School of Engineering and Technology

Programme Structure & Syllabus

Civil Engineering

2022-23

K.K. University
Bihar Sharif, Nalanda - 803115

FIRST SEMESTER

S. No	CODE	TITLE	L	T	P	Hours Per Week	Credit
1	ETSH-101	Engineering Physics	3	0	0	3	3
2	ETSH-102	Engineering Mathematics-I	2	1	0	3	3
3	ETCS-101	Introduction to Artificial Intelligence	3	0	0	3	3
4	ETSH-103	Soft Skills	3	0	0	3	3
5	ETSH-105	Engineering Chemistry	3	0	0	3	3
6	ETEA-111	Inter-disciplinary Experimental Active Learning (IDEA LAB)	0	0	3	3	2
7	ETME-111	Engineering Workshop Lab	0	0	2	2	1
8	ETSH-111	Engineering Physics Lab	0	0	2	2	1
9	ETSH-115	Engineering Chemistry Lab	0	0	2	2	1
10	ETCS-111	Introduction to Artificial Intelligence with Python Lab	0	0	2	2	1
11	ETSH-113	Soft Skill Lab	0	0	1	1	1
		Total	14	1	12	27	22

SECOND SEMESTER

S. No	CODE	COURSE TITLE	L	T	P	Hours Per Week	Credit
1	ETSH-201	Engineering Mathematics -II	2	1	0	3	3
2	ETEE-201	Basic Electrical & Electronics Engineering	3	0	0	3	3
3	ETCS-201	C Programming	3	0	0	3	3
4	ETME-201	Fundamental of Mechanical & Civil Engineering	3	0	0	3	3
5	ETSH-202	Technical Communication & Project Management	2	1	0	3	3
6	ETME-202	Engineering Graphics & Design	1	0	3	4	3
7	ETCS-202	Basics of Internet of Things (IoT)	2	0	0	2	NC
8	ETEE-211	Basic Electrical & Electronics Engineering Lab	0	0	2	2	1
9	ETME-211	Fundamental of Mechanical & Civil Engineering Lab	0	0	2	2	1
10	ETCS-211	C Programming Lab	0	0	2	2	1
		TOTAL	16	2	09	27	21

THIRD SEMESTER

S.No	CODE	COURSE TITLE	L	T	P	Hours per week	Credit
1	ETSH301	Engineering Mathematics- III	3	1	0	4	4
2	ETCE301	Structural Mechanics-I	3	1	0	4	4
3	ETCE302	Building Material & Construction Technique	3	0	0	3	3
4	ETCE303	Engineering Geology	3	0	0	3	3
5	ETCE304	Building Planning and Drawing	3	0	0	3	3
6	ETCE311	Structural Mechanics-I Lab	0	0	3	3	1.5
7	ETCE312	Building Material & Concrete Technology Lab	0	0	3	3	1.5
8	ETCE313	Engineering Geology Lab	0	0	3	3	1.5
9	ETCE314	Building Planning and Drawing Lab	0	0	3	3	1.5
		TOTAL	15	2	12	29	23

FOURTH SEMESTER

S. No	CODE	TITLE	L	T	P	Hours Per Week	Credit
1	ETCE401	Engineering Hydraulics-I	3	0	0	3	3
2	ETCE402	Structural Mechanics-II	3	0	0	3	3
3	ETCE403	Surveying	3	0	0	3	3
4	ETCE404	Transportation Bridge and Tunnel	3	0	0	3	3
5	ETCE405	Reinforced Cement Concrete -I	3	0	0	3	3
6	ETCE411	Engineering Hydraulics-I Lab	0	0	3	3	1.5
7	ETCE412	Structural Mechanics-II Lab	0	0	3	3	1.5
8	ETCE413	Surveying Lab	0	0	3	3	1.5
9	ETCE415	Reinforced Cement Concrete -I Lab	0	0	3	3	1.5
		TOTAL	15	0	12	27	21

