SCHEME OF EXAMINATION

and

SYLLABI

for

Bachelor of Technology
Civil Engineering

Offered by
University School of Engineering and Technology

1st SEMESTER TO 8th SEMESTER

Guru Gobind Singh Indraprastha University
Dwarka, Delhi – 110078 [INDIA]

www.ipu.ac.in
## BACHELOR OF TECHNOLOGY
(COMMON TO ALL BRANCHES)
FIRST SEMESTER EXAMINATION

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### PRACTICAL/VIVA VOCE

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### TOTAL

|       |       |       | 16   | 18   | 27     |

M: Mandatory for award of degree
#NUES (Non University Examination System)

*NCC/NSS* can be completed in any semester from Semester 1 – Semester 4. It will be evaluated internally by the respective institute. The credit for this will be given after fourth Semester for the students enrolled from the session 2014-15 onwards. The camps/classes will be held either during Weekends/Holidays or Winter/Summer Vacations.
BACHELOR OF TECHNOLOGY
(COMMON TO ALL BRANCHES)
SECOND SEMESTER EXAMINATION

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NUES (Non University Examination System)
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BACHELOR OF TECHNOLOGY
(CIVIL ENGINEERING)
THIRD SEMESTER EXAMINATION

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THEORY PAPERS

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PRACTICAL/VIVA VOCE

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TOTAL: 18 14 27

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**BACHELOR OF TECHNOLOGY**
**CIVIL ENGINEERING**
**FOURTH SEMESTER EXAMINATION**

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# NUES (Non University Examination System)

Note: Minimum of 2 week of Software Training related to Civil Engineering will be held after 4th Semester. However, weekly presentations and Viva Voce will be conducted in 5th Semester (ETCE-359).
## BACHELOR OF TECHNOLOGY
(CIVIL ENGINEERING)
FIFTH SEMESTER EXAMINATION

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**TOTAL** | 17 | 15 | 26 |

M: Mandatory for award of degree

^Minimum of 2 week of Software Training related to Civil Engineering was held after 4th Semester, however, weekly presentations and Viva Voce will be conducted in this semester (ETCE-359).

**Note:** Minimum of 2 week Surveying Camp (ETCE 360) will be held after 5th Semester, however, Viva-Voce will be conducted in the 6th Semester.

# NUES (Non University Examination System)
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

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**GENERAL ELECTIVE –I (Choose any one)**

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**PRACTICAL/VIVA VOCE**

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<tr>
<td>ETCE-352</td>
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<td>ETCE-358</td>
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**TOTAL**

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M: Mandatory for the award of degree

**Note:** Minimum of four weeks of Industrial Training related to Civil Engineering will be conducted after 6th Semester; however, viva-voce will be conducted in 7th semester (ETCE-457).

^ Minimum of 2 week Surveying camp (ETCE-360) was held after 5th Semester; however, viva-voce is to be conducted in this semester.

# NUES [Non University Examination System]
## BACHELOR OF TECHNOLOGY
(CIVIL ENGINEERING)
SEVENTH SEMESTER EXAMINATION

<table>
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<tr>
<th>Code No.</th>
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<td>ETCE-417</td>
<td>Structure Repair and Rehabilitation</td>
<td>3</td>
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<td>ETCE-419</td>
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<td>ETEN-419</td>
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<td>Sociology and Elements of Indian History for Engineers</td>
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<td>ETCS 425</td>
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<td>Economics of Infrastructure Projects: Case Studies</td>
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<td>ETCE-459</td>
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<td>ETCE-455</td>
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^ Minimum of 4 weeks Industrial Training related to Civil Engineering was conducted at the end of 6th Semester; however, weekly presentations and viva-voce is to be conducted in this semester.

**Imp:** Elective Paper will be floated if one-third of the total students opt for the same. It is advised that the decision about the elective subject for 8th Semester is done before 15th November every year before end of seventh semester. New Electives may be added as per requirement after getting it duly approved by BOS and AC respectively.

+ The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports.
**BACHELOR OF TECHNOLOGY**  
**CIVIL ENGINEERING**  
**EIGHTH SEMESTER EXAMINATION**

<table>
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<th>Code No.</th>
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<th>Credits</th>
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<tr>
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<td>ETHS-402</td>
<td>Human Values and Professional Ethics-II</td>
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<td>ETCE-404</td>
<td>Planning and Management of Construction Projects</td>
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### CORE ELECTIVE – I (Choose any one)

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<tr>
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<td>Transportation, Planning and Management</td>
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<tr>
<td>ETCE-412</td>
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<td>Ground Water Assessment, Development and Management</td>
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<tr>
<td>ETCE-416</td>
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<td>Advanced Geotechnical Engineering</td>
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### GENERAL ELECTIVE– II (Choose any one)

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<tbody>
<tr>
<td>ETCE-418</td>
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<td>FEM in Structural Engineering</td>
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<tr>
<td>ETEN-418</td>
<td></td>
<td>Ground Water Contamination and Mitigation measures</td>
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<tr>
<td>ETCE-422</td>
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<td>Environment Engineering</td>
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<tr>
<td>ETCE-424</td>
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<td>Offshore structural Engineering</td>
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### PRACTICAL/VIVA VOCE

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<tbody>
<tr>
<td>ETCE-452</td>
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<td>Estimation of Projects using applicable software</td>
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<tr>
<td>ETCE-454</td>
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<td>Lab based on Elective I or II</td>
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<tr>
<td>ETCE-460</td>
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<td>Major Projects*</td>
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**TOTAL** 13 19 26

*The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format, thereafter he/she will have to present the progress of the work through seminars and progress reports. Seminar related to major project should be delivered one month after staring of Semester. The progress will be monitored through seminars and progress reports.

**Imp:** Elective Paper will be floated if one-third of the total students opt for the same. It is advised that the decision about the elective subject is done before 15th November every year before end of seventh semester. New Electives may be added as per requirement after getting it duly approved by BOS and AC respectively.

**NOTE:**
1. The total number of the credits of the B.Tech. (CIVIL) Programme = 215.
2. Student shall be required to appear in examinations of all courses. However, to award the degree a student shall be required to earn a minimum of 200 credits including mandatory papers (M).

**FOR LATERAL ENTRY STUDENTS:**
1. The total number of the credits of the B.Tech. (CIVIL) Programme = 161.
2. Each student shall be required to appear for examinations in all courses Third Semester onwards. However, for the award of the degree a student shall be required to earn a minimum of 150 credits, including mandatory papers (M).
NOMENCLATURE OF CODES GIVEN IN THE SCHEME OF

B.TECH AND M.TECH

1. ET stands for Engineering and Technology.
2. PE stands for Power Engineering.
3. ME stands for Mechanical Engineering.
4. MT stands for Mechatronics.
5. AT stands for Mechanical and Automation Engineering.
6. EE stands for Electrical and Electronics Engineering.
7. EL stands for Electrical Engineering.
8. IT stands for Information Technology
9. CS stands for Computer Science and Engineering
10. CE stands for Civil Engineering
11. EC stands for Electronics and Communications Engineering.
12. EN stands for Environmental Engineering
13. TE stands for Tool Engineering
14. MA stands for Mathematics
15. HS stands for Humanities and Social Sciences
16. SS stands for Social Services
# APPLIED MATHEMATICS-I

**Paper Code:** ETMA-101  
**Paper:** Applied Mathematics-I

<table>
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<tbody>
<tr>
<td>3</td>
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<td>4</td>
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</tbody>
</table>

**INSTRUCTIONS TO PAPER SETTERS:**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

**Objective:** The objective of the paper is to facilitate the student with the basics of Applied Mathematics that are required for an engineering student.

**UNIT-I**

Successive differentiation: Leibnitz theorem for \(n\)th derivative (without proof). Infinite series: Convergence and divergence of infinite series, positive terms infinite series, necessary condition, comparison test (Limit test), D’Alembert ratio test, Integral Test, Cauchy’s root test, Raabe’s test and Logarithmic test (without proof). Alternating series, Leibnitz test, conditional and absolutely convergence. Taylor’s and Maclaurin’s expansion (without proof) of function \((e^x, \log(1+x), \cos x, \sin x)\) with remainder terms, Taylor’s and Maclaurin’s series, Error and approximation.

\([T1], [T2][\text{No. of hrs. 12}]\)

**UNIT-II**

Asymptotes to Cartesian curves. Radius of curvature and curve tracing for Cartesian, parametric and polar curves. Integration: integration using reduction formula for \(\int_a^b \sin^n \theta \, d\theta\), \(\int_a^b \cos^n \theta \, d\theta\), \(\int_0^\pi \sin \theta \cos^m \theta \, d\theta\). Application of integration: Area under the curve, length of the curve, volumes and surface area of solids of revolution about axis only. Gamma and Beta functions.

\([T1],[T2][\text{No. of hrs. 12}]\)

**UNIT-III**


\([T1],[T2][\text{No. of hrs. 12}]\)

**UNIT-IV**


\([T1],[T2][\text{No. of hrs. 12}]\)

**Text:**


**References:**


[R5] Schaum’s Outline on Linear Algebra, Tata McGraw-Hill

APPLIED PHYSICS – I

Paper Code: ETPH – 103

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

MAXIMUM MARKS: 75

Objective: The objective of the paper is to facilitate the student with the basics of Applied Physics aspects that are required for his understanding of basic physics.

UNIT I


UNIT II

Polarization: Introduction, Uniaxial crystals, Double refraction, Nicol prism, Quarter and half wave plates, Theory of production of plane, circularly and elliptically polarized lights, Specific rotation, Laurens half shade polarimeter.


Fibre optics: Introduction, Single mode fibre, Step index and graded index multimode fibres, Acceptance angle and numerical aperture.

UNIT III


Ultrasonics: Introduction, Production of ultrasonics by magnetostriction and Piezoelectric methods, Applications.

UNIT IV

Nuclear Physics: Introduction, Radioactivity, Alpha decay, Beta decay, Gamma decay, Q value, Threshold energy, Nuclear reactions, Nuclear fission: Liquid drop model, Nuclear fusion, Particle accelerators: Linear accelerator, Cyclotron, Radiation detectors: Ionization chamber, Geiger Mueller Counter.

Text Books:


Reference Books

[R3]. Fundamentals of Optics : Jenkins and White , Latest Edition
MANUFACTURING PROCESSES

Paper Code: ETME-105  
PAPER: Manufacturing Processes  
L  
T  
C  
3  
0  
3

INSTRUCTIONS TO PAPER SETTERS: 

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The Objective of the paper is to facilitate the student with the basic Manufacturing processes.

Unit-I


Non-Ferrous metals & alloys: Properties and uses of various non-ferrous metals & alloys and its composition such as Cu-alloys; Brass, Bronze, Al-alloys such as Duralumin.

Casting Processes:  
Principles of metal casting, Pattern materials, types and allowance, composition and properties of moulding sand, foundry tools, concept of cores and core print, elements of gating system, description and operation of cupola, special casting processes e.g. die-casting; permanent mould casting; centrifugal casting; investment casting; casting defects.

UNIT-II

Smithy and Forging:  
Hot working and cold working, Forging tools and equipments, Forging operations, Forging types: Smith forging, Drop forging, Press forging, Machine forging; Forging defects; Extrusion, wire drawing, swaging.

BENCH WORK AND FITTING:  
Fitting shop tools, operation: Fitting; sawing; chipping; thread cutting (with taps and dies); Marking and marking tools.

Unit-III

Metal joining: Welding principles, classification of welding techniques, Oxyacetylene Gas welding, equipment and field of application, Arc-welding, metal arc, Carbon arc welding, submerged arc welding and atomic hydrogen welding, TIG and MIG welding, Electric resistance welding: spot; seam; flash; butt and percussion welding, Flux: composition; properties and function, Electrodes, Types of joints and edge preparation, Brazing and soldering, welding defects.

UNIT-IV

Sheet Metal Work:  
Tools and equipments used in sheet metal work, metals used for sheets, standard specification for sheets, Types of sheet metal operations: shearing, drawing, bending. Other operations like spinning, stretch forming, embossing and coining.


Text Books:

[T1]. Manufacturing Process by Raghuvanshi.(Dhanpat Rai and Co.)
[T2]. Manufacturing Technology by P.N.Rao (TMH publications)

Reference Books:

[R1]. Workshop Technology by Hazra-Chowdhary (Media Promoters and Publishers Pvt. Ltd.)
[R2]. Production Engineering by R.K.Jain (Khanna Publishers)
[R3]. Workshop Technology by Chapman (Elsevier Butterworth-Heinemann)
[R4]. Fundamentals of Modern Manufacturing by Mikell P. Groover (Wiley India Edition)
[R5]. Manufacturing Processes for Engineering Materials by Kalpakjian and Schmid (Pearson)

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
ELECTRICAL TECHNOLOGY

Paper Code: ETEE-107
Paper: Electrical Technology

INSTRUCTIONS TO PAPER SETTERS:

1. This is first introductory course in electrical technology to the students of all the branches of engineering in first year.
2. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
3. Apart from question no. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To provide exposure to the students in respects of the basics of different aspects of electrical engineering with emphasis on constructional, measurement and applications of various types of instruments and equipments.

UNIT – I: DC Circuits
Introduction of Circuit parameters and energy sources (Dependent and Independent), Mesh and Nodal Analysis, Superposition, Thévenin’s, Norton’s, Reciprocity, Maximum Power Transfer and Millman’s Theorems, Star-Delta Transformation and their Applications to the Analysis of DC circuits.

UNIT – II: A.C. Circuits

UNIT – III: Measuring Instruments
Basics of measuring instruments and their types, Working principles and applications of moving coil, moving iron (ammeter, voltmeter) and Extension of their ranges, dynamometer-type Wattmeter, induction-type Energy Meter, Two-wattmeter method for the measurement of power in three phase circuits, Introduction to digital voltmeter, digital Multimeter and Electronic Energy Meter.

UNIT – IV: Transformer and Rotating Machines
Fundamentals of Magnetic Circuits, Hysteresis and Eddy current losses, working principle, equivalent circuit, efficiency and voltage regulation of single phase transformer and its applications. Introduction to DC and Induction motors (both three phase and single phase); Stepper Motor and Permanent Magnet Brushless DC Motor.

Text Books:

Reference Books:
HUMAN VALUES & PROFESSIONAL ETHICS

Paper Code: ETHS-109  
L  T  C
Paper : Human Values & Professional Ethics  
1 1 1

Non-University Examination Scheme (NUES)
Note: There will be no End-Term External University Examination. Marks are to be given on the basis of two internal sessional test of 30 marks each and one final Viva-voce project report Examination of 40 marks.

Objectives:
This introductory course input is intended
a. To help the students appreciate the essential complementarity between ‘VALUES’ and ‘SKILLS’ to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
b. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on the correct understanding of the Human reality and the rest of the Existence. Such a Holistic perspective forms the basis of value-based living in a natural way.
c. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

UNIT-1: Introduction to Value Education  
No. of lectures: 03+1
1. Understanding the need, basic guidelines, content and process for value education.
2. Basic Human Aspirations: Prosperity and happiness
3. Methods to fulfil the human aspirations – understanding and living in harmony at various levels.
4. Practice Session – 1. [T1], [R1], [R4]

UNIT-2: Harmony in the Human Being  
No. of lectures: 05+1
2. Understanding the Harmony of “I” with the body – Correct appraisal of physical needs and the meaning of prosperity.
3. Programme to ensure harmony of “I” and Body-Mental and Physical health and happiness.
5. Understanding society and nation as extensions of family and society respectively.
6. Practice Session – 02 [T2], [R1], [R2]

UNIT-3: Basics of Professional Ethics  
No. of lectures: 04+1
1. Ethical Human Conduct – based on acceptance of basic human values.
2. Humanistic Constitution and universal human order – skills, sincerity and fidelity.
3. To identify the scope and characteristics of people – friendly and eco-friendly production system, Technologies and management systems.
4. Practice Session – 03. [T1], [R4]

UNIT-4: Professional Ethics in practice  
No. of lectures: 04+1
1. Profession and Professionalism – Professional Accountability, Roles of a professional, Ethics and image of profession.
2. Engineering Profession and Ethics - Technology and society, Ethical obligations of Engineering professionals, Roles of Engineers in industry, society, nation and the world.
3. Professional Responsibilities – Collegiality, Loyalty, Confidentiality, Conflict of Interest, Whistle Blowing
4. Practice Session – 04 [T1], [T2], [T3], [R3]

Text Books:
[T1] Professional Ethics, R. Subramanian, Oxford University Press.

References:
[R1] Success Secrets for Engineering Students: Prof. K.V. SubbaRaju, Ph.D., Published by SMARTstudent.

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
[R2] Ethics in Engineering Mike W. Martin, Department of Philosophy, Chapman University and Roland Schinzinger, School of Engineering, University of California, Irvine.


*PRACTICAL SESSIONS OF 14 HOME ASSIGNMENTS* will be followed by the students pursuing this paper. (Ref: Professional Ethics & Human Values: S.B. Srivastava, SciTech Publications (India) Pvt. Ltd. New Delhi.)

**CONTENT OF PRACTICE SESSION**

**Module 1: Course Introduction – Needs, Basic Guidelines, Content and Process of Value Education**

**PS-1:** Imagine yourself in detail. What are the goals of your life? How do you set your goals in your life? How do you differentiate between right and wrong? What have been your achievements and shortcoming in your life? Observe and analyze them.

**Expected Outcome:**
The students start exploring themselves; get comfortable to each other and to the teacher and start finding the need and relevance for the course.

**PS-2:** Now a days there is lot of voice about techno-genie maladies such as energy and natural resource depletion, environmental Pollution, Global Warming, Ozone depletion, Deforestation, etc. – all these scenes are man-made problems threatening the survival of life on the earth – what is root cause of these maladies and what is the way out in your opinion?

On the other hand there is rapidly growing danger because of nuclear proliferation, arm race, terrorism, criminalization of politics, large scale corruption, scams, breakdown of relationships, generation gap, depression and suicidal attempts, etc - what do you think the root cause of these threats to human happiness and peace – what could be the way out in your opinion?

**Expected Outcome:**
The students start finding out that technical education with study of human values can generate more problems than solutions. They also start feeling that lack of understanding of human values is the root cause of all the problems and the sustained solution could emerge only through understanding of human values and value based living.

Any solutions brought out through fear, temptation or dogma will not be sustainable.

**PS-3:** 1. Observe that each one of us has Natural Acceptance, based on which one can verify right or not right for him. Verify this in case of following:

a) What is naturally acceptable to you in relationship – feeling of respect or disrespect?
b) What is naturally acceptable to you to nurture or to exploit others? Is your living the same as your natural acceptance or different?

2. Out of three basic requirements for fulfillment of your aspirations, right understanding, relationship and physical facilities, observe how the problems in your family are related to each. Also observe how much time and efforts you devote for each in your daily routine.

**Expected Outcome:**
1. The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify the right or wrong, and referring to any external source life text or instrument or any other person cannot enable them to verify with authenticity, it will only develop assumptions.

2. The students are able to see that their practice in living is not in harmony with their natural acceptance at most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony.

3. The students are able to see that lack of right understanding leading to lack of relationship is the
major cause of the problems in their family and the lack of physical facilities in most of the cases; while they have given higher priority to earning of physical facilities in their life ignoring relationship and not being aware that right understanding is the most important requirement for any human being.

Module 2: Understanding harmony in human being – Harmony in myself!

PS-4: Prepare the list of your desires. Observe whether the desires. Observe whether the desires are related with self “I” or body. If it appears to be related with both, see which part of it is related to self “I” and which part is related to body.

Expected Outcome:
The students are able to see that they can enlist their desires and the desires are not vague, also they are able to relate their desires to “I” and “body” distinctly. If, any desire appears to be related with both, they are able to see that feeling is related to “I” while the physical facility is related to the body. They are also able to see that “I” and “body” are two realities, and most of their desires are related to “I” and not with the “Body”; while their efforts are mostly connected on the fulfillment of the need of the body assuming that it will meet the needs of “I” too.

PS-5:
1. [A]. Observe that any physical facilities you use, follows the given sequence with time; Necessary and tasteful – unnecessary & tasteful – unnecessary & tasteless.
   [B]. In contrast, observe that any feelings in you are either naturally acceptable or not acceptable at all. If, naturally acceptable, you want it continuously and if not acceptable, you do not want it at any moment.
2. List down all your activities. Observe whether the activity is of “I” or of “body” or with the participation both “I” and “body”.
3. Observe the activities with “I”. Identify the object of your attention for different moments (over a period say 5 to 10 minute) and draw a line diagram connecting these points. Try to observe the link between any two nodes.

