative density, liquefaction potential. Field compaction – static, dynamic, impact and vibratory type. Specification of compaction. Tolerance of compaction. Shallow and deep compaction, Dynamic Compaction, Vibrofloatation

UNIT-II — Classes:12

Hydraulic Modification: Definition, Principle and techniques. gravity drain, lowering of water table, multistage well point, vacuum dewatering. Discharge equations. Design of dewatering system including pipe line effects of dewatering.

Drainage and Preloading: Importance, Vertical drains, Sand drains, Drainage of slopes, Electro kinetic dewatering, Preloading

UNIT-III	Classes:12

Chemical Modification-I: Definition, cement stabilization, sandwich technique, admixtures. Hydration – effect of cement stabilization on permeability, Swelling and shrinkage and strength and deformation characteristics. Criteria for cement stabilization. Stabilization using Fly ash.

Chemical Modification-II: Lime stabilization – suitability, process, criteria for lime stabilization. Other chemicals like chlorides, hydroxides, lignin and hydrofluoric acid. Properties of chemical components, reactions and effects. Bitumen, tar or asphalt in stabilization.

UNIT-IV	Classes:12

Grouting: Introduction, Effect of grouting. Chemicals and materials used. Types of grouting. Grouting procedure, Applications of grouting.

Miscellaneous Methods(ONLY CONCEPTS&USES): Soil reinforcement, Thermal methods, Ground improvement by confinement – Crib walls, Gabions and Mattresses, Anchors, Rock bolts and soil nailing. Stone Column, Micropiles

Text Books

1. Ground Improvement Techniques- Purushothama Raj P.(1999) Laxmi Publications, New Delhi.
2. Construction and Geotechnical Method in Foundation Engineering- Koerner R.M. (1985) - Mc Graw Hill Pub. Co., New York

Reference Books

1. Engineering principles of ground modification- Manfred Hausmann (1990) - McGraw Hill Pub.Co., New York
2. Methods of treatment of unstable ground- Bell, F.G. (1975) Butterworths, London

Web References

1. https://nptel.ac.in/downloads/105108075/
2. https://easyengineering.net/ce6012-ground-improvement-techniques/
3. https://lecturenotes.in/subject/228/ground-improvement-techniques-git

E-Text Books

1. https://books.google.co.in/books?isbn=8170088372
2. https://books.google.co.in/books?isbn=0751400734
3. https://books.google.co.in/books?isbn=812035320X

Outcomes

At the end of the course students able to:

1. Outline various improvement techniques
2. Understand the effect of compaction effect on soil grains
3. Enlist various methods of soil stabilization
4. Understand the process of grouting
5. Explain chemical methods for soil stabilizations
6. Explain drainage and preloading and their importance

Available Selected MOOCs (Elective – V)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1808	Core	3	1	-	3	40	60	100
Contact Classes: -	Tutorial Classes: -	Practical Classes: Nil				Total Classes: -		

Meeting with the global requirements, to inculcate the habit of self learning and incompliance with UGC guidelines, MOOC (Massive Open Online

Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute.
- There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses.

Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration.

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

(Elective – VI)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1809	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12		Practical Classes: Nil			Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on FEM and its applications in civil engineering

II. Understand the concept of FEM and its implementation procedure

III. Understand the procedure for formulation of elements

UNIT-I **Classes:12**

Introduction: Concepts of FEM, Steps involved merits and demerits, energy principles, Discretization, Rayleigh-Ritz method of functional approximation

Principles of Elasticity: Equilibrium Equations, Strain Displacement relationships in matrix form, Constitutive relationships for plane stress, plane strain and axisymmetric bodies of revolution with axisymmetric loading

UNIT-II **Classes:12**

One dimensional elements: Stiffness matrix for bar element, Shape function for one dimensional elements, One dimensional Problems

Two dimensional elements: Different types of elements for plane stress and plane strain analysis, Displacement models, generalised coordinates, Shape functions, Convergent and compatibility requirements, Geometric invariance, Natural coordinate system, area and volume coordinates

UNIT-III **Classes:12**

Generation of element: Generation of element stiffness matrix and nodal load matrix for 3 noded triangular element and four noded rectangular elements

Isoparametric Formulation: Concepts of isoparametric elements for 2-D analysis, formulation of CST element, 4 noded and 8 noded isoparametric quadrilateral elements, Lagrangian and serendipity elements

UNIT-IV **Classes:12**

Axi-symmetric Analysis: Basic Principles, Formulation of 4-noded isoparametric axi symmetric element

Solution Techniques: Numerical Integration, Static Condensation, Assembly of elements and solution techniques for static loads

Text Books

1. Finite Elements Methods in Engineering by Tirupati. R. Chandranpatla and Ashok D. Belegundu, Pearson Education Publications
2. Finite element analysis by S.S. Bhavakatti, New age international publishers 3.Finite Element methods for Engineers by U.S.Dixit, Cengage Publishers, New Delhi

Reference Books

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons
2. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi

Web References

1. https://nptel.ac.in/courses/105105041/
2. www.nptelvideos.in/2012/11/finite-element-analysis.html