FIFTH SEMESTER

S. No	CODE	TITLE	L	T	P	Hours Per Week	Credit
1	ETCE501	Structural Analysis-I	3	1	0	4	4
2	ETCE502	Soil Mechanics	3	0	0	3	3
3	ETCE503	Environmental Engineering -I	3	0	0	3	3
4	ETCE504	Engineering Hydraulics-II	3	0	0	3	3
5	ETCE505	Advanced Surveying	3	0	0	3	3
6	ETCE512	Soil Mechanics Lab	0	0	3	3	1.5
7	ETCE513	Environmental Engineering -I Lab	0	0	3	3	1.5
8	ETCE514	Engineering Hydraulics-II Lab	0	0	3	3	1.5
9	ETCE515	Advanced Surveying Lab	0	0	3	3	1.5
TOTAL			15	01	12	28	22

SIXTH SEMESTER

S. No	CODE	TITLE	L	T	P	Hours Per Week	Credit
1	ETCE601	Structural Analysis-II	3	0	0	3	3
2	ETCE602	Environmental Engineering -II	3	1	0	4	4
3	ETCE603	Steel Structure Design -I	3	0	0	3	3
4	ETCE604	Water Resource & Irrigation Engineering	3	0	0	3	3
5	ETCE605	Highway Engineering	3	0	0	3	3
6	ETCE613	Steel Structure Design -I Lab	0	0	3	3	1.5
7	ETCE614	Water Resource & Irrigation Engineering Lab	0	0	3	3	1.5
8	ETCE615	Highway Engineering Lab	0	0	3	3	1.5
9	ETCE616	Auto-Cad Lab	0	0	3	3	1.5
TOTAL			15	01	12	28	22

SEVENTH SEMESTER

S.NO	CODE	TITLE	L	T	P	Hours Per Week	Credit
1	ETCE701	Reinforced Cement Concrete-II	3	0	0	3	3
2	ETCE702	Design Of Hydraulic Structure	3	1	0	3	3
3	ETCE703	Foundation Engineering	3	0	0	3	3
4	ETCE704	Engineering Biology	3	1	0	4	4
5	ETCE705	Minor Project	0	0	8	2	4
6	ETCE711	Reinforced Cement Concrete-II Lab	0	0	4	3	2
7	ETCE716	Industrial Training	0	0	4	3	2
TOTAL			12	02	16	23	21

EIGHTH SEMESTER

S.NO	CODE	TITLE	L	T	P	Hours per week	CREDIT
1	ETCE801	Quantity Surveying and Costing	3	0	0	3	3
2	ETCE802	Construction Planning And Management	3	0	0	3	3
3	ETCE821A	Computational Methods In Structural Engineering	3	0	0	3	3
	ETCE821B	Traffic Engineering					
	ETCE821C	Industrial Waste Treatment					
4	ETCE822A	Structural Dynamics & Earthquake Engineering	3	0	0	3	3
	ETCE822B	Pavement Design					
	ETCE822C	Air Quality Monitoring & Control					
	ETCE822D	Advance Water Resources Engineering					
5	ETCE811	Quantity Surveying and Costing Lab	0	0	3	3	1.5
6	ETCE812	Major Project	0	0	10	6	5
7	ETCE813	General Proficiency + Seminar	0	0	3	3	1.5
TOTAL			12	0	16	24	20

Elective I:

1. **ETCE821A**   Computational Methods in Structural Engineering
2. **ETCE821B**   Traffic Engineering
3. **ETCE821C**   Industrial Waste Treatment

Elective II

1. **ETCE822A**   Structural Dynamics & Earthquake Engineering
2. **ETCE822B**   Pavement Design
3. **ETCE822C**   Air Quality Monitoring & Control
4. **ETCE822D**   Advance Water Resources Engineering

ETSH-101 Engineering Physics

Course Objectives: -

1. To impart knowledge in basic concepts of physics relevant to engineering applications.

2. To introduce advances in technology for engineering applications.

3. Apply Biot- Savart Law and Ampere's Law to compute magnetic field due to a current distribution.

4.Calculate the field of a magnetized object.