Expected Outcome:
1. The students are able to see that all physical facilities they use are required for limited time in a limited quantity. Also they are able to see that cause of feeling, they want continuity of the naturally acceptable feelings and they do not want feelings which are not naturally acceptable even for a single moment.
2. The students are able to see that activities like understanding, desires, thoughts and selection are the activities of “I” only; the activities like breathing, palpitation of different parts of the body are fully the activities of the body. With the acceptance of “I”, while activities they do with their sense organs like hearing through ears, seeing through eyes, sensing through touch, tasting through tongue and smelling through nose or the activities they do with their work organs like hands, legs, etc. are such activities that require the participation of both “I” and “body”.
3. The students become aware of their activities of “I” and start finding their focus of attention at different moments. Also they are able see that most of their desires are coming from outside (through preconditioning or sensation) and are not based on their natural acceptance.

PS-6:
1. Chalk out the program to ensure that you are responsible to your body – for the nurturing, protection and right utilization of the body.
2. Find out the plants and shrubs growing in and your campus. Find out their use for curing different diseases.

Expected Outcome:
The students are able to list down activities related to a proper upkeep of the body and practice them in their daily routine. They are also able to appreciate the plants wildly growing in and around the campus which can be beneficial in curing the different diseases.

Module 3: Understanding harmony in the family and society - Harmony in Human – Human relationship
PS-7: Form small groups in the class and in that group initiate the dialogue and ask the eight questions related to trust. The eight questions are—

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Intention (Natural Acceptance)</th>
<th>S.No.</th>
<th>Competence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.a.</td>
<td>Do I want to make myself happy?</td>
<td>1.b.</td>
<td>Am I liable to make myself always Happy?</td>
</tr>
<tr>
<td>2.a.</td>
<td>Do I want to make the other happy?</td>
<td>2.b.</td>
<td>Am I liable to make the other always happy?</td>
</tr>
<tr>
<td>3.a.</td>
<td>Does the other want to make him happy?</td>
<td>3.b.</td>
<td>Is the other able to make him always happy?</td>
</tr>
<tr>
<td>4.a.</td>
<td>Does the other want to make me happy? What is answer?</td>
<td>4.b.</td>
<td>Is the other able to make me always happy? What is answer?</td>
</tr>
</tbody>
</table>

Let each student answer the question for himself and everyone else. Discuss the difference between intention and competence.

Expected Outcome:
The students are able to see that the first four questions are related to our natural acceptance i.e. intention and the next four to our competence. They are able to note that the intention is always correct, only competence is lacking. We generally evaluate ourselves on the basis of our intention and other on the basis of their competence. We seldom look at our competence and other’s intention as a result we conclude that I am a good person and other is a bad person.

PS-8:
1. Observe that on how many occasions you are respecting your related ones (by doing the right evaluation) and on how many occasion you are disrespecting by way of under evaluation, over evaluation or otherwise evaluation.
2. Also observe whether your feeling of respect is based on treating the other as yourself or on differentiations based on body, physical facilities or beliefs.

Expected Outcome:
The students are able to see that respect is right evaluation and only right evaluation leads to fulfilment of relationship. Many present problems in the society are an outcome of differentiation (lack of understanding of respect) like gender biasness, generation gap, caste conflicts, class struggle, and domination through poor play, communal violence, and clash of isms and so on so forth.

All these problems can be solved by realizing that the other is like me as he has the same natural acceptance, potential and program to ensure a happy and prosperous life for him and for others though he may have different body, physical facilities or beliefs.

PS-9:
1. Write a note in the form of a story, poem, skit, essay, narration, dialogue, to educate a child. Evaluate it in a group.
2. Develop three chapters to introduce “social science”, its needs, scope and content in the primary education of children.

Expected Outcome:
The students are able to use their creativity for educating children. The students are able to see that they can play a role in providing value education for children. They are able to put in simple words the issues that are essential to understand for children and comprehensible to them. The students are able to develop an outline of holistic model for social science and compare it with the existing model.

Module 4: Understanding harmony in the nature and existence – Whole existence as Co – existence -

PS-10: Prepare the list of units (things) around you. Classify them into four orders. Observe and explain the mutual fulfilment of each unit with other orders.

Expected Outcome:
The students are able to differentiate between the characteristics and activities of different orders and study the mutual fulfilment among them. They are also able to see that human beings are not fulfilling to their orders today and need to take appropriate steps to ensure right participation (in term of nurturing, protection and right utilization) in the nature.
PS-11:
1. Make a chart for the whole existence. List down different courses of studies and relate them to different or levels in the existence.
2. Choose any one subject being taught today. Evaluate and suggest suitable modifications to make it appropriate and holistic.

Expected Outcome:
The students are confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also they are liable to make out how these courses can be made appropriate and holistic.

Module 5: Implication of the above Holistic Understanding of Harmony at all Levels of Existence.

PS-12: Choose any two current problem of different kind in the society and suggest how they can be solved on the basis of the natural acceptance of human values. Suggest the steps you will take in present conditions.

Expected Outcome:
The students are liable to present sustainable solutions to the problem in society and nature. They are also able to see that these solutions are practicable and draw road maps to achieve them.

PS-13:
1. Suggest ways in which you can use your knowledge of engineering / technology / management for universal human order from your family to world family.
2. Suggest one format of humanistic constitution at the level of nation from your side.

Expected Outcome:
The students are able to grasp the right utilization of their knowledge in their streams of technology / engineering / management to ensure mutually enriching and recyclable production systems.

PS-14: The course is going to be over now. Evaluate your state before and after the course in terms of-
- Thoughts
- Behavior
- Work and
- Realization

Do you have any plan to participate in the transition of the society after graduating from the institute? Write a brief note on it.

Expected Outcome:
The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for happy and prosperous society.
INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 10 marks.

Objective: The objective of the paper is to facilitate the student with applied working knowledge of computers. This is the first course of computing and does not assume any pre-requisite.

UNIT-I
Five Component Model of a Computer, System and Application software (introduction) storage devices, primary (RAM, ROM, PROM, EPROM, cache) Memory and secondary (magnetic tape, hard disk, Compact disks) memory, peripheral devices, printers.

UNIT-II
Operating Systems: DOS Internal, External commands, Windows (2000 and NT), Overview of architecture of Windows, tools and system utilities including registry, partitioning of hard disk, Overview of Linux architecture, File system, file and permissions, concept of user and group, installation of rpm and deb based packages.

UNIT-III
Basics of programming through flow chart, Networking Basics - Uses of a network and Common types of networks, Network topologies and protocols, Network media and hardware, Overview of Database Management System.

UNIT-IV
Libre / Open Office Writer: Editing and Reviewing, Drawing, Tables, Graphs, Templates
Libre / Open Office Calc: Worksheet Management, Formulas, Functions, Charts
Libre / Open Office Impress: designing powerful power-point presentation

Text:

References:
### INSTRUCTIONS TO PAPER SETTER:

**MAXIMUM MARKS:** 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Each unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

**Objective:** The objective of the paper is to facilitate the student with the basics of Applied Chemistry aspects that are required for his understanding of basic chemistry.

### UNIT I: FUELS
Definition, Classification & Calorific value of fuels (gross and net), Dulong’s formula (Numericals), Determination of calorific value of fuels using bomb’s calorimeter (Numericals), Determination of calorific value of fuels using Boy’s Gas Calorimeter (Numericals), Cracking – Thermal & catalytic cracking, Octane & Cetane numbers with their significance. High & Low temperature carbonization, Manufacture of coke (Otto – Hoffmann-oven) Proximate and ultimate analysis of Coal (Numericals) Combustion of fuels (Numericals).

[T1,T2][No. of hrs. 08]

### UNIT II: THE PHASE RULE & CATALYSIS
Definition of various terms, Gibb’s Phase rule & its derivation, Application of phase rule to One component system– The water system, Application of phase rule to Two component system- The Lead-Silver system (Pattinson’s process). Catalyst and its characteristics, Types of catalysts, Concept of promoters, inhibitors and poisons. Theories of catalysis: Intermediate compound formation theory, adsorption or contact theory. Application of catalysts for industrially important processes Enzyme catalysis: Characteristics, Kinetics & Mechanism of enzyme catalysed reaction (Michaelis-Menten equation), Acid-Base catalysis: Types, Kinetics & Mechanism, Catalysis by metals salts (Wilkinson’s Catalyst), Auto-catalysis, Heterogeneous catalysis (Langmuir-Hinshelwood mechanism).

[T1,T2][No. of hrs. 08]

### UNIT III: WATER

[T1,T2][No. of hrs. 08]

### UNIT IV: CORROSION & ITS CONTROL

[T1,T2][No. of hrs. 08]

**Text Books:**


**Reference Books:**


Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
APPLIED PHYSICS LAB – I

Paper Code: ETPH-151  P  C
Paper : Applied Physics Lab – I  2  1

LIST OF EXPERIMENTS

1. To determine the wavelength of sodium light by Newton’s Rings.
2. To determine the wavelength of sodium light by Fresnel’s biprism.
3. To determine the wavelength of sodium light using diffraction grating.
4. To determine the refractive index of a prism using spectrometer.
5. To determine the dispersive power of prism using spectrometer and mercury source.
6. To determine the specific rotation of cane sugar solution with the help of half shade polarimeter.
7. To find the wavelength of He-Ne laser using transmission diffraction grating.
8. To determine the numeral aperture (NA) of an optical fibre.
9. To plot a graph between the distance of the knife-edge from the center of the gravity and the time period of bar pendulum. From the graph, find
   (a) The acceleration due to gravity
   (b) The radius of gyration and the moment of inertia of the bar about an axis.
10. To determine the velocity of ultrasound waves using an ultrasonic spectrometer in a given liquid (Kerosene Oil).
11. To verify inverse square law.
12. To determine Planck’s constant.

Text Books:
[T1] C. L. Arora ‘B. Sc. Practical Physics’ S. Chand

Note: Any 8-10 experiments out of the list may be chosen. Proper error – analysis must be carried out with all the experiments.
ELECTRICAL TECHNOLOGY LAB

Paper Code: ETEE 153
Paper: Electrical Technology Lab

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<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

LIST OF EXPERIMENTS

1. To Design the circuit for a given load and selection of its various Components and instruments from the safety point of view
2. Study and applications of CRO for measurement of voltage, frequency and phase of signals.
3. Connection of lamp by
   (1) Single Switch Method
   (2) Two-way Switch Method
   OR
   Performance comparison of of fluorescent Tube & CFL Lamp.
4. To Verify Thevenin’s & Norton’s Theorem
   OR
   To Verify Superposition & Reciprocity Theorem.
   OR
   To Verify Maximum Power Transfer Theorem.
5. To Measure Power & Power Factor in a Single-Phase A.C Circuit using Three Ammeters or three Voltmeters.
7. To study of Resonance in a series R-L-C or Parallel R-L-C Circuits.
8. To perform open circuit and short circuit test on 1-phase transformer.
9. Starting, Reversing and speed control of DC shunt Motor
10. Starting, Reversing and speed control of 3-phase Induction Motor
11. To Study different types of Storage Batteries & its charging system.
12. To Study different types of earthing methods including earth leakage circuit breaker (GFCI)

Note:- Any 8-10 Experiments out of the list may be chosen.

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
WORKSHOP PRACTICE

Paper Code: ETME-155
Paper: Workshop Practice

LIST OF EXPERIMENTS

Sheet Metal Shop
1. To study the tools and machineries used in sheet metal shop.
2. To make a tray using sheet metal tools.
3. To make a Funnel using sheet metal tools.
4. To make a cylindrical mug in sheet metal shop.

Foundry Shop
5. To make a mould in Foundry Shop.

Carpentry Shop
6. To make a half lap T-joint in Carpentry Shop.
7. To make a half cross lap joint in Carpentry Shop.
8. To make a pattern using Carpentry Tools.

Welding Shop
9. To study arc and gas welding equipments and tools.
10. To make Lap Joint, T-Joint and Butt Joint in Welding shop.

Fitting Shop
11. To make V-Section and T-Slot in fitting shop.

Machine Shop
12. To study basic operations on lathe, shaper, milling, drilling and grinding machines.
13. To perform step turning, knurling and threading operations on lathe.
14. To prepare a simple job on shaper.

Note: Any 8-10 Experiments out of the list may be chosen.
LIST OF EXPERIMENTS

UNIT - I
General: Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic Projection, B.I.S. Specifications,

Projections of Point and Lines: Introduction of planes of projection, Reference and auxiliary planes, projections of points and lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines. (T₁, T₂, R₁, R₂, R₃)

Unit - II
Planes other than the Reference Planes: Introduction of other planes (perpendicular and oblique), their traces, inclinations etc., Projections of points and lines lying in the planes, conversion of oblique plane into auxiliary Plane and solution of related problems.

Projections of Plane Figures: Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection. (T₁, T₂, R₁, R₂, R₃)

UNIT - III
Projection of Solids: Simple cases when solid are placed in different positions, Axis faces and lines lying in the faces of the solid making given angles. (T₁, T₂, R₁, R₂, R₃)

UNIT - IV
Isometric Projection of plain surface and bodies. (T₁, T₂, R₁, R₂, R₃)

Text Books:
[T2] Engineering Drawing by S.C.Sharma & Navin Kumar (Galgotia Publications)

Reference Books:
[R2] Engineering Drawing by P.S.Gill (S.K. Kataria & Sons)

Note:- Any 8-10 Experiments out of the list may be chosen.
LIST OF EXPERIMENTS

For program development an IDE e.g. CodeBlock\(^{(a)}\), Eclipse CDT\(^{(b)}\), Netbeans\(^{(c)}\) is recommended

1. Dismantling a PC Part -1
2. Dismantling a PC Part -2
3. Internal and External commands of DOS
4. System utilities of windows including regedit
5. Installation of any rpm or debian/linux distribution with emphasis on drive partitioning
6. Installation of rpm and deb based packages
7. Understanding of File system of Linux
8. Creating user and group (through CLI)
9. Understanding and working knowledge of Libre/Open Office Writer
   - Editing and Reviewing, Drawing, Tables, Graphs, Templates
10. Understanding and working knowledge of Libre/Open Office Calc
11. Understanding and working knowledge Libre/Open Office Impress
12. Understanding of flow chart development through Dia *
13. Two Mini Projects based on the skills learned in experiments 1-12
   * [Dia] http://projects.gnome.org/dia/

Note:- Any 8-10 Experiments out of the list may be chosen.
APPLIED CHEMISTRY LAB

Paper Code –ETCH-161                      P    C
Paper : Applied Chemistry Lab            2    1

LIST OF EXPERIMENTS

1. Determination of alkalinity of water sample.
2. Determination of hardness of water sample by EDTA method.
3. Determine the percentage composition of sodium hydroxide in the given mixture of sodium hydroxide and sodium chloride.
4. Determine the amount of oxalic acid and Sulphuric acid in one litre of solution, given standard sodium hydroxide and Potassium Permanganate.
5. Determine the amount of copper in the copper ore solution, provided hypo-solution (Iodometric Titration).
6. Determine the amount of chloride ions present in water using silver nitrate (Mohr’s Precipitation Method).
7. Determine the strength of MgSO₄ solution by Complexometric titration.
8. Determine the surface tension of a liquid using drop number method.
9. Determine the viscosity of a given liquid (density to be determined).
10. Determine the cell constant of conductivity cell and titration of strong acid/strong base conductometrically.
11. To determine (a) λ max of the solution of KMnO₄ (b) Verify Beer’s law and find out the concentration of unknown solution by spectrophotometer.
12. Determination of the concentration of iron in water sample by using spectrophotometer.
13. Determination of the concentration of Iron (III) by complexometric titration.
15. Determination of eutectic point and congruent melting point for a two component system by method of cooling curve.

(At least 8 to 10 experiments are to be performed)

Suggested Books:


Note:- Any 8-10 Experiments out of the list may be chosen.
APPLIED MATHEMATICS-II

Paper Code : ETMA-102
Paper: APPLIED MATHEMATICS-II

L T C
3 1 4

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: The objective of the paper is to facilitate the student with the basics of Applied Mathematics that are required for an engineering student.

Unit –I

Unit II

Unit-III

Unit-IV

Text:
[T1]. E. kresyzig,” Advance Engineering Mathematics”, Wiley publications

References:
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
ELECTRONIC DEVICES

Paper Code: ETEC-106
Paper : Electronic Devices

<table>
<thead>
<tr>
<th>INSTRUCTIONS TO PAPER SETTERS:</th>
<th>MAXIMUM MARKS: 75</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. This is the first introductory course in Electronics Engineering to the students of all the branches of engineering during the first year.</td>
<td></td>
</tr>
<tr>
<td>2. Question No.1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions from each unit. It should be of 25 marks.</td>
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<td></td>
</tr>
</tbody>
</table>

Objective: Objective of the paper is to facilitate the student with the basics of electronic aspects that are required for his understanding and applications in their respective field of study. The pre-requisites are, to have a basic understanding of Applied Physics and Mathematics.

Unit-I

Unit – II

Unit – III
Bipolar junction transistor: Introduction of transistor, construction, transistor operations, BJT characteristics, load line, operating point, leakage currents, saturation and cut off mode of operations. Eber-moll’s model.

Unit – IV
Application of BJT: CB, CE, CC configurations, hybrid model for transistor at low frequencies, Introduction to FETs and MOSFETs.

Fundamentals of digital electronics: Digital and analog signals, number systems, Boolean algebra, logic gates with simple applications, logic gates, karnaugh maps.

Text Books

Reference Books

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Text Books

Reference Books
INTRODUCTION TO PROGRAMMING

Paper Code: ETCS-108  
L  T  C  
Paper: Introduction to Programming  
3  0  3

INSTRUCTIONS TO PAPER SETTERS: 

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Objective: The objective of the paper is to facilitate the student with the basics of programming aspects, using C as the primary language. This course focuses on the programming constructs which are used in other languages as well. This is the first course on programming and does not assume any prerequisite.

UNIT I
Concept of algorithms, Flow Charts, Overview of the compiler (preferably GCC), Assembler, linker and loader, Structure of a simple Hello World Program in C, Overview of compilation and execution process in an IDE (preferably Code Block)

[Text: T1], [Text: T2], [Text: R4],[Text: R5][No. of hrs 8]

UNIT II
Programming using C: Preprocessor Directive, C primitive input output using get char and put char, simple I/O Function calls from library, data type in C including enumeration, arithmetic, relational and logical operations, conditional execution using if, else, switch and break. Concept of loops, for, while and do-while, Storage Classes: Auto, Register, Static andExtern

[Text: T1], [Text: T2], [Text: R7][No. of hrs 8]

UNIT III
Arrays (one and two dimensional), 2-d arrays used in matrix computation. Concept of Sub-programming, functions. Parameter transmission schemes i.e., call by value and call by reference, Pointers, relationship between array and pointer, Argument passing using pointers, Array of pointer, passing arrays as arguments

[Text: T2], [Text: R1], [Text: R7][No. of hrs 8]

UNIT IV
Structure and unions, Strings and C string library, File Handling in C Using File Pointers, fopen(), fclose(), Input and Output using file pointers, Character Input and Output with Files, String Input / Output Functions, Formatted Input / Output Functions, Block Input / Output Functions, Sequential Vs Random Access Files, Positioning the File Pointer

[Text: T1], [Text: T2],[Text: R2][Text: R7][No. of hrs 8]

Text Books:

Reference Books:
ENGINEERING MECHANICS

Paper Code: ETME 110
Paper: Engineering Mechanics

<table>
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<td>2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.</td>
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OBJECTIVE: THE OBJECTIVE OF THE PAPER IS TO GIVE THE BASIC PRINCIPLES OF MECHANICS APPLIED IN DIFFERENT DISCIPLINES OF ENGINEERING.

UNIT- I

**Force system:** Free body diagram, Parallel force system, concurrent force system, Equilibrium equations and applications in different force systems.

**Friction:** Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction. Belt drive- derivation of equation \( T_1/T_2 = \mu \theta \) and its application, M.A, V.R and Efficiency of Screw Jack, Application of friction in pivot and collar bearing.

[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]

UNIT- II

**Structure:** Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section, graphical method.

**Distributed Force:** Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia.

[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]

Unit-III

**Kinematics of Particles:** Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.

**Kinetics of Particles:** Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum, conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.

[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]

UNIT- IV

**Kinematics of Rigid Bodies:** Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, instantaneous center of velocity, Velocity polygons for four bar mechanism and single slider mechanism.

**Kinetics of Rigid Bodies:** Equation of motion, transatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy. Shear force and bending Moment Diagram.