E-Text Books

1. https://books.google.co.in/books?isbn=0074622102
2. https://books.google.co.in/books?isbn=8120323157
3. https://books.google.co.in/books?isbn=8190619500

Outcomes

At the end of the course students able to

1. Understand basic principles of FEM
2. Understand the concept of one dimensional elements
3. Understand the concept of two dimensional elements
4. Understand axi-symmetric analysis
5. Explain numerical integration
6. Explain isoparametric formulation

CONSTRUCTION PROJECT MANAGEMENT (Elective – VI)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1810	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: - 12	Practical Classes: Nil				Total Classes: 60		

OBJECTIVES

The course should enable the students to

I. Gain knowledge on construction technology and planning

II. Understand the bar charts and elements of network

III. Impart knowledge on planning and scheduling of resources available

UNIT-I — Classes:12

Fundamentals of Construction Technology: Definitions anddiscussion, construction activities ,construction processes ,Constructionworks, construction estimating,Construction schedule , productivity and mechanized construction, construction documents ,Construction records, quality, safety , codes and regulations.

Planning and Implementation at Layouts: Project site; development, setting out; site layout, infrastructure development, construction materials, deployment of construction equipment(including concreting and hoisting equipment also) , prefabrication technology in construction ,false work and temporary works

UNIT-II — Classes:12

Project management

Bar Charts and Milestone Charts: Introduction, project planning , scheduling ,controlling,role ofdecisionin projectmanagement, techniques for analyzing alternatives operationresearch, methodsof planningand programming problems, developmentof barchart, illustrative examples , shortcomingsof bar charts and remedial measures , milestone charts.

Elements of Network and Development of Network : Introduction , event , activity , dummy , network rules , graphical guidelines for network , common partial situations in network , numbering the events , cycles problems , planning for network construction ,steps in development of network , work breakdown structure ,hierarchies , illustrative examples

UNIT-III	**Classes:12**

Crashing of Networks: Introduction, project cost, indirect project cost, direct project cost, Slope if direct cost curve, total project cost and optimum durations, steps in cost optimization, illustrative examples.

Resource Allocation: Introduction, resource histograms, resource smoothing, resource leveling

UNIT-IV	**Classes:12**

Mechanized Excavation: Classification of soil; mechanized excavation, groundwater control,trenchless (no, dig) technology, grading, dredging.

Excavation by Blasting: Rock excavation, basic mechanics of breakage, drillability of rocks, kinds of drilling, selection of the drilling method and equipment, Explosives in blasting, blasting patterns and firing sequence , smooth blasting , environmental effect of blasting

Text Books

1. Construction Technology by SubirK.Sarkar and SubhajitSaraswati, Oxford Higher Education, Univ.Press, Delhi
2. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications, New Delhi.

Reference Books

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Operations research by P.SankarIyer, TMH Publications, New Delhi.

Web References

1. https://nptel.ac.in/courses/105103093/
2. https://www.coursera.org/learn/construction-project-management

E-Text Books

1. https://books.google.co.in/books?isbn=9332542015
2. https://books.google.co.in/books?isbn=1118000242

Outcomes

At the end of the course students able to

1. Understand the basics of construction technologies
2. Understand planning and implementation of layouts
3. Understand various elements of network
4. Explain crashing networks and resource allocation
5. Explain various excavation processes
6. Outline the methods adopted for blasting

POLLUTION CONTROL AND MONITORING (Elective – VI)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1811	Core Elective	3	1	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: -12	Practical Classes: Nil			Total Classes: 60			

OBJECTIVES

The course should enable the students to

I. Gain knowledge on causes, effects and control of pollution

II. Understand sources and control of particulate pollutants

III. Impart knowledge on various pollution acts

UNIT-I — Classes:12

Introduction : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants –

Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and ArealSources of air pollution- stationary and mobile sources.

Effects of Air Pollution: Effects of Air pollutants on man, material and vegetation: Global effects ofair pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes etc.,

UNIT-II — Classes:12

Pollutant Dispersion Models : Lapse Rates, Pressure Systems, Winds and moisture plume behaviorand plume Rise Models; Gaussian Model for Plume Dispersion.

Plume Behavior : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure,Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality wind rose diagrams

UNIT-III	Classes:12

Control of Particulates: Control of particulates – Control at Sources, Process Changes, Equipmentmodifications, Design and operation of control, Equipment's – Settling Chambers, Centrifugal separators, filters dry and wet scrubbers, Electrostatic precipitators.

Control of Gaseous Pollutants: General Methods of Control ofNox and Sox emissions – In-plantControl Measures, process changes, dry and wet methods of removal and recycling.

UNIT-IV	Classes:12

Thermodynamic of Air Pollution: Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products ofcombustion.

Air Quality Management: Air Quality Management – Monitoring of SPM, SOx; NOx and CO EmissionStandards– Air sampling – Sampling Techniques – High volume air sampler – Stack sampling -Analysis of Air pollutants – Air quality standards – Air pollution control act.