5. To impart knowledge on the concepts of electrostatics, electric potential, energy density and their applications.

Learning Outcome: -

1. To design and conduct simple experiments as well as analyze and interpret data.
2. Engineering applications Capability to understand advanced topics in engineering.
3. Identify formula and solve engineering problems.
4. Apply quantum physics to electrical phenomena.

Unit -1 ELECTROSTATICS AND ELECTROMAGNETIC   **Hours - 12**

Electrostatics, Electric charge as point charge, charge distribution, Coulomb s law, Electric field, electric field due to point charge & charge distribution, Electrostatic Potential , Potential due to point charge, long charged wire, charged Spherical conductor & Electric dipole ,Ampere's law, application of Ampere's law, Biot- Savart law, Application of biot- savart law.

Unit -2 OPTICS & LASER   **Hours - 07**

Reflection and refraction, Snell's law, physical significance of refractive index (simple problems), Total internal reflection, Lasers , Characteristics of Laser, Ruby laser, Working Principle of He-Ne Laser. Polarization of light, Brewster's Law, Malu's Law.

Unit- 3 QUANTUM PHYSICS   Hours - 09

Planck's theory of black body radiation, Compton effect, Photo electric effect, Wave particle duality, De-Broglie waves, De-Broglie wave velocity, Wave and group velocity, Heisenberg's uncertainty principle, Application of uncertainty principle.

Unit - 4 SEMICONDUCTORS   Hours - 08

Introduction of semiconductor, intrinsic & Extrinsic semiconductor, P –N junction, P-N junction with fordward bias, P-N junction with reverse bias, reverse breakdown, light emitting diode, Zener diode, properties of zener diode.

Unit -5 NANO-PHYSICS   Hours - 05

Introduction and Basic definition of Nano Technology, Properties of Nano particles, Elementary ideas of Synthesis of Nano particles, Application of Nano particles.

Reference Books:

1. Modern Physics by G. Aruldhas & P. Rajagopal; Pub: Prentice Hall of India.
2. Quantum Physics by H.C. Verma Pub.: Surya Publication.
3. Lasers and Non-Linear Optics by B.B. Laud; Pub: New Age International (P) Ltd.
4. Principles of electricity by Leigh Page and Normal llsley Adams, Pub.: Eurasia Publishing House, New Delhi.
5. Engineering physics by Dr. Rakesh Dogra Pub: S.k kataria & sons.
6. Engineering physics by Dr. Abhijit Nayak Pub: S.k kataria & sons.

ETSH-111 ENGINEERING PHYSICS LABORATORY

Minimum six experiments are required to be performed in a semester:

- 1. Find the acceleration due to gravity (g) with the help of bar Pendulum.

2. To determine the external diameter of solid Cylinder by the slide calipers.

3. To determined the thickness of glass plate by using Spherometer.

4. To determine the diameter of metal wire by using Micrometer (Screw Gauge).

5. Study the junction diode.

6. To find the refractive index of a material given in the form of a prism by using a Spectrometer.

7. To obtain the particle size by the laser.

ETSH-102   Engineering Mathematics-I

COURSE OBJECTIVE:

The objective of this course is to familiarize the prospective engineers with

- Techniques in matrices, differentiation and Integration.
- It aims to equip the student's todeal with advanced level of Mathematics and applications that would be essential for their disciplines.

MODULE -1: LINEAR ALGEBRA

Matrix algebra, Determinant, Inverse and rank of a matrix by elementary transformation, solution of system of linear equation, vector, Basis, L.D&L.I, Eigen value and Eigen vector of a real matrix, properties of Eigen values, cay-lay Hamilton theorem. diagonalization of matrices.

MODULE -2: DIFFERENTIAL CALCULUS

Limit, continuity and Differentiability, Successive differentiation, Leibnitz theorem, mean value theorem (Rolle's, Lagrange's Cauchy) Maxima & Minima for single variable, Taylor & Maclaurin Series.

MODULE -3: FUNCTION OF SEVERAL VARIABLES

Partial derivative, Homogeneous functions and euler's theorem Total derivative, Differentiation of implicit function of two variables, Maxima and Minima of function of variables, Lagrange's method of undetermined co-efficient.