[T1, T2, R1, R2, R4, R5][No. of Hrs. 08]

Text Books:

Reference Books:
COMMUNICATION SKILLS

Paper Code: ETHS – 112
Paper: Communication Skills
L  T  C  2  1  3

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective
or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit
should have two questions. However, student may be asked to attempt only 1 question from each unit. Each
question should be of 12.5 marks.

Objective: To enhance the language and communication competence of professional students with emphasis on
English for Specific Purposes (ESP) through communication skills related activities.

UNIT-I
I. Basic Remedial Grammar (Errors in Parts of Speech, Tenses, Verbs and Modal; Reported Speech; Active
and Passive Voice; Conditional clauses; Question Tags and Short Responses) [T1],[R2],[R3][No. of hrs 06]

UNIT-II
II. Vocabulary and usage (Synonyms and Antonyms; Suffixes and Prefixes; Homophones and Homonyms;
One-word substitution; Prepositions; Phrasal verbs and Idioms, Indianism) [T1],[R2],[R3][No. of hrs 06]

UNIT-III
(A)
I. Types of writing (Expository, Descriptive, Narrative, Analytical and Argumentative)
II. Definition, description and explanation of scientific objects, instruments and processes etc.
III. Interpretation and use of charts, graphs and tables in technical writing.[T1],[R1]

(B)
I. Paragraph writing
II. Precis writing
III. Comprehension [T1],[R2],[R3] [No. of hrs 10]

UNIT-IV
I. Reading different types of texts (speed and purpose)[T1]
II. Reading five essays [T2]
III. E.M. FORSTER, What I Believe (Pg-123)
IV. JAMES BRYCE, Some Hints on Public Speaking (Pg-135)
V. L.A. HILL, Principles of Good Writing (Pg-150)
VI. A.P.J. ABDUL KALAM, Work Brings Solace (Pg-207)
VII. SALIM ALI, Man and Nature in India: The Ecological Balance (Pg-213) [No. of hrs 10]

TEXT BOOKS
[T1] Technical Communication: Principles and practice (OUP), (Meenakshi Raman and Sangeeta Sharma)
OXFORD UNIVERSITY PRESS
[T3] Wren and Martin: High School English Grammar and Composition; S. Chand
[T4] Exploration of Ideas; An Anthology of Prose; Orient Blackswan

REFERENCE BOOKS:
[R1] Professional Communication: Aruna Koneru, MCGRAW HILLS EDUCATION PVT. LTD
[R2] Wren and Martin: High School English Grammar and Composition; S. Chand
[R3] Advanced English Grammar and Composition: Gurudas Mukherjee & Inidbar Mukherjee; (ANE
BOOKS PVT. LTD.)

Modifed Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f.
2015-16, approved in the 23th BOS and 40th AC meeting of USET.
ENVIRONMENTAL STUDIES

Paper Code: ETEN-114  

Paper: Environmental Studies  

INSTRUCTIONS TO PAPER SETTER:  

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Each unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question will carry 25 marks.

MAXIMUM MARKS: 75

Objective: The objective of this course is to make students environment conscious. They will be exposed through the fundamental concepts of environment and ecosystem so that they can appreciate the importance of individual and collective efforts to preserve and protect our environment. This course must raise various questions in student’s mind that how our environment is inter-dependent on various factors and how human being must care for their natural surroundings.

UNIT I: Environmental Studies: Ecosystems, Bio-diversity and its Conservation

(i) The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance of Environmental Studies. Biotic and a biotic component of environment, need for environmental awareness.

(ii) Ecosystems: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structures and function of the following ecosystem:
(a) Forest ecosystem
(b) Grassland ecosystem
(c) Desert ecosystem
(d) Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries).

(iii) Bio-diversity and its Conservation: Introduction to biodiversity — definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: Consumptive use, productive use, social, ethical, aesthetic and option values, Biodiversity at global, national and local levels, India as a mega-diversity nation, Hot-spots of biodiversity, Threats to biodiversity: Habitat loss, Poaching of wildlife, man-wildlife conflicts, rare endangered and threatened species (RET) endemic species of India, method of biodiversity conservation: In-situ and ex-situ conservation.

[T1], [R3][No. of hrs. 08]

UNIT II: Natural Resources: problems and prospects

(i) Renewable and Non-renewable Natural Resources: Concept and definition of Natural Resources and need for their management

- Forest resources: Use and over-exploitation, deforestation, case studies, timber extraction, mining, dams and their effects on forests and tribal people.
- Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems, Water conservation, rain water harvesting, watershed management.
- Mineral resources: Uses are exploitation, environmental effects of extracting and using mineral resources, case studies.
- Food resources: World food problems, changes causes by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Urban problems related to energy, case studies.
- Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

[T1], [R3][No. of hrs. 08]
UNIT III: Environmental Chemistry and Pollution Control

(i) Chemistry of Environment

(a) Green Technology
Principles of Green technology, Zero Waste Technology, Green Chemistry & Its basic principles, Atom Economy, Green Methodologies, clean development mechanisms (CDM), concept of environmental impact assessment,

(b) Eco-Friendly polymers
Environmental degradation of polymers, Biodegradable, Photo-biodegradable polymers, Hydrolysis & Hydrobiodegradable, Biopolymers & Bioplastics: polyactic acid, polyhydroxybutyrate, polycaprolactone, Concept of bioremediation.

(ii) Environmental Pollution
Definition, types, causes, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g) Nuclear hazards. Pollution case studies. Solid waste and its management: causes, effects and control measures of urban and industrial waste.

Chemical Toxicology Terms related to toxicity, impact of chemicals (Hg, As, Cd, Cr, Pb) on environment.

[T1], [R3][No. of hrs. 08]

UNIT IV: Disaster Management, Social Issues, Human Population and the Environment

(i) Disaster Management
Disaster management: floods, earthquake, cyclone and land-slides, nuclear accidents and holocaust, case studies.

(ii) Social Issues, Human Population and the Environment


[T1][No. of hrs. 08]

Text Books:

References Books:
APPLIED PHYSICS LAB – II

Paper Code: ETPH-152
Paper: Applied Physics Lab – II

LIST OF EXPERIMENTS

1. To determine the e/m ratio of an electron by J.J. Thomson method.
2. To measure the frequency of a sine-wave voltage obtained from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave signals from two signal generators.
3. To determine the frequency of A.C. mains by using Sonometer.
4. To determine the frequency of electrically maintained tuning fork by Melde’s method.
6. To study the charging and discharging of a capacitor and to find out the time constant.
7. To study the Hall effect.
8. To verify Stefan’s law.
9. To determine the energy band gap of a semiconductor by four probe method/or by measuring the variation of reverse saturation current with temperature.
10. To study the I-V characteristics of Zener diode.
11. To find the thermal conductivity of a poor conductor by Lee’s disk method.
12. To study the thermo emf using thermocouple and resistance using Pt. Resistance thermometer.

Suggested Books:

Note: Any 8-10 experiments out of the list may be chosen. Proper error – analysis must be carried out with all the experiments.
Electronic Devices

Paper Code: ETEC-156
Paper: Electronic Devices Lab

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LIST OF EXPERIMENTS

1. Introduction to C.R.O, Function Generator & Bread Board Kit & to generate different types of waveform with the help of Function Generator & to calculate their frequency, amplitude AC & DC voltage.
2. Identification & testing of Active & passive components
3. To plot V-I characteristics of a semiconductor diode & Calculate Static & Dynamic Resistance
4. To Study the Reverse characteristics of Zener diode
5. To Study the Rectifier circuit.
   a) Half Wave Rectifier
   b) Centre Tapped Rectifier.
   c) Bridge Rectifier.
6. To Study the output waveforms of different Filter Ckts of Rectifier.
7. To Plot Input & Output characteristics CB transistor.
8. To Plot Input & Output characteristics of CE transistor.
9. Realization of basic gates.
10. Implementation of Boolean functions (two or three variables).
11. Few experiments mentioned above to be performed on P-spice.
12. To develop a working model of any electronic circuit.

Note:- Any 8-10 Experiments out of the list may be chosen.
**ENGINEERING MECHANICS LAB**

**Paper Code:** ETME-158  
**Paper:** Engineering Mechanics Lab  

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**LIST OF EXPERIMENTS:**

1. To verify the law of Force Polygon  
2. To verify the law of Moments using Parallel Force apparatus, (simply supported type)  
3. To determine the co-efficient of friction between wood and various surface (like Leather, Wood, Aluminum) on an inclined plane.  
4. To find the forces in the members of Jib Crane.  
5. To determine the mechanical advantage, Velocity ratio and efficiency of a screw jack.  
6. To determine the mechanical advantage, Velocity ratio and Mechanical efficiency of the Wheel and Axle.  
7. To determine the MA, VR, η of Worm Wheel (2-start)  
8. Verification of force transmitted by members of given truss.  
9. To verify the law of moments using Bell crank lever  
10. To find CG and moment of Inertia of an irregular body using Computation method.

**Note:** Any 8-10 Experiments out of the list may be chosen.
PROGRAMMING LAB

Paper Code : ETCS 154  
Paper : Programming Lab

LIST OF EXPERIMENTS

For program development an IDE e.g. CodeBlock[a], Eclipse CDT [b], Netbeans[c] is recommended

1. Write a program to find divisor or factorial of a given number.
2. Write a program to find sum of a geometric series
3. Write a recursive program for tower of Hanoi problem
4. Write a recursive program to print the first n Fibonacci number
5. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
   Addition of two matrices
   Finding upper and lower triangular matrices
   Transpose of a matrix
6. Write a program to copy one file to other, use command line arguments.
7. An array of record contains information of managers and workers of a company.
   Print all the data of managers and workers in separate files.
8. Write a program to perform the following operators on Strings without using String functions
   To find the Length of String.
   To concatenate two strings.
   To find Reverse of a string.
9. Write a Program to store records of an student in student file. The data must be stored using Binary File.Read the record stored in “Student.txt” file in Binary code.Edit the record stored in Binary File.Append a record in the Student file.
10. Write a programmed to count the no of Lowercase, Uppercase numbers and special characters presents in the contents of File.
11. Two Mini Projects based on the skills learned in experiments 1-10 [ These mini projects may be done in a group not exceeding group size of 4 ]
[a] http://www.codeblocks.org/
[c] https://netbeans.org/features/cpp/
Note:- Any 8-10 Experiments out of the list may be chosen.
ENVIRONMENTAL STUDIES LAB

Paper Code –ETEN-160  
Paper : Environmental Studies Lab  

LIST OF EXPERIMENTS

1. Determination of pH, conductivity and turbidity in drinking water sample.
2. Determination of pH and conductivity of soil/sludge samples.
3. Determination of moisture content of soil sample.
4. Determination of Total Dissolved Solids (TDS) of water sample.
5. Determination of dissolved oxygen (DO) in the water sample.
6. Determination of Biological oxygen demand (BOD) in the water sample.
7. Determination of Chemical oxygen demand (COD) in the water sample.
8. Determination of Residual Chlorine in the water sample.
10. Determination of carbon dioxide in the water sample.
11. Determination of nitrate ions or sulphate ions in water using spectrophotometer.
13. Base catalyzed aldol condensation by Green Methodology.
15. To determine the concentration of particulate matter in the ambient air using High Volume Sampler.

P.S.: For better understanding of various aspects of environment visits to local areas, depending upon easy access and importance may be planned to any nearby river, forest, grassland, hills and students should write a report based on their observations.

Suggested Books:
2. dst.gov.in/green-chem.pdf (monograph of green chemistry laboratory experiments).

Note:- Any 8-10 Experiments out of the list may be chosen.
NUMERICAL ANALYSIS AND STATISTICAL TECHNIQUES

Paper Code: ETMA-203

Paper: Numerical Analysis and Statistical Techniques

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Maximum Marks: 75

Objective: To develop numerical ability and to impart knowledge in Statistical methods and Probability theory and their applications in Engineering to enable them to apply that for solving real world problems.

UNIT I
Probability Theory: conditional probability, Baye’s theorem, Random variable: discrete probability distribution, continuous probability distribution, expectation, moments, moment generating function, skewness, kurtosis, binomial distribution, Poisson distribution, normal distribution, Curve Fitting: Principle of least square Method of least square and curve fitting for linear and parabolic curve.

UNIT II
Correlation Coefficient, Rank correlation, line of regressions and properties of regression coefficients, ANOVA, Sampling distribution: Testing of hypothesis, level of significance, sampling distribution of mean and variance, Chi-square distribution, Student’s T- distribution, F- distribution, Fisher’s Z- distribution.

UNIT III

UNIT IV:

Text Books:

Reference Books:
[R5] Schaum’s Outline on Fourier Analysis with Applications to Boundary Value Problem, TMH
STRENGTH OF MATERIAL

Paper Code: ETCE-203
Paper: Strength of Material

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To develop knowledge of mechanics and to have in-depth understanding of material responses to load.

UNIT I
Simple stresses and strains: Definition, types of stresses and strains; Hooke’s law, Modulus of elasticity, various elastic constants and their relationship, stress strain curve for ductile materials, deformation of bars under axial loads, temperature stresses, bars of varying cross sections and composite sections, Poisson’s ratio, volumetric strain, Strain rosette.
Analysis of plane stress and plane strain: General case of plane stress, Principle stresses due to combined bending and torsion, Analysis of strain, Mohr’s circle for 2 dimensional stresses and strain, and Elementary concepts of theories of failure.

UNIT II
Shear force and bending moment: Different types of beams and loads, shear force and bending moment diagrams for cantilever and simply supported beams with and without overhangs subjected to different kinds of loads, relation between loading, shear force and bending moments.
Bending and shear stresses in beams: Theory of simple bending, moment of resistance, modulus of section, calculation of bending stresses in beams for different loads and different types of structural sections. Shear stress and its distribution on different types of cross sections of beams.

UNIT III
Combined direct and bending stresses: Middle third rule, core of a section, stresses due to wind, water and earth pressure in structures like retaining walls, dams, chimneys, walls etc.
Slope and deflection of beams: Relation between slope, deflection and radius of curvature, deflection and slope of statically determinate beams; moment area method, double integration method, conjugate beam method, dummy load method, Maxwell’s law of reciprocal deflection, Betti’s law and Castigliano’s theorem and their applications.

UNIT IV
Torsion: Torsion of hollow and solid circular shafts, torsion equation, torsional rigidity, modulus of rupture, power transmission by shafts, importance of angle of twist and various stresses in a shaft, comparison of solid and hollow shafts, torsional resilience.
Columns and struts: Columns and struts of uniform section, crippling/buckling load, Euler theory and concept of equivalent length, Rankine’s formula and other empirical formulae, Secant formula.

Text Books:

References:
[R2] Solid Mechanics, S.M.A Kazmi
[R3] Structures, Schodek, Pearson Education

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
FLUID MECHANICS

Paper code: ETCE-205
Paper: Fluid Mechanics

INSTRUCTIONS TO PAPER SETTERS:

Objective: To develop knowledge of properties, movement and behavior of fluid (water) under various flowing conditions. At the end of the course, students will have in-depth knowledge of fluid mechanics, measurement of fluid flow.

UNIT I
Introduction: Fluid properties, Ideal and real fluids, Concept of viscosity, surface tension and compressibility; thermodynamic (isothermal, isobaric and adiabatic) properties.
Fluid Statics: Fluid pressure and its measurement, types of manometers, Total pressure and centre of pressure, Evaluation of pressure force on dams, lock gates, curved surfaces, pressure distribution in liquid subjected to constant horizontal/vertical acceleration, principles of equilibrium, buoyancy, centre of buoyancy, meta centre, stability conditions of floating and submerged bodies, Experimental and analytical method of determination of meta-centric height.

UNIT II
Fluid Kinematics: Variation of flow parameters in space and time, Lagrangian and Eulerian concepts in fluid motion, Types of fluid flow: steady and unsteady, uniform and non uniform, rotational and irrotational, Laminar and turbulent, one, two and three dimensional flow, streamline, pathline and streakline, Continuity equation in Cartesian and polar co-ordinates and its applications, Velocity potential and stream function, Cauchy-Riemann equation, flownet.
Types of motion: Linear translation, linear deformation, Angular deformation, Rotation, Vorticity, Free and forced vortex flow.

UNIT III
Fluid Dynamics: Reynolds’s, Navier-Stokes and Euler’s equations of motion, Derivation of Bernoulli’s equation from Euler’s equation and its limitations, Applications of Bernoulli’s equations-Orifice, Venturimeter, Mouth piece, Weir and notch, Pito’s tube, Siphon, etc; hydraulic gradient and total energy lines and their Engineering significance. Momentum equation, Moment of momentum equation- Assumptions and limitations, applications, impact of jets and forces in bends.

UNIT IV
Dimensional and Model Analysis: Dimensional homogeneity, methods of dimensional analysis, Buckingham’s π theorem, selection of Repeating variables, Forces acting on moving fluid, Dimensionless numbers and their Engineering significance, Model analysis, Geometric, Kinematic and Dynamic similarity, Model testing of partially submerged bodies, scale ratios for distorted models.

Text Books:

References:

Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.
Objective: In this course, students will learn about different types of materials that are used in the construction industry to create buildings and structures.

UNIT I
Building Materials: Properties and uses of common types of stones, bricks, tiles and hollow building blocks, Pozzolonic Material, Cement, lime and mortar, Properties, types and applications of other building materials like timber, protective coverings [Paints and varnishes], rubber, bitumen, tar and asphalt, glass, plastics and polymers, refractory materials etc.
Plastering, Pointing, Painting, distempering, white washing, damp proofing, ventilation and air conditioning, Concept of thermal insulation, sound insulation, fire protection.

[UNIT I] No. of Hrs. 10

UNIT II
Concrete: Cement, Sand, aggregates and water, Batching of concrete by weight and volume, Batching plant and equipment, workability, mix proportions and grades of concrete, types of mixers, transportation, pumping, placing and compacting of concrete. Admixtures, Formwork for RCC structures, Ready mix concrete, Pre-cast concrete.

[UNIT II] No. of Hrs. 12

UNIT III
Building construction: Components of building, shallow and deep foundations, Stone and brick masonry, type of bonds, load bearing walls, cavity wall, partition walls, finishing/coating materials for Roofs/floors/walls, construction and expansion joints, Introduction to Green building and LEED Classifications.

[UNIT III] No. of Hrs. 12

UNIT IV
Stairs, lintels, trusses, arches, domes, doors and windows: Introduction, classification, types, material of construction.
Special Materials and Systems: Smart materials and structures, geosynthetics, nano-materials and bio-materials, Fire resistant materials, Sound Insulation.

[UNIT IV] No. of Hrs. 10

Text Books:

References Books:
[R2] Building construction, P.C.Varghese, PHI Publications
[R4] Building Materials, Duggal, New Age Publication
Objective: The successful completion of the course will enable the students to understand angle and distance measurement; differential, profile, cross-section, and topographic leveling procedures using conventional equipments and use of GPS and DGPS and apply them to field conditions.

UNIT I

Compass Survey: Use and adjustment of prismatic and surveyor’s compass, Methods of surveying with a compass, Magnetic declination, local attraction, Errors in prismatic survey, plotting of compass survey, distribution of closing error.

Leveling: Definition and working principles of a leveling instrument and its various parts with reference to the bubble tube and the telescope, Use and adjustment of dumpy and tilting levels, Establishment of Bench Marks by leveling, Longitudinal leveling, Cross section leveling, fly leveling and reciprocal leveling, Methods of booking and reduction of levels, Errors in leveling, Curvature and refraction correction, Advanced leveling instruments.

UNIT II

Contouring: Definition of contours, contour interval, characteristics of contours, Direct and indirect methods of contouring, uses of contours, Estimation of volumes of the earthwork by means of contour lines and section, Grade contours, Topographic maps.

UNIT III
Tacheometric Surveying: Stadia system, Fixed and movable hair methods, staff held vertical and normal, Instrument constants, Analytic lens, Tangential system, direct reading tachometer, subtense bar.

Plane Table Survey: Instruments employed in plane table survey, Use and adjustment of these instruments including simple alidade. Working operations like fixing, leveling, centering and orientation, Methods of orientation, various methods of plane table survey. Three point and two point problems. Errors in plane table survey, Contouring using clinometer, Advantages and disadvantages of plane tabling.

UNIT IV
Triangulation: Principal, selection of base line and stations, order of triangulation, triangulation figures, scaffold and signals, marking of stations, Intervisibility and heights of stations, satellite stations, base line measurement and corrections, Introduction to adjustment of observations.