Text Books

1. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw Hill Company
2. Air Quality by Thodgodish, Levis Publishers, Special India Edition, New Delhi

Reference Books

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal& Co. Publications, New Delhi

Web References

1. https://www.cseindia.org/pollution-monitoring-557
2. www.pcemworldconference.com/
3. https://nptel.ac.in/courses/105102089/

E-Text Books

1. https://books.google.co.in/books?isbn=8122415075
2. https://books.google.co.in/books?isbn=156252285X
3. https://books.google.co.in/books?isbn=812241835X

Outcomes

At the end of the course students able to

1. Identify various pollutants, sources and their effects.
2. Understand various dispersion models
3. Understand the plume behavior
4. Explain sources and control of particulate pollutants
5. Explain thermodynamics of air pollution
6. Understand air quality management

AVAILABLE SELECTED MOOCs (Elective – VI)

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE1812	Core	3	1	-	3	40	60	100
Contact Classes: -	Tutorial Classes: -	Practical Classes: Nil				Total Classes: -		

Meeting with the global requirements, to inculcate the habit of self learning and incompliance with UGC guidelines, MOOC (Massive Open Online Course) courses have been introduced as electives. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discuss with professors from various universities and finally to obtain certificate of completion for the course from the MOOCs providers

Regulations for MOOCs

- The respective departments shall give a list from NPTEL or any other standard providers, whose credentials are endorsed by the HOD.
- Each department shall appoint Coordinators/Mentors and allot the students to them who shall be responsible to guide students in selecting online courses and provide guidance for the registration, progress and completion of the same.
- A student shall choose an online course (relevant to his/her programme of study) from the given list of MOOCs providers, as endorsed by the teacher concerned, with the approval of the HOD.
- The details of MOOC(s) shall be displayed in Grade card of a student, provided he/she submits the proof of completion of it to the department concerned through the Coordinator/Mentor.
- Student can get certificate from SWAYAM/NPTEL or any other standard providers, whose credentials are endorsed by the HOD. The course work should not be less than 12 weeks or student may appear for end examination conducted by the Institute.
- There shall be one Mid Continuous Internal Examination (Quiz exam for 40 marks) after 9 weeks of the commencement of the course and semester end examination (Descriptive exam for 60 marks) shall be done along with the other regular courses.

Three credits will be awarded upon successful completion of each MOOC courses having minimum of 8 weeks duration.

MAJOR PROJECT AND COMPREHENSIVE VIVA – VOCE

B.Tech 8th Semester: Civil Engineering								
Course code	Category	Hours/week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	TOTAL
16CE2813	Core	-	-	8	12	60	140	200
Contact Classes: -	Tutorial Classes: -	Practical Classes: 75				Total Classes: 75		

Internal Evaluation for Major Project Work

The major project shall be carried out during the 8th Semester in the **Non FSI Model** and shall be evaluated for 200 marks out of which 60 marks for internal evaluation and 140 marks for semester end evaluation. Major project will be taken up batch wise and batches will be divided as per the guidelines. The object of major project is to enable the student to extend further the investigative study taken up as the project in Mini project under the guidance of the supervisor/ guide from the department.

The assignment normally includes

- Preparing an action plan for conducting the investigation including the team work.
- In depth study of the topic assigned.
- Review and finalization of the approach to the problem relating to the assigned topic.
- Final development of product/process, testing, results, conclusions and further direction.
- Preparing a paper for conference presentation/ publication in journal if possible.
- Preparing a dissertation in the standard format for being evaluated by the department.
- Final presentation of the work done before the Project Review Committee (PRC).

Major Project is allocated 60 internal marks. Out of 60, 30 marks are allocated for the supervisor/guide and head of the department to be evaluated based on two seminars given by each student on the topic of the project. The other 30 marks shall be evaluated on the basis of his presentation on the work done on his project by the Departmental Committee comprising of Head of the Department, respective supervisor/ guide and two senior faculty of the department appointed by the Principal.

External Evaluation for Major Project

The major project shall be carried out during the 8th Semester in the **Non FSI Model** and shall be evaluated for 200 marks. The Semester End Examination for major project work done during 8th Semester and for 140 marks shall be conducted by a Project Review Committee (PRC). The committee comprises of an External Examiner appointed by the Principal, Head of the Department and Project Guide/Supervisor. The evaluation of project work shall be conducted at the end of the 8th Semester. The above committee evaluates the project work report with weightages of 50% of the marks (50 marks) awarded by external examiner, 20% of marks (20 marks) awarded by HOD & 30% of the marks (30 marks) by Project Guide/Supervisor respectively for a total of 100 marks. Of the 40 marks for Presentation & Viva-Voce examination, HOD evaluates for 10 marks and external examiner for 30 marks. The evaluation of 140 marks is distributed as given below:

Distribution of Project Work Marks

Sl. No.	Criterion	Marks
1	Report	100
2	Presentation & Viva – Voce	40

A candidate shall be declared to have passed in major project if he secures a minimum of 50% aggregate marks (100 marks) (Internal & Semester External Examination marks put together), subject to a minimum of 50% marks (70 marks) in the major project end examination.