MODULE -4: INTEGRAL CALCULUS

Integration of various functions, Definition of proper and improper integral, Convergence of improper integral, Beta and gamma functions, Differentiation under integral sign

MODULE -5: CURVE TRACING

Curve tracing of Cartesian and Polar form, Surface area and volume of Surface of revolution.

COURSE OUTCOMES:

After completing this course, students should demonstrate competency in the following skills:

1.Use both the limit definition and rules of differentiation to differentiate functions.

2.Apply differentiation to solve maxima and minima problems.

3.Evaluate integrals both by using Riemann sums and by using the
Fundamental Theorem of Calculus.

4.Evaluate integrals using techniques of integration, such as substitution,
partial fractions and integration by parts.

5.Determine convergence/divergence of improper integrals and evaluate
convergent improper integrals.

6.Apply various techniques in solving differential equations.

REFERENCE BOOKS

1. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher's, 36 th edition, 2010.

2. Erwin Kresyszig, Advance Engineering Mathematics, John Wiley and Sons, 9 th edition,

   2006.

ETCS-101 Introduction to Artificial Intelligence

COURSE OBJECTIVES:-

The primary objective of this course is to introduce the basic principles, techniques, and applications of. Artificial Intelligence. In this course, students will get a basic introduction to the building blocks and components of artificial intelligence, learning about concepts like algorithms.

MODULE -1:

Introduction to AI : History of AI, Overview of AI, Problems of AI, AI technique, Production Systems, Characteristics of production systems, Tic-Tac-Toe problems, Searching techniques like hill climbing,A* Algorithm, AO* Algorithm etc , and various types of control strategies.

MODULE -2:

Introduction to Python: Python basics – Data types, Variables, Basic input –output operations, Basic operators, Python literals, Strings, Number, list, tuple, Dictionary, Functions, Conditional Statement, Loop Statements, Numpy, Matplotlib, Simple programming exercises using Python.

MODULE -3:

Knowledge representation, Problem in representing knowledge, Knowledge representation using propositional and predicate logic, resolution, refutation, deducation, Theory proving, monotonic and non monotonic reasoning.

MODULE -4:

Probabilistic reasoning, Baye's Theorem, Semantic networks, Scripts, Schema, frames, conceptual dependency, fuzzy logic, forward and backward reasoning, introduction to understanding,natural language processing.

MODULE -5:

Introduction to learning, various techniques in Learning, Introduction to neural networks, application Neural network, common sense, reasoning, some example of expert systems.

COURSE OUTCOMES:

- Understand concepts of Artificial Intelligence and different types of intelligent agents andTheir architecture.
- Formulate problems as state space search problem & efficiently solve them.
- Understand the working of various informed and uninformed searching algorithms andDifferent heuristics

- Understand concept of knowledge representation i.e. propositional logic, first order logic.

Text Books

1. Stuart Russell and Peter Norvig – Artificial Intelligence A Modern Approach, PEARSON Education.
2. Simon Haykin -Neural Networks PHI.

Reference Books

1. N. P. Padhy – Artificial Intelligence and Intelligence Systems, OXFORD publication. 2. B. YagnaNarayana - Artificial Neural Networks, PHI

ETSH-103 Soft Skills

COURSE OBJECTIVES

The objective of this course to help the students to develop as team member, leader and all-round professional in the long run. This course would focus on over all personality development of the student and to improve his technical writing and documentation.

MODULE -1: SELFAWARENESSANDSELF-DEVELOPMENT

Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self-appraisal, Personal Goal setting, Career Planning, Personal success factors, Handling failure, Emotional Intelligence, Lateral thinking, Depression and Habit, relating SWOT analysis &goal setting, prioritization.

MODULE -2: COMMUNICATION SKILL

Importance of communication, Aspects of communication, communication through words, communication through body language, communication through technology, Oral communication, Listening Skills, Group Discussion and Interview Skills, Presentations kills: preparing the presentation, performing the presentation,

Written communication: Reading comprehension, précis writing, Business and technical reports, Styles, Business correspondence, Memorandum writing, Notice, Agenda andMinutes, Research papers and articles, Advertising and job Description, Mechanics of Manuscript preparation.