Curves: Types of curves, Elements of a curve, Simple curves, different methods of setting out, Introduction to compound, reverse, transition and vertical curves: Introduction to modern surveying Instruments /Techniques like Total station, GPS etc

Text Books:
[T1] Plane Surveying, A.M. Chandra., New Age International Publications
References:
[R2] Surveying, Arthur Bannister, Pearson Education
[R3] Surveying, Mimi Das Saikia, Madan Mohan Das, PHI Publications
ENGINEERING GEOLOGY

Paper Code: ETCE-211  
Paper: Engineering Geology  

INSTRUCTIONS TO PAPER SETTERS:  
Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives: To expose various geological formations and processes involved such as weathering, erosion etc. Further the concepts of structural geology and photogeology have been discussed for their relevance in the field of Civil Engg. This subject also includes causes, effects and measurement of earthquakes and seismic zoning map of India. The course aims at identifying appropriate sites for civil engineering projects such as Dams, Bridges, Tunnels etc., based on geological factors.

UNIT I
Introduction: Definition and scope of geology, its importance to Civil Engineers, Interior of earth, earth movement.
Rocks and minerals: Physical properties of minerals and their occurrence and uses, Classification and occurrence of rocks, Building and ornamental stones.
Geological processes: Weathering of rocks, agents of weathering, products of weathering, soil formation, soil profile, Erosion by running water, winds and glaciers.

UNIT II
Structural Geology: Stratification, Altitude of formation, dip, strike, apparent dip, Faults, folds, joints and their engineering importance.

UNIT III
Hydrogeology: Definition, source of ground water, ground water storage and circulation. Quality of ground water, hot water springs.
Introduction of Engineering Seismology: Earthquakes and its causes and effects, waves generated, basic terminology, Earthquakes and its measurements, Distribution of earthquakes in the World and in India, Seismic Zoning map of India.

UNIT IV
Photogeology: Aerial photographs, their importance in the field of civil engineering, stereoscope and its use.
Dams and Reservoirs: Geological investigations for dams and reservoirs. Examples of dam failures due to geological causes, Geological study for selecting site for dam and reservoir.
Bridges, highways and buildings: Geological investigations.
Tunnels through rocks: Definition. Purposes for tunneling. Geological background for selecting a site for a tunnel.
Landslides: Definition, causes and effects. Types of landslides. Preventive measures.

Text Books:

References Books:

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
NUMERICAL ANALYSIS AND STATISTICAL TECHNIQUES LAB

Paper Code: ETMA-253
Paper: Numerical Analysis and Statistical Techniques Lab

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List of experiments:
1. Solution of algebraic and transcendental equation.
2. Algebra of matrices: Addition, multiplication, transpose etc.
3. Inverse of a system of linear equations using Gauss-Jordan method.
7. Calculation of eigen values and eigen vectors of a matrix.
8. Plotting of Unit step function and square wave function.

It is expected that atleast 12 experiments be performed, including the above specified 8 experiments which are compulsory. The remaining experiments may be developed by faculty and students based on applications of Mathematics in Real Life problem.

Text Books:

Reference Books:
[R4] Byrom Gottfried, “Programming With C” Shaum’s Outline
FLUID MECHANICS LAB

Paper code: ETCE-253
Paper: Fluid Mechanics Lab

Course Outline:
Based on theory 8-10 experiments are to be performed. The list is provided below:

LIST OF EXPERIMENTS:

1. Determination of metacentric height
2. Calibration of a venturimeter
3. Determination of frictional losses in pipes of different diameters.
4. Determination of minor losses in pipes
5. Calibration of a V-notch and rectangular notch
6. Reynolds dye experiment for flow characterization
7. Determination of c_v, c_l and c_d of an orifice
8. Verification of Bernoulli’s theorem
9. Calibration of orifice meter
10. Verify the impulse momentum equation [impact of jet]

NOTE:- At least 8 Experiments out of the list must be done in the semester.
CIVIL ENGINEERING DRAWING USING CAD LAB

Paper Code: ETCE-255
Paper: Civil Engineering Drawing using CAD Lab

Course Outline:

Drawing work using CAD: Plan, elevation, section and views of residential buildings, different types of roofs, sanitary and water supply works, road works, culverts, bridges, wells, and irrigation works, etc.
SURVEYING LAB

Paper Code: ETCE-257  
Paper: Surveying Lab  

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Based on theory courses ETCE 209 (10-12 experiments)

1. Linear measurement using tape, chain and tacheometric methods.
2. Levelling using Autolevel
3. Plotting of the area using radiation, intersection and linear measurement.
4. Solution to three point problem using Plane table.
7. Preparation of close traverse of about 1km periphery using Total Station.
8. Adjustment of close traverse.
10. Use of DGPS for drawing a map of roads covering an area of about 5 sq. kms.
11. Traverse computation using appropriate softwares like Autoplotter.
12. Computation of missing side/angle of a polygon (triangle/quadrilateral) and error estimation.
13. Laying out of simple curve.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
GEOLOGY AND BUILDING MATERIAL LAB

Paper Code: ETCE-259
Paper: Geology and Building Material Lab

Based on theory 8-10 experiments are to be performed. The list is provided below:

ENGINEERING GEOLOGY

1. Study of Geological map and section of local area
2. Study the various properties of igneous rocks, sedimentary and metamorphic through rocks samples.
3. Study the various properties of different minerals and mineral ores through samples.
4. Study the various types of folds and faults.
5. Physical properties of minerals such as, hardness, colour, streak, etc.
6. Numerical Problems related to Dip and Strike
7. Study of different geological features through models
8. Field visit

BUILDING MATERIALS

1. Assessment of physical properties of bricks, such as, absorption, shape and size, structure, soundness, hardness, presence of soluble salts.
2. Hardness, impact and water absorption test etc for stones
3. Study on different types of bonds for bricks and stones
4. Study on defects in timber

NOTE: At least 8 Experiments out of the list must be done in the semester.
## WATER ENGINEERING

**Paper Code:** ETCE-202  
**Paper:** Water Engineering  
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### INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

### Objective:

To familiarize the students with the basics of water quality and its treatment methods, importance of planning, analysis and design of modern water supply schemes.

### UNIT I

**Demand of water:** Domestic, commercial and public requirements, Factors affecting demand fluctuations, Estimate of prospective population, fire demand requirements and other allowances.

**Sources of water:** Estimating the quantity of water from various sources, surface and underground sources, such as, impounded, perennial stream, shallow wells artesian wells, deep wells, infiltration galleries, intake works from different sources.

**Water quality:** Suspended solids, turbidity, colour, taste odour, temperature, Total dissolved solids, pH, acidity, alkalinity, hardness, nitrates, chlorides, fluorides, metals, organics, nutrients, and Pathogens.

**In-stream standards:** Potable water standards, waste water / effluent standards, standards for receiving wastes in natural streams / sewer / sea, Bio-monitoring of streams and lakes Groundwater quality, chemical/biological remediation of ground water.

[T1][No. of Hours: 12]

### UNIT II

**Water purification processes in natural system:** Water pollutants and their sources, Physical processes: Dilution, sedimentation and re-suspension, filtration, gas transfer, heat transfer, Chemical processes, metabolic processes, role of micro-organisms in natural water systems. Stream water quality changes due to waste disposal, Streeter-Phelps D.O. model, and water quality management of rivers having multiple discharges, lakes and estuaries.

[T2][No. of Hours: 11]

### UNIT III

**Analysis and Design [as per CPHEEO manual etc] of Engineered systems for water purification:** Water treatment process and design, economic construction in water works design, solids separation by aeration, settling operations, coagulation, softening, mixing and flocculation, sedimentation.

**Analysis and design of other system for water purification:** Filtration, disinfection, [Residual chlorine, chlorine demand and brake point chlorination] adsorption, membranes, Water plant waste management, Pump drive units and analysis of pumping systems.

[T2,T3][No. of Hours: 12]

### UNIT IV

**Distribution system:** Methods of distributing water, distribution reservoirs, stand pipes and water tanks, design of pumping mains, use of nomograms, appurtenances, distribution systems and their components, capacity and pressure requirements, design of distribution systems, hydraulic analysis of distribution systems.

[T1][No. of Hours: 10]

### Text Books:


### References:


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Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
STRUCTURAL ANALYSIS

Paper Code: ETCE-204
Paper: Structural Analysis

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INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: (i) To identify determinate, indeterminate, stable and unstable structures (ii) To analyze indeterminate trusses, beams and frames using method of consistent deformation, slope deflection method, moment distribution and Kani’s method (v) to construct influence lines and be able to use them.

UNIT I

Columns and Struts: Columns and struts of uniform section, crippling/buckling load, Euler theory and concept of equivalent length, Rankine’s formula and other empirical formulae, Secant formula. Combined direct and bending stresses: Middle third rule, core of a section, stresses due to wind, water and earth pressure in structures like retaining walls, dams, chimneys, walls etc.

Thin cylinders: Thin cylinders subjected to internal fluid pressure, wire wound thin cylinders. Thin cylindrical shells, circumferential and hoop stresses, longitudinal stresses, Maximum shear stress.

UNIT II

Moving loads and Influence lines: Introduction to moving loads, concept of equivalent UDL, absolute maximum bending moment and shear force, concept of influence lines, influence lines for reaction, shear force, bending and deflection of determinate beams, Influence line diagram [ILD] for forces in determinate frames and trusses, analysis for different types of moving loads, single concentrated load, several concentrated loads, uniformly distributed load shorter and longer than span, Application of Muller Breslau Principle for determinate structures.

UNIT III

Indeterminate Structures: Indeterminacy, choice of unknowns, Castigliano’s second theorem and its applications. Method of consistent deformation: Analysis of indeterminate beams and frames upto two degree of indeterminacy, settlement effects, analysis of pin jointed trusses, externally and internally redundant trusses, effects of settlement and prestrains.

Slope Deflection Method: analysis of continuous beams, analysis of rigid frames, frames with sloping legs, gabled frames, frames without sway and with sway, settlement effects.

UNIT IV

Moment distribution and Kani’s method: Analysis of beams and frames.

Approximate methods of analysis of multistory frames: Analysis of vertical load, substitute frames, loading condition for maximum positive and negative bending moment in beams and maximum bending moment in columns, analysis for lateral load, portal method, cantilever method and factor method.

Text Books:

References Books:
[R3] Schodek, “Structures”, Pearson Education

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
HYDRAULICS AND HYDRAULIC MACHINES

Paper Code: ETCE-206
Paper: Hydraulics and Hydraulic Machines

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Maximum Marks: 75

Objective: To get knowledge about characteristics of different flow types, flow through pipes, forces on submerged bodies and the working of hydraulic machinery. At the end of course the student will have the knowledge regarding various theories dealing with the flow phenomenon of fluid in pipes and understanding of basics of the hydro-machinery and the components function and use of different types of turbines and pumps.

UNIT I
Laminar Flow: Flow through circular pipe and parallel plates, Kinetic energy correction factor, Momentum correction factor; Loss of head due to friction; determination of coefficient of viscosity.
Boundary Layer: Concept and development of boundary layer, Laminar and turbulent boundary layers and their analysis, boundary layer thickness; Critical Reynolds number; Boundary layer separation and control.
Turbulent flow: Shear stress, velocity distribution in smooth and rough pipes, Resistance of smooth and rough pipes.

UNIT II
Forces on submerged bodies: Forces exerted by flowing fluid, Concept and expression for Drag and lift; Pressure drag and friction drag; Stream line and bluff body; Drag on sphere and cylinder, Terminal velocity of a body, Lift on a circular cylinder, Drag force acting on a rotating cylinder, Development of lift on Airfoil.
Flow through pipes: Loss of head / energy in pipes - Major losses-friction loss by Darcy Weisbach formula, Chezy’s formula; Types of minor losses; Hydraulic gradient and total energy line, Flow through siphon, Pipes in series, concept of Equivalent pipe, flow through parallel and branched pipes; Water hammer in pipes, sudden and gradual closure of valve; Analysis of Pipe network using Hardy Cross method; Use of EPANET software for pipe flow analysis.

UNIT III
Hydraulic machines: General layout of hydroelectric power plant, classification of hydraulic turbines, Pelton turbine and its main parts, Analysis and design of Pelton turbine for jet diameter, wheel diameter, width, depth and number of buckets; Hydraulic, mechanical and overall efficiencies of turbine, Introduction to other turbines like Francis and Kaplan turbines. Specific speed and its significance, characteristic curves of turbines.

UNIT IV
Centrifugal pumps: Main parts; Head, efficiencies and work done computations, minimum speed for starting a centrifugal pump, specific speed, centrifugal pump; Cavitations in turbines and centrifugal pumps and their effects and precautions, Computation for maximum suction lift.
Reciprocating pumps: Main parts of Reciprocating pump, discharge, work done and power required to drive a double acting pump, Velocity and acceleration in suction and delivery pipes, Indicator diagram and its utility, Air vessels.

Text Books:

Reference Books:

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
## ADVANCED SURVEYING

**Paper Code:** ETCE-208  
**Paper:** Advanced Surveying

### INSTRUCTIONS TO PAPER SETTERS:

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**Maximum Marks:** 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Objective:** In this course students will learn the advanced topics of surveying such as, trigonometric leveling, field astronomy, and photogrammetric survey.

### UNIT I

**Trigonometric leveling:** Observations for heights and distances Heights and distances, accessible and inaccessible base of the object, Geodetical observations. Terrestrial refraction, correction for refraction and curvature, eye and object correction, determination of difference of elevation by single and reciprocal observations.

**Survey Adjustments and Theory of Errors:** Types of errors, law of errors, law of weights, distribution of error and field measurements, Probability cures, method of lest squares, determination of most probable value by normal adjustment and method of correlates, most probable error. Triangulation adjustments: Adjustment of geodetic quadrilateral with and without central station.

[T1, T2, T3][No. of Hours: 10]

### UNIT II

**Setting out works:** Setting out of buildings, culverts, roads, pipelines, sewers, underground tunnels and centre line of dams, bridge survey, mine survey.

**Route surveying:** Reconnaissance, preliminary and location surveys for road, railway, canal and pipe alignments longitudinal and cross sections, computation of earthwork and mass haul curve.

Introduction to Hydrographic surveying: Shore line survey, soundings, tide and its characteristics, tide gauges, mean sea level as datum.

[T1, T2, T3][No. of Hours: 10]

### UNIT III

**Photogrammetric Survey:** Basic principles, elevation of a point, determination of focal length of lens, aerial camera, scale of a vertical photograph, relief displacement of a vertical photograph, height of object from relief displacement, scale of a tilted photograph, tilt distortion, relief displacement of a tilted photograph, combined effects of tilt and relief, flight planning for aerial photography, selection of altitude, interval between exposures, crab and drift, location of principal points, transfer image from photograph to map, stereoscope parallax, parallax in aerial stereoscopic views, parallax equations.

[T1, T2, T3][No. of Hours: 12]

### UNIT IV

**Field Astronomy:** Co-ordinate systems, latitude and longitude, spherical trigonometry, relation between degrees and hours of time, conversion of local time to standard time, conversion of mean time interval to sidereal time interval, to find local sidereal time (LST) at local mean midnight for given Greenwich sidereal time (GST) at Greenwich Mean midnight (GMN), determination of LST from LMT at any instant, determination of LMT of transit of a known star across the meridian for given GST of GMN, Local sidereal time of elongation of star, interpolation of values, instrumental and astronomical correction to observed altitude to the azimuth, observation for time by meridian transit of star and by meridian transit of Sun. Azimuth by observation on Polaris and ex-meridian observation on stars, determination of latitude, calculation of true altitude, declination, latitude, polar distance, determination of longitude.

[T1][No. of Hours: 12]

**Text Books:**

[T1] Surveying ,B.C. Purnimia-II/III, Laxmi Publication  
[T2] Higher Surveying,A.M. Chandra,New age Publication  
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

Reference Books:
[R1] Higher surveying. Norman Thomas,
[R3] Advanced Surveying: Total Station, GIS and Remote Sensing, Gopi, Pearson Education
[R5] Surveying, Bannister, Raymond and Baker, Pearson Education
SOIL MECHANICS

Paper Code: ETCE-210
Paper: Soil Mechanics

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INSTRUCTIONS TO PAPER SETTERS: Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To explain the methods of classifying the soils, to analyze the flow of water through soils, to estimate the stress distribution in the soil mass and compaction characteristics, compressibility characteristics, settlements and to assess the shear strength of the soils.

UNIT I
Soil formation, properties: Origin of soils, soil formation, geographical distribution of major soils in India, composition of soil, particle size and shapes, interparticle forces, soil minerals / structure and their effect on basic soil properties. Three phase diagram and relationships among void ratio, specific gravity, dry density, porosity, water content, unit weights and degree of saturation.

Laboratory and field identification of soil: Determination of water content, specific gravity and grain size distribution for coarse grained and fine grained soils, Atterberg limits and indices, visual identification by simple field test, field density by core cutter and sand, replacement methods.

Classification of soils: Necessity, principles, Indian and unified classification, plasticity charts.

UNIT II
Permeability and seepage: Concept of pore water pressure, Total, effective and neutral stresses. Darcy’s law, laboratory and field permeability tests, factors affecting permeability, surface tension and capillary phenomenon in soil, shrinkage and swelling of soil, seepage forces, Laplace equation and its significance, Flow potential, Flow nets and their properties, seepage through earth dams, exit gradient and uplift pressure, mechanics of piping, design of filters.

Stress distribution in soil: Stress at a point, Mohr’s circle, stresses due to force of gravity, Point, line and uniformly distributed loads, Influence charts, contact pressure distribution, Boussinesque’s and Westerguard’s equation for vertical pressure due to point loads and uniformly distributed loads.

UNIT III
Compaction of soils: Definition, consolidation and compaction, objectives, compactive effort, Laboratory compaction, Standard Proctor test, Modified Proctor test, IS compaction tests [light / heavy], Field compaction and equipment, Concept of optimum moisture content and zero air voids line, Factors influencing compaction, Effect of compaction on soil properties, Compaction specifications and field control.

Consolidation and settlement: Consolidation test and compressibility characteristics, Terzaghi’s theory of one dimensional consolidation, types of clay deposits, Normal/over/consolidated clays, determination of pre-consolidation pressure and its significance, time factor and coefficient of consolidation, fitting methods, settlement analysis, secondary compression, consolidation settlement and its rates, acceleration of consolidation by sand drains.

UNIT IV
Shear strength of soil: Stress strain curve, Mohr-coulomb failure criteria, Peak and residual shear strengths, Laboratory and field measurement of shear strength of soil, Direct, Triaxial and Unconfined compression tests, vane shear tests. Determination of shear strength parameters for different drainage and stress conditions, measurement of pore pressure, choice of test conditions, Shear strength of soils, Pore pressure coefficients, Sensitivity of cohesive soils, use of various types of shear parameters in design.

Text Books:
[T1] Basic And Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New age international Ltd
[T2] Soil Engineering, Alam singh,CBS Publication
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

Reference Books:
[R1] Soil Mechanics and Foundation Engg., Purushothama Raj, Pearson Education
[R2] Geotechnical Engg, Venkataramaiah, New Age International Publishers
[R5] Geotechnical engineering: principles and practices of soil mechanics and foundation engineering, by V. N. S. Murthy, Marcel Dekker
DESIGN OF CONCRETE STRUCTURE

Paper Code: ETCE-212
Paper: Design of Concrete Structure

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<td>III</td>
<td>Analysis and design of singly and doubly reinforced simply supported cantilever and continuous beams and flanged beam section, lintels, Design principles of retaining walls. Design of simply supported, cantilever slabs, one way and two way slabs.</td>
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<td>IV</td>
<td>Design of short and slender columns under axial load, under uniaxial and biaxial bending and shear force. Design of isolated footing for vertical load and Moment, Design of combined footings.</td>
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Text Books:


Reference Books:

| R5 | SanthaKumar A.R., “Concrete Technology”, Oxford Publications., New Delhi |

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To provide basic understanding of concrete making materials and their properties, mix design concepts and to make them understood various properties of the hardened concrete. The course also aims at designing of basic elements of structures such as beam, column, slab and foundation.
CEMENT AND CONCRETE TESTING LAB

Paper Code: ETCE-252
Paper: Cement and Concrete Testing Lab

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Note: Based on theory 8-10 experiments are to be performed. The list is provided below:

LIST OF EXPERIMENTS

1. To determine the quantity of water for cement paste for normal consistency
2. To determine initial and final setting time of cement
3. To determine the fineness, specific gravity and unit weight of cement
4. Determination of tensile and compressive strength of cement
5. To determine fineness modulus of fine and coarse aggregate
6. To determine compressive strength of nominal mix concrete of a given grade
7. To determine the modulus of rupture of concrete
8. Workability of concrete by various methods
9. To determine the split tensile strength of concrete of given mix proportion
10. To determine the percentage bulking of fine aggregate
11. To determine soundness of given cement by Le-Chatelier method
12. Effect of water cement ratio on strength of concrete
13. Concrete mix design

NOTE:- At least 8 Experiments out of the list must be done in the semester.
STRUCTURE LAB

Paper Code: ETCE-254  
Paper: Structure Lab

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Note: Based on theory 8-10 experiments are to be performed. The list is provided below:

LIST OF EXPERIMENTS

1. To find the value of flexible stiffness EI for a given beam and comparison with theoretical value
2. To verify the moment area theorem
3. To study the behavior of different types of columns
4. To verify the Clark’s Maxwell reciprocal theorem
5. To determine the horizontal thrust in a three hinged arch and verify it
6. To determine the elastic displacement of curved members and verify it
7. To obtain the influence line diagram for horizontal thrust in a three hinged arch and verify it
8. To find the value of torsional constant and compare it with theoretical value

NOTE:- At least 8 Experiments out of the list must be done in the semester.
HYDRAULICS LAB

Paper Code: ETCE-256
Paper: Hydraulics Lab

Note: Based on theory 8-10 experiments are to be performed. The list is provided below:

LIST OF EXPERIMENTS

1. To study and compare the losses due to flow in smooth and rough pipes
2. To draw the performance characteristics of variable speed centrifugal pump
3. To draw the performance characteristics of single stage reciprocating pump
4. To determine operating characteristics of pelton wheel turbine
5. To determine operating characteristics of Francis turbine
6. To determine operating characteristics of Kaplan turbine
7. To determine the coefficient of impact for different types of vanes
8. Reynolds dye experiment for flow characterization
9. Model studies
10. Pipe analysis using EPANET software

NOTE:- At least 8 Experiments out of the list must be done in the semester.
ADVANCED SURVEYING LAB

Paper Code: ETCE-258
Paper: Advanced Surveying Lab

Based on theory course ETCE 208, 8-10 experiments are to be performed.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
Objective: The objective is to assess and enhance the presenting capability of the students. Also to impart training to a student to face audience and present his ideas and thus creating in him self esteem and courage that are essential for an engineer. Individual students are required to choose a topic of their interest from the syllabus of second year (i.e. 3rd and 4th semester) and give a seminar on at least two topics for about 10 minutes. Seminar will be liberally attended by faculty present in college in conference hall and award marks to the students based on presentation (50% weightage) and Interjections by the candidates will be observed in assessment (50% weightage). Each student shall submit copy of a write up of the seminar topic.
COMMUNICATION SKILLS FOR PROFESSIONALS

Paper Code: ETHS–301
Paper: Communication Skills for Professionals

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

MAXIMUM MARKS: 75

Objective: To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision. This course will also equip them with the basic skills required for a variety of practical applications of communication such as applying for a job, writing reports and proposals. Further, it will make them aware of the new developments in communication that have become part of business organisations today.

UNIT I
Organizational Communication: Meaning, importance and function of communication, Process of communication, Communication Cycle - message, sender, encoding, channel, receiver, decoding, feedback, Characteristics, Media and Types of communication, Formal and informal channels of communication, 7 C's of communication, Barriers to communication, Ethics of communication (plagiarism, language sensitivity)


UNIT II
Introduction to Phonetics: IPA system (as in Oxford Advanced Learner’s Dictionary), Speech Mechanism, The Description of Speech Sounds, Phoneme, Diphthong, Syllable, Stress, Intonation, Prosodic Features; Pronunciation; Phonetic Transcription - Conversion of words to phonetic symbols and from phonetic symbols to words. British and American English (basic difference in vocabulary, spelling, pronunciation, structure)

Non-Verbal Language: Importance, characteristics, types – Paralanguage (voice, tone, volume, speed, pitch, effective pause), Body Language (posture, gesture, eye contact, facial expressions), Proxemics, Chronemics, Appearance, Symbols.

UNIT III
Letters at the Workplace – letter writing (hard copy and soft copy): request, sales, enquiry, order, complaint.
Job Application -- resume and cover letter
Meeting Documentation-- notice, memo, circular, agenda and minutes of meeting.

UNIT IV
Listening and Speaking Skills: Importance, purpose and types of listening, process of listening, difference between hearing and listening, Barriers to effective listening, Traits of a good listener, Tips for effective listening. Analytical thinking; Speech, Rhetoric, Polemics; Audience analysis. Telephone Skills - making and receiving calls, leaving a message, asking and giving information, etiquettes.

Presentations: Mode, mean and purpose of presentation, organizing the contents, nuances of delivery, voice and body language in effective presentation, time dimension.

Group Discussion: Purpose, types of GDs, strategies for GDs, body language and guidelines for group discussion.

Interview Skills: Purpose, types of interviews, preparing for the interview, attending the interview, interview process, employers expectations, general etiquettes.
Text Books:

References Books:
**ADVANCED STRUCTURAL ANALYSIS**

**Paper Code:** ETCE-303  
**Paper:** Advanced Structural Analysis  

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**INSTRUCTIONS TO PAPER SETTERS:**  
Maximum Marks: 75  
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

**Objective:** This course covers advance topics such as structural response of arches, curved beams. The course also deals with use of basic principles of matrix method such as flexibility and stiffness method for analysis of structures. The course also involves introduction to FEM software package.

**UNIT I**  
**Arches:** Theory of arches, Eddy’s theorem, Circular, parabolic and geometric arches, concept of radial shear force and axial thrust, analysis of three hinged and two hinged arches, Effect of yielding of supports, rib shortening and temperature changes, tied arches, ILD for 3 hinged arches.

**Curved Beams:** plan and elevation, beams on elastic foundations.

**UNIT II**  
**Basic Principles of Matrix Method:** Types of framed structures, Deformations, Equilibrium, Compatibility, Static and Kinematic Indeterminacy, Flexibility and Stiffness matrices, Equivalent joint loads, Energy concepts, Principle of virtual work.

**Matrix analysis of structures:** Force and displacement methods of analysis, definition of flexibility and stiffness influence coefficients.

**UNIT II**  
**Flexibility method:** Development of flexibility matrices by physical approach, Flexibility matrices for truss and frame elements, load transformation matrix, development of total flexibility matrix of the structure, analysis of simple structures, plane truss and plane frame, nodal loads and element loads, lack of fit and temperature effects.

**Stiffness method:** Development of stiffness matrices by physical approach, stiffness matrices for truss and frame elements, displacement transformation matrix, development of total stiffness matrix, analysis of simple structures, plane truss and plane frame, nodal loads and element loads, lack of fit and temperature effects.

**UNIT III**  
**Direct stiffness method:** Introduction, element stiffness matrix, rotation transformation matrix, transformation of displacement and load vectors and stiffness matrix, equivalent nodal forces and load vectors, assembly of stiffness matrix and load vector, determination of nodal displacement and element forces, analysis of plane truss, plane frame [with numerical examples], analysis of grid, space truss and space frame [without numerical examples].

**Computer implementation:** A project on development of an analysis program using some of the above method is envisaged at this stage. Introduction to FEM package.

**Text Books:**  

**References:**  
[R6] Structural Analysis, Hibbeler, Pearson Education

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
DESIGN OF STEEL STRUCTURE

Paper Code: ETCE-305
Paper: Design of Steel Structure

L T/P C
3 1 4

INSTRUCTIONS TO PAPER SETTERS:
Maximum Marks: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To provide a basic understanding of use of steels in civil engineering, and to develop technical competence in the design of simple bolted and welded connections, tension and compression members, beams and plate girders. The course also deals with plastic analysis of structures.

UNIT I
Introduction: Types of steel structures like industrial buildings, beams/truss/arch/ suspension bridges, Beam and column framing, Rolled steel section, Advantages of steel as a structural material. Introduction to working stress and limit state theories, Type of sections, Connections and frames.

Riveted connections: Analysis and design of various types of riveted connections, permissible stresses in rivets, Design criteria, Code requirements, Tacking rivets, rivet joints subject to moment, Stresses in rivets.

Welded connections: Advantage and disadvantages of welding, Design criteria, Code requirements, Analysis and design of Fillet and Butt weld, Fillet weld subjected to moment.

Design of Tension members: Analysis of trusses and design of axially loaded tension member, Lug angle, tension splice.

[T1][No. of Hours: 12]

UNIT II
Design of compression members: Modes of failure in column, Design of compression member, Lacing and battening for built up compression member. Compression member composed of two components back-to-back, column base and foundation, Roof trusses [including Purlins, bracings and connections].

[T1][No. of Hours: 11]

UNIT III
Design of flexural members: Beam, Plate girder, Gantry girder including lateral and flexural torsional building, design of structural elements.

[T2][No. of Hours: 11]

UNIT IV
Plastic Analysis of structures: Moment curvature relationship, shape factor, plastic hinges, upper and lower bounds.
Analysis and Design of Steel Frames: Analysis and Design of frames as per codal recommendations.

[T1,T2][No. of Hours: 11]

Text Books:

References

INSTRUCTIONS TO PAPER SETTERS:
Maximum Marks: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To provide a basic understanding of use of steels in civil engineering, and to develop technical competence in the design of simple bolted and welded connections, tension and compression members, beams and plate girders. The course also deals with plastic analysis of structures.

UNIT I
Introduction: Types of steel structures like industrial buildings, beams/truss/arch/ suspension bridges, Beam and column framing, Rolled steel section, Advantages of steel as a structural material. Introduction to working stress and limit state theories, Type of sections, Connections and frames.

Riveted connections: Analysis and design of various types of riveted connections, permissible stresses in rivets, Design criteria, Code requirements, Tacking rivets, rivet joints subject to moment, Stresses in rivets.

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Design of Tension members: Analysis of trusses and design of axially loaded tension member, Lug angle, tension splice.

[T1][No. of Hours: 12]

UNIT II
Design of compression members: Modes of failure in column, Design of compression member, Lacing and battening for built up compression member. Compression member composed of two components back-to-back, column base and foundation, Roof trusses [including Purlins, bracings and connections].

[T1][No. of Hours: 11]

UNIT III
Design of flexural members: Beam, Plate girder, Gantry girder including lateral and flexural torsional building, design of structural elements.

[T2][No. of Hours: 11]

UNIT IV
Plastic Analysis of structures: Moment curvature relationship, shape factor, plastic hinges, upper and lower bounds.
Analysis and Design of Steel Frames: Analysis and Design of frames as per codal recommendations.

[T1,T2][No. of Hours: 11]

Text Books:

References

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
ENGINEERING HYDROLOGY

Paper Code: ETCE-307
Paper: Engineering Hydrology

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective:
1. To introduce students to various methods of estimation and analysis, precipitation and abstraction from rainfall and stream flow.
2. Assessment of stream flow and design principles of Dams, Weirs and Barrage, estimation of all parameters and characteristics related to hydrological aspects of catchment studies.

UNIT I
Introduction: Importance of Hydrology in relation to water resources development, Hydrology cycle, climatic and meteorological aspects, Water budget equation, Applications of hydrology in engineering.
Precipitation: Types, measurements, rain gauges, errors in measurements, check for consistency, missing data, Areal mean, mass curves, intensity duration frequency curves, depth area duration curves, and rainfall distribution in India.
Abstractions from Precipitation: Evaporation, measurements, empirical equation and analytical methods for evaporation estimation, Reservoir evaporation and methods for its reduction, Transpiration, Evapo-transpiration, Interception, Depression storage, Infiltration process and measurements, Infiltration capacities, Horton’s equation, Infiltration indices.

UNIT II
Stream flow measurement: Measurement of stage and velocity, Area velocity method, chemical and Tracer method, Electromagnetic and ultrasound method, indirect methods, Stage discharge relationships.
Runoff: Runoff characteristic of streams, Rainfall-runoff correlation, Empirical equations, flow duration curve, flow mass curve, calculation of storage / maintainable demand, Sequent peak algorithm, Droughts, causes and management.

UNIT III
Hydrographs: Hydrograph and its components, Factors affecting flood hydrograph, components of hydrograph, basic flow separation techniques, effective rainfall, Unit hydrographs, concept of time invariance and linear response, Applications and derivation of unit hydrographs, complex storm, Unit hydrograph of different durations, methods of superposition and S-curve, Synthetic unit hydrograph, dimensionless unit hydrograph, Uses and limitations of unit hydrographs.

UNIT IV
Floods: Computations of peak floods by empirical formulae, by rational method and by unit hydrograph method, CWC recommendations for design flood values, flood estimation by Gumbel’s Method, flood routing principles, reservoir routing, Floods in major Indian rivers, Flood damage, causes and remedial measures
Ground Water Hydraulics: Sources of ground water, flow through porous media, Energy and momentum concepts applied to groundwater flow, groundwater storage and derivation of the mass balance equation, potential and stream functions, Characteristics of wells and their yield, recharging ground water.

Text Books:
[T2] Elementary Engineering Hydrology, Deodhar, Pearson Education

References Books:
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

GEOTECHNICAL AND FOUNDATION ENGINEERING

Paper Code: ETCE-309

L T/P C
Paper: Geotechnical and Foundation Engineering
3 1 4

INSTRUCTIONS TO PAPER SETTERS:
Maximum Marks: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objectives: To help students understand analyzing the bearing capacity of soils, to design shallow and deep foundations, to estimate the settlements, to design the rigid and flexible retaining structures and to design cuts and excavations. Students will learn various sub surface exploration techniques and methods of ground improvement.

UNIT I
Sub surface exploration: Types of soil and rock sample, Indirect, direct and semidirect methods of sub surface exploration; Routine field tests, Location, spacing and depth of borings.
Bearing capacity of soils: Bearing capacity criteria and factors affecting it, Modes of shear failure, Theories of Bearing capacity, Foundation Pressures, Permissible settlements, Allowable bearing pressure, Field tests to estimate bearing capacity.
Shallow foundations: Types of shallow foundations, selection of type of foundation, location and depth of foundation, causes of settlement, settlement analysis, Design of shallow foundations, design of combined footings, Mat foundations.

[T1][No. of Hours: 12]

UNIT II
Deep foundations: Classification of Piles, Pile driving equipment, calculation of bearing capacity of a single pile, Under-reamed piles, Pile groups, Uplift and Lateral resistance of piles, Inclined loading of piles, pile cap.
Drilled Piers: Types and uses, bearing capacity, settlement, construction procedures
Caissons: Types, uses and construction procedures.

[T2][No. of Hours: 12]

UNIT III
Lateral Earth Pressure: Limit analysis and Limit Equilibrium methods, Earth pressure at rest, Rankine’s states of Plastic equilibrium, Earth pressure theories, Graphical methods to determine magnitude and location of resultant earth pressure; Concept of Arching of soils and braced cuts.
Earth retaining structures: Gravity type retaining walls; Proportioning retaining walls, stability requirements, backfill materials and drainage; Joints in retaining walls; Cantilever and Anchored sheet pile walls, Braced excavations.

[T1,T2][No. of Hours: 11]

UNIT IV
Stability of slopes: Short and long term failures, causes of failure, Types of landslides and slope movements, factor of safety, Concept of slope stability analysis, Infinite and finite slopes and their analysis, Selection of shear strength parameters, slope protection measures.
Soil improvement techniques: Compaction, Drainage and vibration methods, Precompression and consolidation, grouting and injection; Chemical stabilization, Geomembranes and geotextiles.
Environmental Geotechnology: Environmental and Natural cycles, Environmental imbalance, contaminated soils, Load environment design criteria.

[T1,T2][No. of Hours: 10]

Text Books:

References Books:

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

WASTEWATER ENGINEERING AND REUSE

Paper code: ETCE-311
Paper: Wastewater Engineering and Reuse

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**Objective**: The course deals with planning of sewerage collection and treatment processes such as attached culture system, suspended culture system. The subject also deals with nutrient removal, sludge thickening, sludge digestion.

**UNIT I**

Sewerage systems and their components: Introduction to sewerage system, Estimation of sewerage and drainage discharge, Dry weather flow, capacity of sewers, self cleansing and non scouring velocities, calculations of sizes and grades, forms and cross sections of sewers, hydraulic characteristics of circular sewer sections, use of tables and monograms, egg shaped sewers, systems of drainage, separate, combined and partially combined systems.

Quality and characteristics of sewage: physical, chemical and biological characteristics of sewage, Aerobic and anaerobic decomposition of sewage, nitrogen, sulphur and carbon cycles, collection of sewage sample, bacteriological and virological testing.


[T1][No. of Hours: 12]

**UNIT II**

Engineered systems for waste water treatment: Types of treatment units in preliminary, primary and secondary treatment, their functions and efficiencies, analysis and design of screening, grit chambers, detritus tanks, skimming tanks, design of septic tanks and Imhoff tanks.

Ponds and lagoons: Principle, operations, construction, design and detailing of Oxidation ponds, Aerated lagoons, Facultative ponds, Oxidation ditches, Anaerobic lagoons.

Attached culture systems: System microbiology, Contact beds, Principle, operations, Construction and design details of Trickling filters, Bio towers, Rotating biological contractors (RBC).

[T1,T2][No. of Hours: 12]

**UNIT III**

Design of Suspended culture systems: Activated sludge, concept of completely mixed and Plug flow reactors, process variation and design considerations, Aeration of activated sludge, Air diffusers and mechanical aeration, activated sludge clarifiers, Secondary clarifier design based on limiting flux rate.


Sludge thickening and sludge digestion: Sludge characteristics, sludge volume and solids relationships, Aerobic and anaerobic digestion, Factors affecting sludge digestion and their control, disposal of digested sludge.

[T1,T2][No. of Hours: 11]

**UNIT IV**

Sewage collection from houses and buildings: General principles for design of sanitary plumbing system, Functions and types of traps, types of plumbing systems; one pipe / two pipe, single stack / partially ventilated single stack system.

Construction and maintenance of sewers: Forces acting on sewer pipes, materials used in construction, laying and testing of sewer pipes, sewer appurtenances such as manholes, street inlets, gullies, catch basins, grease and oil traps, storm water overflows, inverted siphons, flushing and ventilation of sewers, Pumps for lifting sewage.

[T1,T2][No. of Hours: 10]

**Text Books:**


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Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

References:
COMMUNICATION SKILLS FOR PROFESSIONALS LAB

Paper Code: ETHS-351
Paper: Communication Skills for Professionals Lab

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**Objective:** To develop communication competence in prospective engineers so that they are able to communicate information as well as their thoughts and ideas with clarity and precision. These activities will enhance students’ communication skills with a focus on improving their oral communication in both formal and informal situations. They will develop confidence in facing interviews and participating in group discussions which have become an integral part of placement procedures of most business organisations today.

**Lab Activities to be conducted:**

1. **Listening and Comprehension Activities** – Listening to selected lectures, seminars, news (BBC, CNN, etc.). Writing a brief summary or answering questions on the material listened to.
2. **Reading Activities** – Reading different types of texts for different purposes with focus on the sound structure and intonation patterns of English. Emphasis on correct pronunciation.
3. **Conversation Activities** – Effective Conversation Skills; Formal/Informal Conversation; Addressing higher officials, colleagues, subordinates, a public gathering; Participating in a video conference.
4. **Making an Oral Presentation** – Planning and preparing a model presentation; Organizing the presentation to suit the audience and context; Connecting with the audience during presentation; Projecting a positive image while speaking; Emphasis on effective body language.
5. **Making a Power Point Presentation** – Structure and format; Covering elements of an effective presentation; Body language dynamics.
6. **Making a Speech** – Basics of public speaking; Preparing for a speech; Features of a good speech; Speaking with a microphone. Famous speeches may be played as model speeches for learning the art of public speaking. Some suggested speeches: Barack Obama, John F Kennedy, Nelson Mandela, Mahatma Gandhi, Jawahar Lal Nehru, Atal Bihari Vajpayee, Subhash Chandra Bose, Winston Churchill, Martin Luther King Jr.
7. **Participating in a Group Discussion** – Structure and dynamics of a GD; Techniques of effective participation in group discussion; Preparing for group discussion; Accepting others’ views / ideas; Arguing against others’ views or ideas, etc.
8. **Participating in Mock Interviews** – Job Interviews: purpose and process; How to prepare for an interview; Language and style to be used in an interview; Types of interview questions and how to answer them.

**Suggested Lab Activities:**

1. Interview through telephone/video-conferencing
2. Extempore, Story Telling, Poetry Recitation
3. Mock Situations and Role Play; Enacting a short skit
4. Debate (Developing an Argument), News Reading and Anchoring.

**Reference Books:**


**Note:** The Communication Skills Lab should be equipped with computers, microphones, an internet connection, overhead projector, screen, sound system, audio/video recording facilities, and seating arrangement for GDs and mock interviews. The student activities may be recorded and students may replay them to analyse and improve their pronunciation, tone, expressions, body language, etc.