MODULE -3: INTERPERSONALRELATIONSHIP

Teamwork, Team effectiveness, Group discussion, Decision making- Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics, Multicultural Diversity and Socializing

MODULE -4: LEADERSHIP SKILLS

Leaders: their skills, roles, and responsibilities. Vision, Empowering and delegation, motivating others, organizational skills, team building, Organizing and conducting meetings, decision making, giving support, Vision, Mission, Coaching, Mentoring and counselling, Appraisals and feedback, conflict, Power and Politics, Public Speaking.

MODULE -5: OTHER SKILLS

Managing Time, Managing Stress, Meditation. Improving personal memory, Study skills that include Rapid Reading, Notes Taking, Self-learning, Complex problem solving and creativity, listening skills and speaking skills, Corporate and Business Etiquettes.

MODULE -6: ETHICS IN ENGINEERING PRACTICE AND RESEARCH

Introduction to ethical reasoning and engineer ethics, Right and responsibilities regarding Intellectual property, workplace rights and responsibilities, Central Professional Responsibilities of Engineers, Responsibility for environment.

COURSE OUTCOMES:

Having successfully completed this course, the student will be able to:

- Communicate, interact and present his ideas to the other professionals.
- Understand and aware of importance, Role and contents of soft skills through instructions, knowledge acquisition, demonstration and practice.
- Have right attitudinal and behavioural aspects, and build the same through activities.
- Possess right professional and social ethical values.

TEXTBOOKS:

1. Developing Communication Skill:KrishnaMohan,MeeraBanerji,MacMillanIndiaLt.

2. BNGhosh, :Managing Soft Skills for Personality Development Graw Hill

3. Ethics in Engineering Practice and Research: Caroline Whitbeck, Cambridge University press

4. A Course In Communication Skills:Kiranmai Dutt,Cambridge University press

5. English for Business Communication: SimonSweeney, Cambridge University Press.

6. Basics of Communication In English: Francis Sounderaj,Mac Millan India Ltd.

7. Group Discussions and Interview Skills:Priyadarshi Patnaik,Cambridge University Press

8. Professional Presentations: Malcolm Goodale,Cambridge University Press.

ETSH-105 Engineering Chemistry

UNIT- I: CHEMICAL BONDING

Introduction, Molecular Orbital Theory (MOT), Sigma (σ) and pi (π) Molecular Orbitals, Energy level Diagram for Mono and Di atomic Molecules, Linear Combination of Atomic Orbitals (LCAO) Method, Crystal Field Theory, Calculation of CFSE

UNIT- II: WATER AND ITS TREATMENT

Introduction, Soft and Hard Water, Type of Hardness, Techniques for Water Softening- Lime Soda Process, Zeolite Process, Ion Exchange Process.

UNIT- III: SPECTROSCOPIC TECHNIQUES AND APPLICATIONS

Basic concept of spectroscopy. Principle and Applications of different spectroscopic techniques (UV-Visible and IR spectroscopy). Nuclear magnetic resonance and magnetic resonance imaging. Elementary Discussion of Flame photometry.

UNIT- IV: POLYMER

Introduction, types of polymerization. Classification, mechanism of polymerization (Free radical and Ionic polymerization). Thermoplastic, and thermosetting polymers Elementary idea of Biodegradable polymers, preparation, properties and uses of the following polymers- PVC, PMMA, Teflon, Nylon-6, Polyester phenol formaldehyde, Urea-Formaldehyde, Buna-s, Vulcanization of Rubber.

UNIT- V: CORROSION AND LUBRICANT

Lubricant- Definition, Classification with examples. Functions of Lubricant, Physical Characterisitics of Lubricants Such and Viscosity, Viscosity Index, Oiliness, Volatility, Flash & Fire Point, and Cloud & Pour Point. Chemical Characteristics of Lubricant such as Acid Value or Neutralization Number, Emulsification, Saponification Value etc.