Traditional language lab softwares are not mandatory and may be used by students to practice and enhance their language competence. Such softwares are usually elementary in nature and are mostly based on British/American English (pronunciation, accent and expression). They should preferably be in Indian English.
GEOTECHNICAL ENGINEERING LAB

Paper Code: ETCE-353  
Paper: Geotechnical Engineering Lab  

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Note: Based on theory 8-10 experiments are to be performed. The list is provided below:

LIST OF EXPERIMENTS

1. Moisture content determination by oven drying method, pycnometer method, and rapid moisture meter
2. Specific Gravity of soil particles by Pycnometer method and Density Bottle method
5. Field density tests of soils by Core cutter method and sand replacement method
6. Permeability tests of soils by Variable head method and Constant head method
7. Soil compaction test [Density moisture relations]
8. Consolidation test
9. Triaxial compression test
10. Unconfined compression test
11. Direct shear test
12. Plate load test

NOTE: At least 8 Experiments out of the list must be done in the semester.
WATER AND WASTEWATER ANALYSIS LAB

Paper Code: ETCE-355
Paper: Water and Wastewater Analysis Lab

Note: Based on theory 8-10 experiments are to be performed. The list is provided below:

LIST OF EXPERIMENTS

1. To determine pH, turbidity, electrical conductivity of the given sample.
2. To determine the total hardness, calcium and magnesium in the given sample.
3. To find the amount of Fluoride, Sulfate, iron and manganese in the given sample.
4. To determine the optimum coagulant dose quantity for given sample of raw water.
5. To determine chlorine demand and residual chlorine.
6. To determine most probable number [MPN] of coliforms of the given sample.
7. To determine the solids [total, suspended and dissolved] of the given sample.
8. To find out total settle-able solids [by Imhoff Cone] in the given wastewater sample.
9. To estimate the amount of dissolved oxygen present in the given wastewater sample.
10. To estimate the value of biochemical oxygen demand [BOD] in the given water sample/sewage sample.
11. To find out chemical oxygen demand [COD] of the given wastewater sample.
12. Field visit of water/sewage treatment plant.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
Objective: The objective is to assess and enhance the presenting capability of the students. Also to impart training to a student to face audience and present his ideas and thus creating in him self esteem and courage that are essential for an engineer. Students are required to give a seminar on Civil Engg. Projects/Visits/Case Studies for about 10 minutes. Seminar will be liberally attended by faculty present in college in conference hall and award marks to the students based on presentation (50% weightage) and Interjections by the candidates will be observed in assessment (50% weightage). Each student shall submit copy of a write up of the seminar topic.
SOFTWARE TRAINING

Paper Code: ETCE-359
Paper: Software Training

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Minimum of two weeks model/software training related to Civil Engg., is to be held after 4th Semester. Further weekly presentations and viva-voce will be conducted in this semester.
APPLICATIONS OF REMOTE SENSING AND GIS

Paper Code: ETCE-304
Paper: Applications of Remote Sensing and GIS

L T/P C
3 0 3

INSTRUCTIONS TO PAPER SETTERS:

Maximum Marks: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To understand the principles of remote sensing and digital image processing, GIS, such as assessment of cyclone, rainfall, atmospheric humidity etc., and Gain experience in the use of image processing and GIS software.

UNIT I
Introduction, concepts and physical basis of Remote Sensing, Electromagnetic spectrum, radiation laws, atmospheric effects, image characteristics.
Remote sensing systems; sources of remote sensing information, spectral quantities spectral signatures and characteristics spectral reflectance curves for rocks, soil, vegetation and water.
Introduction to Aerial and space borne platforms.
Global positioning system (GPS) photogrammetry – analog, analytical and digital photogrammetry, height and plan metric.

[T1][No. of Hours 11]

UNIT II
Optical, thermal and microwave sensors and their resolution, salient features of some of operating Remote Sensing satellites,
Digital image processing; introduction, image rectification and restoration, image enhancement, manipulation, image classification, fusion.

[T1,T2][No. of Hours 11]

UNIT III
GIS system: Definition terminology and data types, Map projection and Co-ordinate system, basic components of GIS software, data models, data acquisition, both raster based and vector based data input and data processing and management including topology, overlaying and integration and finally data product and report generation, principle of cartography and cartographic design.
GIS customization concepts, approaches of Multi-criteria decision making, concepts and applications of Geostatistics.

[T1][No. of hours 12]

UNIT IV
Application of Geo-spatial technology in Civil Engineering, assessment of cyclones, rainfall, atmospheric humidity etc., weather analysis, forecasting and modelling, Land use, inventory and monitoring, urban planning, snow and glaciers, coastal zone management, air and water pollution, commercially available remote sensing and GIS software.

[T2][No. of hours 11]

Text Books:

Reference Books:

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
QUEMITY SURVEYING AND COST ESTIMATION

Paper Code: ETCE-306
Paper: Quantity Surveying and Cost Estimation

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To learn the fundamentals of estimation of different types of civil engineering structures, analysis of rates and valuation concepts. The course also deals with different method of depreciation and valuation of properties including case studies.

UNIT-I
Earthwork Calculations: Calculation of areas, Measurement of earthwork, Determination of Earthwork for reservoirs from contour map.

[No. of Hours: 11]

UNIT-II
RCC works and Structure: Estimate of RCC Slab, beam, T beam, Column with foundation, staircase, retaining wall etc.
Road Estimating: Earthen, WBM and RCC roads, Premix carpeting, Stabilized soil road, Modernization of a road.

[No. of Hours: 11]

UNIT-III
Analysis of Rates for building work: Purpose and principal factors affecting the rate of an item of work, overhead costs, Materials for brick masonry, stone masonry, cement concrete, cement mortar, Plastering, different types of flooring, floor finish, color washing, distemper, varnish, painting, items for sanitary work, wood work, preparing analysis of rates.
Analysis of Rates for Road works: Bituminous painting 1st and 2nd coats, Premix carpet, bituminous macadam, Laying and Consolidation of stone metal and Kankar material. Itemized rates as per DSR [Delhi Schedule of Rates.

[No. of Hours: 11]

UNIT –IV
Depreciation: Different methods of calculating depreciation-straight line method, declining balance method, sinking fund method, quantity Survey method, Depreciated Cost, Case Studies

[No. of Hours: 12]

Text Books:
[T1] B. N. Dutta- Estimating and costing in Civil Engg. UPSPD.

References:
[R2] PWD Account Code
[R3] Samuelson and Nardhaus-Economics, Mc Graw Hill
[R5] ‘Civil Engineering Building Drawing’ by Gurucharan Singh
INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To introduce the concepts of channel hydraulics. The contents of the course are applicable in design of inland waterways needed for irrigation, navigation etc., the course also deals with finite volume approach for convection, diffusion and transport problems.

UNIT I
Flow in open channels: Type of channels, classification of flows, continuity energy and momentum equation, concept of critical depth and specific energy, critical depth for rectangular, triangular, circular and trapezoidal channels, flow through transition with a hump and with change in width (contraction and expansion).

Uniform flow: Chezy’s equation, Manning’s formula, Factors affecting Manning’s roughness coefficient, velocity distribution, shear stress distribution, Uniform flow computations for rectangular, trapezoidal and circular channels, standard line canal channels, Hydraulically efficient channel sections, compound sections, Critical slope and limit slope, Design of irrigation canals.

UNIT II

Hydraulic jump: Hydraulic jump in rectangular channel: sequent depth ratio, Energy loss; Classification of jumps, characteristics of jumps in rectangular channels, use of jump as an energy dissipater.

UNIT III

UNIT IV


Basic mechanisms for mixing: Laminar and turbulent diffusion, Dispersion and advection. Mixing in rivers, lakes and coastal waters.

The general transport (advection-diffusion) equation: Formulation and special cases, Transport processes and spreading of pollutant, Balance equations for water and pollutants in surface water systems.

Text Books:

References:
ADVANCED STRUCTURAL DESIGN

Paper Code: ETCE-310
Paper: Advanced Structural Design

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**Objective:** Develop professional level competence in the seismic design and detailing of concrete and steel structures, structural elements as well as design of commonly used prestressed concrete structures.

**UNIT I**
Introduction to Seismic design: General principles of seismic design, Introduction to IS 1893 : 2002, Building equivalent static analysis, Vertical distribution of seismic forces and horizontal shears, dynamic analysis, design spectrum, Seismic weights, Modal combination, Load combinations and permissible stresses, Guidelines for earthquake resistant design, Ductile detailing for seismic design, Analysis for lateral Loads, Introduction to IS 875 Part-III.

[T1][No. of Hours: 12]

**UNIT II**
Concrete structure design: Design of elevated and underground water tanks as per IS: 3370 and IS: 1893 Part-V. Design of retaining walls, Design of Box culvert.

[T2][No. of Hours: 12]

**UNIT III**
Prestressed concrete: Need for prestressing, pre tensioning and post tensioning methods, Concept of load balancing and cable profile, End anchorage, losses of prestress, Design of pre-stressed concrete beams as per IS: 1343.

[T1,T2][No. of Hours: 10]

**UNIT IV**
Steel structural design: Design of elevated water tanks, Design of transmission and communication towers and design of gantry girder as per IS: 800.

[T1,T2][No. of Hours: 10]

**Text Books:**

**References:**
[R5] Prestressed concrete, Pandit and Gupta, CBS
[R7] Edward Nawy, Prestressed Concrete: A fundamental approach, prentice hall, New Jersey
[R8] BIS 1893 – 2002 and BIS 875 Part III
TRANSPORTATION ENGINEERING-I

Paper Code: ETCE-312
Paper: Transportation Engineering-I

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INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To learn the fundamentals for alignment and geometric and pavement design of highway, various aspects of traffic engineering, highway construction materials, quality control and maintenance etc.

UNIT I
Highway Development and Alignment: Scope of highway engineering, road development and planning in India, role of NHAI, classification of roads, types of road pattern, Planning and Engineering surveys, Highway alignment, Highway project financing and economics of urban roads, expressways, national and state highways.
Highway geometric design: Cross section, elements, width, camber, gradient, sight distance, requirements and design principles of horizontal and vertical alignment, Alignment and Geometrics of hill roads. Highway safety and safety audit.

[T1,T2][No. of Hours: 11]

UNIT II

[T1,T2][No. of Hours: 11]

UNIT III
Highway materials: Properties of sub-grade and pavement component materials, Tests on sub grade soil, aggregates and bituminous materials, Bituminous paving mixes, Marshall Mix design criteria. Use of flyash, concrete and polymers in highway construction
Pavement design: Types of pavement [WBM, RCC, Prestressed CC etc]. Factors influencing the design of flexible and rigid pavements. Methods of flexible and rigid pavement design, I.R.C codes and recommendations.
Road side development: Arboriculture, planning plantation of trees, species selection and care of trees.

[T1,T2][No. of Hours: 12]

UNIT IV
Highway construction, technique and quality control: Techniques of construction of rural, urban roads and expressways, Joints in cement concrete pavements, Design and construction of hill roads.
Highway maintenance and Drainage: Causes and types of Pavement failures, Pavement testing, monitoring and evaluation, strengthening of existing pavements, Surface and sub surface drainage, drainage of slopes and erosion control, drainage, maintenance problems on hill roads, road construction in water logged areas.

[T1,T2][No. of Hours: 11]

Text Books:

References:
[R1] I.S. specifications on concrete, aggregates and bituminous materials
OBJECTIVE: The course aims to introduce fundamentals and need for optimization techniques in engineering problems. Various techniques such as Linear Programming, Geometric Programming, Dynamic Programming and Non-Linear Programming are taught to students to solve various environmental engineering problems for optimal solutions.

UNIT – I

UNIT – II

UNIT – III


UNIT – IV

TEXT BOOKS:

REFERENCE BOOKS:
OPERATION RESEARCH AND MANAGEMENT

Paper Code: ETCE-302

L T/P C
3 1 4

INSTRUCTIONS TO PAPER SETTERS:

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2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 12.5 marks.

Objective: To prepare students for technical careers and providing a strong foundation for engineering management positions. The subject also deals with concepts of Linear Programming, Geometric Programming, Dynamic Programming and problem formulation/solution of various engineering problems.

UNIT I

UNIT II
Standard Form of Linear Programming, Simplex Algorithm, Two Phases of the Simplex Method, Duality in Linear Programming, Sensitivity of Post optimality Analysis, Transportation Problems, Assignment Model. [T2][No. of Hours: 12]

UNIT III

UNIT IV

Text Books:

References:
[R2] Daniel L.Babacock-Managing Engineering and Technology- Lucy C.Morse, PHI, New Delhi
DECISION SCIENCE

Paper Code: ETIT-302
Paper: Decision Science

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2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

MAXIMUM MARKS: 75

Objective: Skills acquired from this course will enable students to apply various decisions making and optimization techniques in solving problems pertaining to their respective areas of study.

UNIT- I

UNIT- II
Decision Sciences and Role of quantitative techniques, Steps in decision making. Decision making under uncertainty, including optimism criterion, pessimism criterion, Laplace criterion, optimism criterion, Hurwicz criterion and Regret criterion. Decision making under risk, Multistage decision making, Multi criteria decision making. Posterior probabilities and Bayesian Analysis.

UNIT- III

UNIT-IV
Transportation Problems, Initial Basic Feasible Solution, Test for Optimality. Assignment problems. Network Analysis - PERT and CPM, Network Models, Concept, Drawing network, identifying critical path, Calculating EST, LST, EFT, LFT, Slack and probability of project completion (CPM and PERT), Crashing of Network.

Text Books:

References Book:
TRANSPORTATION ENGINEERING LAB

Paper Code: ETCE-352  
Paper: Transportation Engineering Lab  

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Note: Based on theory 8-10 experiments are to be performed. The list is provided below:

List of Experiments:

1. Aggregate crushing strength test.
2. Los Angeles Abrasion test.
3. Aggregate impact test.
4. Flakiness index and elongation index test.
5. Penetration test.
6. Ductility test.
7. Viscosity test.
8. Softening point test.
9. Flash and fire point test.
10. Determination of bitumen content by centrifuge extractor.
11. Determination of marshal stability value.
12. Determination of rebound deflection of pavement by Benkelman beam.

NOTE:- At least 8 Experiments out of the list must be done in the semester.
APPLICATIONS OF REMOTE SENSING LAB

Paper code: ETCE-354
Paper: Applications of Remote Sensing Lab

List of Experiments:

1. Introduction to basics of digital images and Data (Vector and Raster)
2. Interpretation of satellite images
3. Understanding the basic principles of Photogrammetry.
4. An introduction to image classification.
5. Interpreting RADAR images.
6. Extracting information from thermal remote sensing data.
7. Using GIS Software for plotting points, lines, polygons on maps.
8. Use of GIS in selection of Landfill site.
9. Note: Rest two experiments will be provided by the institute.

NOTE: At least 8 Experiments out of the list must be done in the semester.
STRCTURES DESIGN LAB

Paper Code: ETCE-356
Paper: Structures Design Lab

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List of Experiments:

2. Design of Elevated and underground RCC water tank as per BIS:3370-1965
3. Design of Cantilever and counter-fort retaining walls
4. Design of box Culvert
5. Design of Pre-stressed concrete beams
6. Design of elevated steel water tank
7. Design of transmission line towers
8. Ductile detailing of structure elements and joints for seismic design as per BIS 13920:1993

Rest two experiments will be provided by the institute

NOTE:- At least 8 Experiments out of the list must be done in the semester.
### ECONOMICS FOR ENGINEERS

**Paper Code:** ETCE-401  
**Paper:** Economics for Engineers  
**L** **T/P** **C**  
3 1 4

#### INSTRUCTIONS TO PAPER SETTERS:

**MAXIMUM MARKS:** 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

**Objective:** The objective of this course is to give the working engineer an overview of the economics principles often employed in effective engineering decisions as related to the designing, planning and implementation of successful civil engineering projects.

#### UNIT – I


[T1,T2] [No. of Hrs: 10]

#### UNIT – II


[T1,T2] [No. of Hrs. 12]

#### UNIT – III


[T2,R4] [No. of Hrs. 12]

#### UNIT IV


[T1, R5][No. of Hours: 11]

#### Text Books:

[T1] Sullivan, Wicks, Koelling, “Engineering Economy”, Pearson Education  

#### References Books:

[R7] Khan, Siddiquee, Kumar, “Engineering Economy” Pearson Education
IRRIGATION ENGINEERING

Paper Code: ETCE-403
Paper: Irrigation Engineering

L T/P C
3 0 3

INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: The course deals with various principles and requirements of irrigation scheme involving canals/channels carrying clear or Sediment-Laden water, design of canal sections, sheet pile, cut-off walls, canal fall, distributory head regulator, cross regulator, cross drainage structures, canal head works, dams, spillways, guide bank and bank protection.

UNIT I
Major and medium irrigation schemes of India, Command area development, Types of Soils and their suitability for irrigation, Root Zone soil water, Irrigation requirements, Irrigation water quality, Irrigation canal system, Duty of water, Canal losses, Estimation of design discharge of a canal, canal outlets, Canal regulation, Water logging, causes, effects and remedial measures. Alluvial channels carrying clear water and Sediment-Laden water, Evaporation and seepage losses in channels, Cross section of irrigation channels, Berms, Freeboard and service road, Siling of channels.

UNIT II
Sheet pile cut-off walls, Khosla’s theory and its applications, Correction for Floor Thickness, Correction for Mutual Interference of sheet piles, Correction for the slope of the floor, Method for determination of exit gradient, Uplift force on the floor of canal structure. Canal regulation structures, Canal Fall, Types of canal fall, Cistern element, Vertical/ Horizontal/Inclined-impact Cisterns, No-Impact Cisterns, Roughening measures for energy dissipation such as Friction Block, Ribbed pitching and Provisions such as baffle wall/ deflector/dentated cill etc at the Downstream end of cistern system Distributary Head Regulator and Cross Regulator and their Design criteria, Control of Sediment Entry into an offtaking channel.

UNIT III
Cross Drainage Structure, their need and types, Head loss through cross drainage structures, Design of Transitions for canal waterway using Hind’s Method, Upiri Method and Vittal and Chiranjeevi’s method, Canal Headworks, Selection of the site, Weir or Barrage, Undersluices, Divide Wall, Fish Ladder, Canal Head Regulator, Sediment Excluders and Sediment Ejector, Settling Basin, River Training for Canal Headworks.

UNIT IV

Text Books:

References Books:
[R6] Bharat Singh, Fundamentals of Irrigation Engineering, Nem Chand and Brothers, roorkee

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
TRANSPORTATION ENGINEERING-II

Paper Code: ETCE-405
Paper: Transportation Engineering-II

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INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To learn the fundamentals, planning and design concepts of railways, airways, tunneling, docks and harbours and other minor modes of transportation.

UNIT I
Components and Geometric design of Railways: Requirement and capacity of railway tracks, Various gauges, typical cross sections, Coning of wheels and tilting of rails, Functions and requirements of component parts of a railway track, Wear and tear and creep of rails, Requirement and types of sleepers, rail fixtures, ballast, sub-grade and embankments, Geometric design of railway track, Horizontal curves, radius, super elevation, transition curves, safe speed on curves, different types of gradients, Grade compensation.

UNIT II
Railway operation and control: Points and crossings and their design, Track junctions and simple track layouts, details of different types of stations and yards, signaling and interlocking, Various systems for control of train movements.

Railway construction and maintenance: Construction of railway track, earthwork, plate laying and packing, maintenance of track alignment, renewal of component parts and track drainage, modern methods of track maintenance, Classification and causes of accidents and their prevention.

Delhi Metro: Salient features of design, construction, operation and maintenance.

UNIT III
Tunneling: Considerations in tunneling, Tunnel alignment and grade, size and shape of a tunnel, methods of tunneling in hard rocks, Methods of tunneling in soft soils, compressed air and shield tunneling, shafts in tunnels, Safety measures, ventilation, lighting and drainage in tunnels

Docks and Harbours: Historical development of ports, harbours and docks, Tides, winds and waves, Causes and impact of Tsunami waves, Types of harbours, Types of docks, Break waters classification and types, Jetties, Landing stages and wharves.

UNIT IV
Airport planning and design: Traffic characteristics and operations, fleet requirements, component parts of airport and site selection, Runway design, Orientation, basic runway length, geometric design, design of taxiways and aprons, terminal area planning, facilities in terminal area and their planning concepts, Environmental requirements for Airport projects, Design of Airport drainage system, Lightening of airport, Specific requirements for design of airport pavements.

Text Books:
[T2] Khanna and Arora, “Airport Planning and design”, Nemchand and Bros

References Books:
[R1] Horonjeff, “Planning and design of Airports”, TMH
[R2] Mundrey, “Railway Track Engineering”, TMH
WATER RESOURCE SYSTEM PLANNING

Paper Code: ETCE-411  
Paper: Water Resource System planning  
L T/P C  
3 1 4

INSTRUCTIONS TO PAPER SETTERS:  
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

MAXIMUM MARKS: 75

Objective: The course will cover the topics of water planning and management by providing in-depth coverage of the tools of analysis, namely econometric principles, Fuzzy rule-based model, optimization and simulation, and by providing the theoretical framework for analysis.

UNIT I
Introduction of Water Systems engineering-scpe and approach  

[T1,R2][No. of Hours: 10]

UNIT II
Reservoir Operation, Standard Operating Policy, Optimal Operating Policy using LP Rules, Curves for Reservoir Operations  
Reservoir Systems [Deterministic Inflow], Reservoir Sizing, Sequent Peak Analysis Neglecting Evaporation, Sequent Peak Analysis Considering Evaporation Loss, Reservoir Capacity using LP, Storage Yield Function, Mixed Integer LP Formulation for Maximizing Yield.

[T2,R2][No. of Hours: 10]

UNIT III
Multireservoir Operation, Stationary Policy using DP, Simulation of Reservoir Operation for Hydropower Generation, Reservoir Systems [Random Inflow], Lognormal and Exponential Distributions, Chance Constrained LP, Linear Decision Rule, Deterministic Equivalent of a chance constraint  
Concept of Reliability, Reliability-based Reservoir Sizing, Maximum Reliability, Stochastic Dynamic programming for reservoir operation, State variable discretisation, Inflow as a stochastic process, Steady state operating policy, Steady State Probabilities, Real-time Operation, Case Study.

[T1,T2][No. of Hours: 11]

UNIT IV
Water quality managements planning and associated models, Regional planning models, Policy issues for improvement in utilization of water resources, Optical Irrigation Water allocation for single and multiple crops, Crop Yield optimization.  

[T1,R3][No. of Hours: 10]

Text Books:  

References:  

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

EARTHQUAKE TECHNOLOGY

Paper Code: ETCE-413
Paper: Earthquake Technology

INSTRUCTIONS TO PAPER SETTERS:

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

MAXIMUM MARKS: 75

Objective: To introduce the basic concepts in dynamic as well as probabilistic modeling of earthquake loading and dynamic analyses/simulation with uncertainty in earthquake engineering and to introduce the basics of structural dynamic analyses with emphasis on earthquake engineering applications.

UNIT I
Introduction, Causes and Classification of Earthquakes, Surface Wave Magnitude, Body Wave Magnitude, Moment Magnitude, Modified Mercalli Intensity Scale, Comprehensive Intensity Scale [MSKG 64] as per IS: 1893 Part-I, Characteristics of ground motion, local site effects, Impact of earthquake on buildings and infrastructure, Iso-seismal map, Development of seismic zoning map of India, Types of Ground failures due to earthquake.

D’Alembert’s principle, Equation of motion, Degrees of freedom, Damping, Free and Forced Vibrations of an un-damped and damped single degree freedom system and its equivalence.

[T1][No. of Hours: 11]

UNIT II
Free vibrations of an Un-damped two degree freedom system, Determination of frequencies and mode shape and concept of vibration absorber, Equation of Motion for multi-degree freedom system using D’Alembert’s principle, Stiffness Coefficient and Flexibility coefficient, Determination of Frequencies and Mode Shapes for Three storey building idealize as lumped mass cantilever model with one degree of freedom at each mass, using matrix iteration technique, Holzers’ Method and Stodolas’ Method.

[T2][No. of Hours: 11]

UNIT III

[T1,T2][No. of Hours: 11]

UNIT IV
Earthquake resistance requirements for horizontal and vertical projections of the building, Special considerations for non-structural components attached to the building.

Importance of shear wall buildings in earthquake resistance and Design of Reinforced Concrete Shear Walls as per IS 13920, Concept of Vibration Isolation of Buildings, Control devices like active control, passive control, hybrid control, semi-active control, isolation devices, energy dissipation devices, Need for Seismic Evaluation of Buildings and their Retrofitting, Condition Assessment of existing Buildings, GSDMA Guidelines on Seismic Evaluation and strengthening of Buildings.

[T1,T2][No. of Hours: 11]

Text Books:
[T1] Steven and Kramer.- Geotechnical Earthquake Engineering, Pearson Education.
[T2] Anil K. Chopra - Dynamics of Structures” [Third Edition], Published by Pearson Education

References Books:

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.


GEO-SYNTHETICS AND REINFORCED SOIL

Paper Code: ETCE-415
Paper: Geo-synthetics and Reinforced Soil

INSTRUCTIONS TO PAPER SETTERS:
MAXIMUM MARKS: 75
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To introduce the students to the different types of geosynthetics, their manufacturing technique, testing methods and their applications in different types of Civil Engineering projects.

UNIT - I
Introduction: Historical background of reinforced soil, Principles of reinforced soil through Mohr circle analysis.
Different types of geosynthetics: Types of geosynthetics like geotextiles, geogrids, geonets, geocells, geo-composites, their manufacturing methods.
Testing methods for geosynthetics: Techniques for testing of different index properties, strength properties, Apparent Opening Size, In-plane and cross-plane permeability tests.

UNIT - II
Reinforced Soil retaining walls: Different types of walls like wrap-around walls, full-height panel walls, discrete-facing panel walls, modular block walls Design methods as per BS-8006 and FHWA methods
Construction methods for reinforced soil retaining walls.

UNIT - III
Applications in foundations: Binquet and Lee's approach for analysis of foundations with reinforcement layers.
Drainage and filtration applications of geosynthetics: Different filtration requirements, filtration in different types of soils and criteria for selection of geotextiles.

UNIT - IV
Pavement application: Geosynthetics for separation and reinforcement in flexible pavements, design by Giroud-Noiray approach, reflection cracking and control using geosynthetics.
Construction of landfills using geosynthetics: Different components of modern landfills, collection techniques for leachate, application of different geosynthetics like geonets, geotextiles for drainage in landfills, use of geomembranes and Geosynthetic Clay Liner [GCL] as barriers.

Text Books:

References
STRUCTURE REPAIR AND REHABILITATION

Paper Code: ETCE-417
Paper: Structure Repair and Rehabilitation

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75
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2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks

Objective: To help students in understanding the various causes of structural failure and latest techniques in repair and rehabilitation of structures.

UNIT I
Evaluating concrete in concrete structures: site survey, cracking, disintegration and spalling, scaling, dusting, distortion, erosion, seepage, crack survey, joint inspections, physical and chemical analysis, NDT testing
Causes of distress and deterioration: Accidental loading, chemical reactions, corrosion, freezing and thawing, settlement and movement, shrinkage, temperature changes.

[T1][No. of Hours: 12]

UNIT II

[T2][No. of Hours: 12]

UNIT III
Maintenance of concrete: Stains and stain removal, cleaning details, oil stains, grease, dirt, mildew, asphalt, efflorescence, coating and sealing compounds.
Specialized repairs: rehabbing lock walls, blasting lock walls, anchors, pre-placed aggregate concrete, cut-off walls, under water repairs, geomembrane work.

[T1,T2][No. of Hours: 11]

UNIT IV
Trouble shooting defects in concrete: excess water, bad design data, chemical attacks, alakali-aggregate reaction, freezing, moving water and cavitation.

[T1,T2][No. of Hours:10]

Text Books:
[T2] Allen R.T.L, Repair Of Concrete Structures, John Willey and Sons,1987

References Books:
**DATA ANALYTICS**

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**INSTRUCTIONS TO PAPER SETTERS:**

**MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

**Objective:** This course is aimed at providing in-depth understanding of data analysis based on statistical techniques. The approach to data analysis involves exploratory methods, continuous distributions such as normal, lognormal distribution, probability plotting for normal distributions, hypothesis testing etc. The subject deals with model estimation and testing using parametric and non parametric methods, identification and accommodation of outliers, frequency analysis of extreme events like flood, storms, droughts etc and use of simulation techniques such as monte-carlo simulation.

**UNIT – I**

**Preliminary Data Analysis:** Graphical representation-line diagram or Bar Chart, Dot diagram, Histogram, Exploratory methods- stem and leaf plot, Box plot. Random events- sample space and events, the null event, Intersection and Union, Venn Diagram and Event space. Continuous Distributions- Normal Distribution, Lognormal Distribution, Bivariate Normal Distribution.

[T1] [No. of Hrs. 10]

**UNIT – II**

**Model Estimation and Testing:** Properties of Estimator- Unbiasedness, Consistency, Minimum Variance, Efficiency, Sufficiency. Estimation of Confidence Intervals: Hypothesis testing- Procedure for testing, Probabilities of Type I and Type II Errors and the power function, Tests of Hypothesis involving the Variance, the F Distribution and its use. Nonparametric methods- Wilcoxon Signed- Rank Test for Association of Paired Observations.

[T2] [No. of Hrs. 12]

**UNIT – III**

**Goodness of Fit Tests:** Chi-squared Goodness of Fit test, Kolmogorov- Smirnov Goodness of Fit test, Kolmogorov- Smirnov Two- sample test, Anderson- Darling Goodness of Fit test, Other methods for testing the Goodness of Fit to a Normal Distribution.

**Analysis of Variance:** One-Way Analysis of Variance, Two-way analysis of Variance. Probability Plotting for Normal Distribution, Probability Plotting for Type I Extreme Value Distribution.


**Spatial Correlation:** The Estimation problem, Spatial Correlation and the Semivariogram, some Semivariogram Models and Physical Aspects, Spatial Interpolations and Kriging.

[T1,T2] [No. of Hrs. 12]

**UNIT – IV**


**Simulation techniques for Design:** MonteCarlo Simulation- Statistical Experiments, Probability Integral Tranform, Sample size and accuracy of Monte Carlo Experiments.

[T1,T2] [No. of Hrs. 11]

**Text Books:**


Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
Reference Books:


# Planning and Design of Green Buildings

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<td>Paper: Planning and Design of Green Buildings</td>
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## INSTRUCTIONS TO PAPER SETTERS:

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## Objective:

1. To introduce the key concept, requirements and important issues of Designs Construction and Commissioning of green buildings.
2. To develop practical skills for planning and designing sustainable building projects.

### UNIT – I

Planning and Design of Green Buildings: History, Increased public focus on Sustainability and Energy Efficiency, Supportive Framework and general condition, Green Home Certifications, CO₂ Emission Trade, High Performance Building Characteristic, the LEED rating system, Rating system for Sustainable Building.

An integrated view of green building - Lifecycle engineering, Barriers to green building growth.

[T1,T2][No. of Hours: 11]

### UNIT – II


[T1,T2][No. of Hours: 12]

### UNIT – III


[T1,T2][No. of Hours: 11]

### UNIT – IV


[T1,T2][No. of Hours: 10]

## Text Books:


## Reference Books:


DATA COMMUNICATIONS AND NETWORKS

Paper Code: ETEC-421
Paper: Data Communications and Networks

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Objectives: The objective of the paper is to provide an introduction to the fundamental concepts on data communication and the design, deployment, and management of computer networks.

UNIT-I


Error Detection and Correction:
Types of error, Error detection codes: parity, linear block codes, cyclic redundancy check (CRC codes); Burst error detecting and correcting codes; Convolution codes.

Switching:
Circuit switching (space-division, time division and space-time division), packet switching (virtual circuit and Datagram approach), message switching.

UNIT-II

Data Link Layer: Design issues, Data Link Control and Protocols: Flow and Error Control, Stop-and-wait ARQ, Sliding window protocol, Go-Back-N ARQ, Selective Repeat ARQ, HDLC, Point-to-Point Access: PPP Point to-Point Protocol, PPP Stack,

Medium Access Sub layer: Channel allocation problem, Controlled Access, Channelization, multiple access protocols, IEEE standard 802.3 and 802.11 for LANS and WLAN, high-speed LANs, Token ring, Token Bus, FDDI based LAN, Network Devices-repeaters, hubs, switches bridges.

UNIT-III


UNIT-IV

Transport Layer: Process to Process Delivery: UDP; TCP, congestion control and Quality of service.

Application Layer: Client Server Model, Socket Interface, Domain Name System (DNS): Electronic Mail (SMTP), file transfer (FTP), HTTP and WWW.

Text Books:

Reference Books:
[R2] Introduction to data Communications and Networking, Tomasi, Pearson 7th impression 2011
[R5] Data Communications and Networking: White, Cengage Learning

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
SOCIOLOGY AND ELEMENTS OF INDIAN HISTORY FOR ENGINEERS

Paper Code: ETHS-419
Paper: Sociology and Elements of Indian History for Engineers

INSTRUCTIONS TO PAPER SETTERS:

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MAXIMUM MARKS: 75

Objective: The objective of this course is to familiarize the prospective engineers with elements of Indian history and sociological concepts and theories by which they could understand contemporary issues and problems in Indian society. The course would enable them to analyze critically the social processes of globalization, modernization and social change. All of this is a part of the quest to help the students imbibe such skills that will enhance them to be better citizens and human beings at their work place or in the family or in other social institutions.

UNIT I
Module 1A: Introduction to Elements of Indian History: What is history? ; History Sources-Archeology, Numismatics, Epigraphy and Archival research; Methods used in History; History and historiography;
[3 Lectures]

Module 1B: Introduction to sociological concepts-structure, system, organization, social institution, Culture social stratification (caste, class, gender, power). State and civil society;
[7 Lectures]

UNIT II
Module 2A: Indian history and periodization; evolution of urbanization process: first, second and third phase of urbanization; Evolution of polity; early states of empires; Understanding social structures-feudalism debate;
[3 Lectures]

Module 2B: Understanding social structure and social processes: Perspectives of Marx, Weber and Durkheim;
[7 Lectures]

UNIT III
Module 3A: From Feudalism to colonialism-the coming of British; Modernity and struggle for independence;
[3 Lectures]

Module 3B: Understanding social structure and social processes: Perspectives of Marx, Weber and Durkheim;
[9 Lectures]

UNIT IV
Module 4A: Issues and concerns in post-colonial India (upto 1991); Issues and concerns in post-colonial India 2nd phase (LPG decade post 1991)
[3 Lectures]

Module 4B: Social change in contemporary India; Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization.
[10 Lectures]

Text Books:

Reference Books:
[R1] Guha, Ramachandra (2007), India After Gandhi, Pan Macmillan
DATABASE MANAGEMENT SYSTEMS

INSTRUCTIONS TO PAPER SETTERS:

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MAXIMUM MARKS: 75


UNIT-IV: Transaction Management: ACID properties, serializability of Transaction, Testing for Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, Database recovery management.

Implementation Techniques: Overview of Physical Storage Media, File Organization, Indexing and Hashing, B+ tree Index Files, Query Processing Overview, Catalog Information for Cost Estimation, Selection Operation, Sorting, Join Operation, Materialized views, Database Tuning.

Text Books:

References Books:
IRRIGATION ENGINEERING DESIGN LAB

Paper Code: ETCE-451  
Paper: Irrigation Engineering Design Lab  
L  T/P  C  
0  2  1

List of Experiments:

List of design, detailing and drawing of the following problems:

1. Design of Irrigation Canal [lined and unlined]
2. Design of canal outlets
3. Design of Alluvial channels carrying clear and sediment laden water
4. Design the section of hydraulic jump
5. Design of cross drainage structures with typical plan and section
6. Design of profile of ogee spillway
7. Design of Trapezoidal Notch Fall, SARDA fall and Glacis Fall.
8. Design of Cisterns
9. Analysis and Design of gravity dam
10. Analysis and Design of earth embankment dam
11. Problems related to energy dissipaters

NOTE:- At least 8 Experiments out of the list must be done in the semester.
ECONOMICS OF INFRASTRUCTURE PROJECTS: CASE STUDIES

Paper Code: ETCE-453
Paper: Economics of Infrastructure Projects: Case Studies

Based on theory course ETCE-401, 10-12 exercises, designs/experiments.

NOTE:- At least 8 Experiments from the syllabus must be done in the semester.
DATABASE MANAGEMENT SYSTEMS LAB

Paper Code: ETCE-459 (ELECTIVE)  
Paper: Database Management Systems Lab  

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LAB BASED ON DBMS

Lab includes implementation of DDL, DCL, DML i.e SQL in Oracle.

**List of Experiments:**

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key, Foreign key, NOT NULL to the tables.
3. Write a SQL statement for implementing ALTER, UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the queries for implementing the following functions: MAX(), MIN(), AVG(), COUNT()
6. Write the queries to implement the concept of Integrity constrains
7. Write the queries to create the views
8. Perform the queries for triggers
9. Perform the following operation for demonstrating the insertion, updation and deletion using the referential integrity constraints

**TEXT BOOK:**

MINOR PROJECT

Paper code: ETCE-455
Paper: Minor Project

The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The Project work will be a design project or experimental project or computer oriented project or Research Review Project on any of the topics of civil engineering interest. It will be a group project. The assessment of the project will be done at the end of the 7th semester by a departmental committee consisting of 2-3 faculty members/experts specialized in various fields of Civil Engineering. The students will present their project work before the committee. The complete project report is to be submitted prior to the practical exams of 7th semester. However, an interim report based on the work carried out will have be submitted by the students within two weeks of first mid semester exam of 7th semester to the Project Guides based on the Assessment after submission of interim report, but prior to commencement of Theory exams.
Minimum 4 weeks Industrial Training related to Environmental Engineering is to be conducted after 6th semester. However, weekly presentations and Viva-voce is to be conducted in this semester.
HUMAN VALUES AND PROFESSIONAL ETHICS – II

Paper Code: ETHS-402  
Paper : Human Values and Professional Ethics-II

INSTRUCTIONS TO PAPER SETTERS:  
MAXIMUM MARKS: 75

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2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.
3. Two internal sessional test of 10 marks each and one project report* carrying 5 marks.

Objectives:
1. The main object of this paper is to inculcate the skills of ethical decision making and then to apply these skills to the real and current challenges of the engineering profession.
2. To enable student to understand the need and importance of value-education and education for Human Rights.
3. To acquaint students to the National and International values for Global development

UNIT I - Appraisal of Human Values and Professional Ethics:
(a) Impact of Science and Technology
(b) Effects of Printed Media and Television on Values
(c) Effects of computer aided media on Values (Internet, e-mail, Chat etc.)
(d) Role of teacher in the preservation of tradition and culture.
(e) Role of family, tradition and community prayers in value development.

UNIT II – Engineers responsibility for safety:
Some Case Studies: Case Studies, BHOPAL Gas Tragedy, Nuclear Power Plant Disasters, Space Shuttle Challenger, Three Mile Island Accident, etc.

UNIT III – Global Issues:
Globalization and MNCs: International Trade, Issues,
Case Studies: Kelleg’s, Satyam, Infosys Foundation, TATA Group of Companies
Business Ethics: Corporate Governance, Finance and Accounting, IPR.
Corporate Social Responsibility (CSR): Definition, Concept, ISO, CSR.
Environmental Ethics: Sustainable Development, Eco-System, Ozone depletion, Pollution.
Computer Ethics: Cyber Crimes, Data Stealing, Hacking, Embezzlement.

UNIT IV - Engineers Responsibilities and Rights and Ethical Codes:
Collegiality and loyalty, Conflict of interests, confidentiality, occupational crimes, professional rights, responsibilities. To boost industrial production with excellent quality and efficiency, To enhance national economy, To boost team spirit, Work Culture and feeling of job satisfaction, National integration, Examples of some illustrious professionals.
Need for Ethical Codes, Study of some sample codes such as institution of Electrical and Electronics Engineers, Computer Society of India etc., Ethical Audit.
Development and implementation of Codes: Oath to be taken by Engineering graduates and its importance**.

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

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Need for Ethical Codes, Study of some sample codes such as institution of Electrical and Electronics Engineers, Computer Society of India etc., Ethical Audit.
Development and implementation of Codes: Oath to be taken by Engineering graduates and its importance**.
Text Books:
[T1] Professional Ethics, R. Subramanian, Oxford University Press.

References Books:
[R8] Charles E Harris; Micheal J Rabins, “Engineering Ethics, Cengage Learning
[R9] PSR Murthy, “Indian Culture Values and Professional Ethics”, BS Publications
[R10] Caroline Whitback< Ethics in Engineering Practice and Research, Cambridgs University Press
[R13] C, Sheshadri; The Source book of Value Education, NCERT
[R14] M. Shery; Bhartiya Sanskriti, Agra (Dayalbagh)

*Any topic related to the experience of the B.Tech student in the assimilation and implementation of human values and professional ethics during the past three years of his/her studies in the institute OR A rigorous ethical analysis of a recent case of violation of professional ethics particularly related to engineering profession.

**All students are required to take OATH in writing prior to submission of major project and the record of the same is to be maintained at the college level and/or, this oath may be administered by the head of the institutions during the graduation ceremonies. The draft for the same is available alongwith the scheme and syllabus.
OATH TO BE TAKEN BY ENGINEERING GRADUATES

In a manner similar to the Hippocratic Oath taken by the medical graduates, Oath to be taken by the engineering graduates is as given below.

1. I solemnly pledge myself to consecrate my life to the service of humanity.
2. I will give my teacher the respect and gratitude, which is their due.
3. I will be loyal to the profession of engineering and be just and generous to its members.
4. Whatever project I undertake, it will be for the good of mankind.
5. I will exercise my profession solely for the benefit of humanity and perform no act for criminal purpose and not contrary to the laws of humanity.
6. I will keep away from wrong, corruption and avoid tempting others to vicious practices.
7. I will endeavor to avoid waste and consumption of non-renewable resources.
8. I will speak out against evil and unjust practices whenever and wherever I encounter them.
9. I will not permit considerations of religion, nationality, race, party politics or social standing to intervene between my duty and my work, even under threat.
10. I will practice my profession with conscience, dignity and uprightness.
11. I will respect the secrets, which are confided to me.

I make these promises solemnly, freely and upon my honor.

(Name of the Student)

Correspondence Address: ________________________________
______________________________
______________________________

Email: ________________________________
PLANNING AND MANAGEMENT OF CONSTRUCTION PROJECTS

Paper Code: ETCE-404

| Paper: Planning and Management of Construction Projects |
|-----------|-----------|-----------|
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INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

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Objective: This course is aimed at providing both basic and advanced exposure to Construction Project Management so as to enable the manager/consultant of tomorrow to successfully plan and complete sophisticated projects within the constraints of capital, time and other resources. The course also deals with basic concept of network analysis, O and M works, contract Management etc.

UNIT-I

Master Plan and Building By laws: Objectives and necessity of Master Plan, Land use features, Building Bylaws, Function of Local Authority, Provision of Building Regulation, Salient features of Land Acquisition, etc

Project Planning: Scheduling, Controlling, Methods of Planning and Programming, Schedules for Labour, Materials and Equipment, Graphical Presentation of Earthwork.

Work Accounts: Muster roll, measurement book, cash book imprest, temporary advance, classification of stores, stock, receipt and issue of stores, authority of use, and materials at site account, Master Test Register-Site Order Book, Dismantle Register, Inspection Register, Hindrance Register, Building Register surplus and shortage, A Sample Case Study.

UNIT-II


UNIT-III

Contract Management: Scope of work, Detailed Estimate [approved plan], Administrative approval/Estimate Sanction, Notice inviting tenders and its types, Tender, earnest money deposit, security deposit, types of contracts, Essentials of legally valid contract, Contract between Engineer and Employers, Appointment and authority of Engineer for execution of civil construction works, Category of contractors.

Public Works Administration: C.P.W.D. Organization set up, system of accounts, classes of works in PWD, Estimates, Delhi Scheduled Rules [CPWD], Cost adjustment indices sub head, sub works, administrative approval, technical sanction, possession of funds, expenditure sanction, Various methods of executing works.

UNIT-IV

Project Monitoring using PRIMAVERA or MS Project

Construction Equipment: Equipment for excavation and transportation of earth, hauling equipment, hoisting equipment, pile driving equipment, Equipment for pumping water, Dozers and cranes, Scraper, Batching plants, RMC equipment etc.

Text Books:


References Books:

[R1] Peurifoy-Construction Planning, equipment and methods, Tata Mc Graw Hill

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.

ANALYSIS AND DESIGN OF BRIDGES

Paper code: ETCE-406
Paper: Analysis and Design of Bridges

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INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75
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2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To help students in understanding the various concepts of structural analysis and design of concrete and steel bridges.

UNIT-I
Selection of bridge site, preliminary data to be collected, preliminary drawings, design discharge, linear water way, economical span, location of piers and abutments, vertical clearance, width of carriageway.
Standard Specifications of Bridges, IRC Bridge codes, clearances, Dead load, live loads, application of LL on deck slabs, impact effect of wind load, longitudinal forces, centrifugal forces, Force due to water currents, buoyancy effect, temperature effects, secondary stresses, erection seismic force, specifications for railway bridges, forces due to earthquake on railway bridges.

[T1,T2][No. of Hours: 12]

UNIT-II
Reinforced concrete bridges, box culvers, T-beam bridges, hollow girder bridges, continuous bridges, balanced cantilever bridges, arch bridges, [Illustrative examples of culverts, T-beam bridges, balanced cantilever bridge and arch bridges.

[T1,T2][No. of Hours: 10]

UNIT-III
Steel bridges, plate girder bridges, box girder bridges, cable stayed bridges, suspension bridges [Illustrative examples of plate girder, truss bridge and suspension bridges].
Importance of bearings, and joints, bearings for slab bridges, bearing for girder bridges, expansion bearings, modern trend in bearing designs, joints, expansion joints.

[T1,T2][No. of Hours: 11]

UNIT-IV
Design of prestressed concrete slab deck, post tensioned prestressed concrete, T-Beam and Slab, Bridge deck-structural components, Load distribution methods and design, Assembly of prestressing steel and grouting of ducts, Expansion joints for bridge decks.
Design of two span continuous prestressed concrete bridge deck, Cellular Box girder bridges.

[T1,T2][No. of Hours: 12]

Text Books:
[T2] O'Connor C., Design of Bridge Super Structure

References Books:
[R4] Libby and Perkins, Modern Pre stressed Concrete Highway Superstructure, CBS.
TRANSPORTATION, PLANNING AND MANAGEMENT

Paper Code: ETCE-410
Paper: Transportation, Planning and Management

INSTRUCTIONS TO PAPER SETTERS:

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MAXIMUM MARKS: 75

Objectives: This course aims at understanding system approach to traffic planning process based on travel demand and traffic management. Further, exposure to traffic management for accident prevention, smooth highway traffic flow has been dealt. Application of queuing approach to traffic flow, trip generation, trip distribution models have also been used for traffic analysis. The ultimate aim of the course is to develop urgent intelligent transport system based on the experience of ITS in developed world.

UNIT-I


UNIT-II

UNIT-III

UNIT-IV
Urban Intelligent Transport System, Urban Transportation issues. Transportation Demand Analysis, Sequential Demand Analysis, Development of comprehensive mobility plan, Standards of Intelligent Transportation System [ITS], Experience of ITS in Europe/Japan/North America, Sensors in ITS, ITS applications such as Detector, Traffic Signal systems, Freeway Management, Electronic Road Pricing and Automatic vehicle classification, ITS for traffic law enforcement, Application of GIS in ITS. Simultaneous or direct demand formulation, Model of demand elasticities, Direct and Cross elasticities Comprehensive examples of traffic impact study.

Text Books:
[T1] Dr. L.R.Kadiyali -Traffic Engineering and Transport Planning, Khanna Publication

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
References Books:

[R1] Urban Transport: Planning and Management by Ashok Kumar Jain – 2009, APH pub Corporation, ND.
[R2] Partha Chakroborty Animesh Das-Principles of Transportation Engineering, PHI, New Delhi.
GROUND WATER ASSESSMENT, DEVELOPMENT AND MANAGEMENT

Paper Code: ETCE-412
Paper: Ground Water Assessment, Development and Management

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Objective: The course will help students:
1. To apply appropriate methods to groundwater resource evaluation;
2. Use different methods to estimate groundwater recharge;
3. Combine these skills for groundwater resource assessment, Development and Management

UNIT-I

UNIT-II

UNIT-III
Multiple-Well System, Radial Wells and Infiltration Galleries, Design of Tube Wells, Design of Housing Pipe and Well Casing, Bore Size and Well Depth, Selection of Strata to be Screened, Design of Well Screen, Design of Gravel Pack, Sanitary Protection of Tube Wells, Common Causes of Contamination and Their Remedies, Design of Skimming Wells, Ground Water Exploration, Geologic and hydrologic methods, Surface geophysical methods, Hydro-geologic well logging, Geophysical well logging, Tracer techniques.

UNIT-IV
Ground Water Modelling using finite difference, use of appropriate software like Modflow etc, Case Study, Pumping of Water, Design of Centrifugal pumps, Design of Impeller, Shaft Impeller inlet and vane angles, Diameter of the Eye of Impeller, Impeller outlet and vane angle, Design of Impeller vanes, Design of Volute, Design of vanes, effect of Suction lift on discharge and efficiency, Centrifugal pump installation in open wells/tube wells, operation and maintenance, Vertical Turbine pumps and their installation, operation and maintenance, submersible pump and their installation, operation and maintenance, propeller pumps and their operating characteristics and installation, Jet pumps, Performance characteristics and installation.
Text Books:

Reference Books:
ADVANCE GEOTECHNICAL ENGINEERING

Paper Code: ETCE-416
Paper: Advance Geotechnical Engineering

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**Objective:** To introduce the fundamentals of soil dynamics and design of machine foundations as well as introduce the advanced topics of geotechnical engineering, such as, foundation of expansive soils and concepts and applications of geoenvironmental engineering.

**UNIT-I**

**Soil Dynamics:** One Dimensional wave propagation, One Dimensional Wave in layered body, impedance ratio, angle of refraction, critical angle of incidence, introduction of attenuation of stress waves, Definitions of Material Damping and Radiation Damping in soil. Measurements of Wave Propagation Velocity, Shear Modulus, Thickness of soil layers etc; Field Tests like Low Strain Test, Seismic Reflection Test, Seismic Refraction Test for Horizontal Layering and inclined or irregular layering, Suspension Logging Test, Steady States Vibration [Raleigh wave] Test, Seismic Cross Hole Test, Seismic Down Hole Test, Seismic Cone Test, Details and interpretation of Standard Penetration Test and Cone Penetration Tests. Laboratory Tests: Cyclic Triaxial Shear Test, Introduction of Centrifuge and Shaking Table Test.

*T1,T2* [No. of Hours: 12]

**UNIT-II**

**Machine Foundation:** Types of Machine Foundations, General Requirements, Design Data, Dynamic Loads induced in simple Crank Mechanism, Permissible Amplitudes and Bearing Pressure, General Theory of Transmissibility of force for Vibrating machines in brief


*T1,T2* [No. of Hours: 12]

**UNIT-III**

**Foundation on Expansive Soils:** Identification of expensive soils by field inspection and Laboratory Tests, general mechanism and characterization of swelling, Types of Damages in Building on expensive clay. Design of foundation on expensive soils like under-reamed piles, Computation of collapse settlement, Retaining walls in expansive soils, Treatment of cracked buildings.

*T1,T2* [No. of Hours: 10]

**UNIT-IV**

**Environmental Geo-technology:** Contamination due to landfills, subsurface contamination due to leachate and its effects. One dimensional analysis of contaminant transport, contaminated sites, Containment of solid waste in verticals, Barrier for containment, Geo-technical reuse of construction and industrial waste materials Case study of Ash disposal from Thermal power plant, Ash pond and its design with/without geo-textiles, Environmental impact and control.

*T1,T2* [No. of Hours: 10]

**Text Books:**

[T1] Fundamentals of Soil Dynamics by B.M. Das, Elsevier Publication


**References Books:**


FEM IN STRUCTURAL ENGINEERING

Paper Code: ETCE-418  
Paper: FEM in Structural Engineering  
L  T/P  C  
3  1  4

INSTRUCTIONS TO PAPER SETTERS:  
MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: To introduce the concept of the FEM for obtaining solution of ordinary and partial differential equation. The course deals with numerical discretisation as a finite element approach and deals with various methods/problems such as Continuum problems, weighted residual methods, higher order finite element approximation, variational methods, partial discretisation and time-dependent problems and generalized finite elements and error estimates.

UNIT-I
Weighted residual methods: Approximation by trial functions, weighted residual forms, piecewise trial functions, weak formulation, Galerkin method, examples of One-, two- and three -dimensional problems.

[ST1,ST2][No. of Hours: 11]

UNIT-II
Higher order finite element approximation: Degree of polynomial in trial functions and rate of convergence, the patch test, shape functions for C0 and C1 continuity, one-, two- and three-dimensional shape functions.
Isoperimetric formulation: The concept of mapping, isoperimetric formulation, numerical integration, mapping and its use in mesh generation.

[ST1,ST2][No. of Hours: 10]

UNIT-III
Variational Methods: Variational principles, establishment of natural Variational principles, approximate solution of differential equations by Rayleigh-Ritz method, the use of Lagrange multipliers; general Variational principles, penalty functions, least-square method.
Partial discretisation and time-dependent problems: Partial discretisation applied to boundary value problems, time-dependent problems via partial discretisation, analytical solution procedures, finite element solution procedures in time domain.

[ST1,ST2][No. of Hours: 12]

UNIT-IV
Generalized finite elements and error estimates: The generalized finite element method, the discretisation error in a numerical solution, measure of discretisation error, estimate of discretisation error
Coordinate Transformation: Transformation of vectors and tensors, transformation of stiffness matrices, degree of freedom within elements, condensation, condensation and recovery algorithm, sub structuring, structural symmetry.

[ST1,ST2][No. of Hours: 12]

Text Books:

References:

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
## GROUND WATER CONTAMINATION AND MITIGATION MEASURES

**Paper Code:** ETEN-418  
**Paper:** Ground Water Contamination and Mitigation Measures

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**INSTRUCTIONS TO PAPER SETTERS:**  
**MAXIMUM MARKS:** 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.  
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

**Objective:** The students will be able to:
1. Describe the human activities that may modify groundwater chemistry;
2. Discuss pollutant classification and the nature of diffuse and point-source pollution, giving examples;
3. Describe the origin and properties of the major organic and inorganic pollutants;
4. Apply the principles of modelling solute transport;
5. Outline the various approaches to remediation of polluted groundwater.

**UNIT-I**  

**UNIT-II**  
**Contaminant transport mechanism:** Underground storage tanks, Landfills, Septic Systems, Agricultural Wastes, Return Flow from Irrigation and Sewage, Strategy for Hydrologic Site Investigations, Geologic Data Acquisition, Hydrologic Data Acquisition, Acquisition of Soil and Groundwater Quality Data, Data Evaluation Procedures, Contaminant Transport Mechanism such as Advection, Diffusion and Dispersion, Sorption and Desorption, Biodegradation, Mass Transport Equations, One Dimensional Models, Governing Flow and Transport equations, Analytical Methods, Multi-Dimensional Methods.

**UNIT-III**  

**Non-aqueous Phase Liquids (NAPLs):** Types of NAPL, Transport, Computational methods, Characterizing NAPLs at Remediation Sites.

**UNIT-IV**  
**Natural Attenuation and Risk Based Corrective Action:** General Principles behind Natural Attenuation, Natural Attenuation Protocols and Guidance, Risk Based Corrective Action.  


**Text Books:**  

**Reference Books:**  
Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.


ENVIRONMENT ENGINEERING

Paper Code: ETCE-422  
Paper: Environment Engineering  
L T C 3 1 4

INSTRUCTIONS TO PAPER SETTERS:  
MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objectives: The subject deals with primary and secondary air pollutants, monitoring and standards of various pollutants in ambient air, indoor air pollution and noise measurement, occupational noise, handling and management of municipal hazardous and bio-medical waste.

UNIT – I
Concept of unpolluted air, Gaseous and vapour pollutants in atmosphere, Scales of air pollution, Primary and secondary pollutants, Ambient Air Quality [AAQ], Monitoring for pollutants [SO₂, NO₂, O₃, Particulates and their health effects, Stack monitoring for SOx, NOx and CO. Effects of air pollution on materials, structures and Human health. Air quality criteria, National air emission standards and AAQ guidelines, Indoor Air pollution. Control and management of indoor and outdoor Air pollution. Green house gases Green house effect, Global warming.

[T1,T2][No. of Hours: 12]

UNIT – II
Characteristics and Sources of noise, Legal aspects: Standards of noise, Legislation in India Types of noise: Neighborhood noise, Traffic noise, Occupational noise, Community noise, Health effects of noise, Physiological hazard and Psychological hazard. Occupational noise-exposure, Noise measuring equipments such as Sound Level Meter. Control of Noise pollution in industrial, residential and silent zone.

[T1,T2][No. of Hours: 11]

UNIT – III
Solid Waste Collection and Transportation: Types of collection systems [Hauled- container system and Stationary container system], Collection routes and their Layout, Solid waste Transfer Stations. Landfills: Classification, Types and methods, site selection, site preparation. Composition, Characteristics.

[T1,T2][No. of Hours: 11]

UNIT – IV
Generation and Control of Landfill gases, Composition, formation, movement and control of leachate in landfills, landfill design.
Composting: Theory of composting, manual and mechanized composting, Characterization, Storage and Segregation of hazardous and biomedical waste Techniques of hazardous and biomedical waste management.

[T1,T2][No. of Hours: 11]

Text Books:

References Books:
[R4] Lawrence K. Wang, Norman C. Pereira-Advanced Air and noise pollution control, Humana Press
[R5] Kenneth Wark, Cecil F. Warner-Air pollution its origin and control, PHI

Modified Scheme and Syllabus of B. Tech-CIVIL Engg. (1st Semester to 8th Semester) implemented from Academic Session w.e.f. 2015-16, approved in the 23rd BOS and 40th AC meeting of USET.
Objective: To obtain expertise and specialize in Offshore Structures and subsea Engineering.

UNIT I
Concrete/composites: Underwater concrete, mix design, quick setting compounds, high strength grout, fiber reinforced plastics, special composite materials for under water repairs.
Structural Steel: Corrosion Mechanism; Types of corrosion; Seawater corrosion; corrosion allowance, cathodic protection design, impressed current method, sacrificial anodes design, protective coatings, splash zone protection, cathodic protection monitoring system.

UNIT II
Static Structural Analysis: Estimation of wave and current loading on framed structures; maximum base shear and overturning methods; Cyclic loads for fatigue analysis.
Dynamic Structural analysis: Dynamic analysis of framed structures; Mode shapes and Eigen frequency analysis; Wave response; dynamic wave response; frequency and time domain analysis of risers and pipelines.

UNIT III
Loads on offshore structures: Wind Loads; Wave and Current Loads; Calculation based on Maximum base Shear and Overturning Moments; Design Wave heights and Spectral Definition; Hydrodynamic Coefficients and Marine Growth; Fatigue Load Definition and Joint Probability distribution; Seismic Loads.

UNIT IV
Foundation for Offshore Structures: Mud-mats: bearing capacity, sliding stability, over-turning stability, short term and long term settlements, factor of safety; Bucket foundation; Suction anchors; Gravity foundation.

Text Books:

References:
[R2] Structural Stability - Theory and Implementation by W.F.Chen and E.M.Lui by Elsevier
ESTIMATION OF PROJECTS USING APPLICABLE SOFTWARE

Paper Code: ETCE-452
Paper: Estimation of Projects using Applicable Software

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List of Experiments:

1. Detailed Estimate [Duration and Cost] for a two storey building.
2. Detailed estimate for following projects:
   - [i] a culvert.
   - [ii] stretch of road about 1 Km long including earthwork.
   - [iii] Elevated water tanks.
   - [v] Water supply Scheme and
   - [vi] Drainage Scheme.
3. Estimate of Electrification Work for a Material Testing Laboratory.
4. Time Estimate by Network Analysis.
5. Estimation of Air Conditioning requirements for a Library.
6. Valuation reports for:
   - [i] A hotel
   - [ii] A Theatre
   - [iii] An Educational Building

Books/References:

1. B.N. Dutta-Estimating and Costing in Civil Engineering, UPSPD
2. Delhi Schedule Rates, C.P.W.D.
LAB BASED ON ELECTIVE I OR II

Paper Code: ETCE-454
Paper: Lab based on Elective I or II

Based on theory course 8-10 exercises, designs/experiments.

NOTE: At least 8 Experiments from the syllabus must be done in the semester.
MAJOR PROJECTS

Paper Code: ETCE-460
Paper: Major Projects

Students may choose a project based on any subject of Civil Engineering. The students will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format.

The project work will be a design project for possible implementation of project including field surveying a computer oriented project on any of the topics of civil engineering interest. It will be a group project. The topic of the project will be different from the minor project.

The assessment of the project will be done at the end of the semester by a departmental committee consisting of 3-4 faculty members/experts specialized in various fields of Civil Engineering. The students will present their project work before the committee. The complete project report is to be submitted prior to the practical exams of 8th semester. However, an interim report based on the work carried out will have to be submitted by the students within two weeks of first mid semester exam of 8th Semester to the Project Guides based on the Assessment after submission of interim report, but prior to commencement of Theory/Practical exams.

****************************************************************END****************************************************************