COURSE OUTCOME:

The course will enable the student to:

1.Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2.Rationalise bulk properties and processes using thermodynamic considerations. 3.Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.

TEXT BOOKS:

- University Chemistry,by B.H.Mahan
- Chemistry Principles and Applications, by M.J.Sienko and R.A.Plane
- Fundamentals of Molecular Spectroscopy, by C.N.Banwell
- Engineering Chemistry(NPTEL Web-book),by B.L. Tembe,Kamaluddin andM.S.Krishnan ⬜ Physical Chemistry, by P.W.Atkins

ETSH-115 Engineering Chemistry Lab

Course objectives:

This Engineering Chemistry Laboratory is common to first year branches of UG Engineering. At the end of the course the student is expected to

- Provide the students with a solid foundation in Chemistry laboratory required to solve engineering problems.
- Practical implementation of fundamental concepts.

LIST OF EXPERIMENT: -

Qualitative analysis of given salts having three acidic and basic radicals.

Basicradicals:$Pb^{2+},Cu^{2+},Al^{3+},Fe^{2+},Fe^{3+},Cr^{3+},Zn^{2+},Ca^{2+},Ba^{2+}$

Acidic radicals: - $Cl^-,Br^-,I^-,,SO_4,NO_3,OH^-$ etc.

1. Determination the total hardnees of given water smaple.

2. To Determine the Saponifcation value of given oil sample.

3. To Determine the acid value of given oil sample.

4. Adsorption of acetic acid by charcoal.

6. Synthesis of polymer /drug.

7. To Determine the Ph of given solution by universal indicator or pH meter.

8. Determine dissolved oxygen in water sample.

9. To determine thinner content in oil paint.

10. To determine carbon monoxide, carbon di-oxide, Content emission from petrol vehicle.

Course Outcomes:-
- Students are able to estimate the impurities present in water.
- Ability to select lubricants for various purposes.
- Ability to prepare advanced polymer materials.
- Ability to find the Fe^{+2}, Ca & Cl^- present in unknown substances/ ores using titrimetric and instrumental methods.

ETEA-111 Inter-disciplinary Experimental Active Learning (IDEA LAB)

VISION: -

To create globally competitive electronics and communication professionals with strong values for the advancement of the nation.

MISSION: -

M1- To provide an ambiance of excellence in teaching and learning replete with innovation, collaboration and research.

M2- To instill human values, social obligations and national responsibilities.

M3- To promote a learning ecosystem for progress and development of all in the department.

List of Experiments

1. To study various active & passive devices like R, L & C, battery etc.

2. To study the CRO and function generator for signal analysis.

3. To study the basics of mechatronics and various parts of a robot.

4. To study the refrigeration and Air-conditioning system with future perspectives.

5. Identification of various types fabrics like cotton, woolen, linen, silk etc

6. Identification of different types of stones and aggregates (visual identification) with study of their properties and applications.

7. Identification of timbers: teak, sal, chir, shisum, siras, deodar, kail and mango. (visual identification) and with study of their properties and applications.

8. Identification of hard drive, RAM, mother board and other important parts in a desktop computer.

9. To learn the parts of fan, LED bulb, induction cooktop, electric iron etc

10. To study the types of soil, water and renewable energy with present scenario and future challenges for sustainable development.

11. To study the working principle and various parts of a Hybrid Electric Vehicle (HEV)

12. To study the electrical switch board and staircase wiring.

13. To learn to use the various types of pliers, wrenches & screw drivers.

14. To study the various components of Green Building (also called as Zero Energy Building).

ETME-111 Engineering Workshop Lab

COURSE OBJECTIVES:

Providing basic knowledge of workshop tools, equipment, machineries and various workshop activities related to carpentry, smithy, foundry etc. with hands-on practices.

LIST OF EXPERIMENTS: -
1. **Smithy Shop**

    (a)   To prepare a ring a mild steel rod in black smithy shop.

    (b)   To prepare an eye-nail of M.S rod of 125 mm long & 8 mm thickness.

2. **Foundry Shop**

    (a)   To prepare a V block casting using pit furnace.

3. **Carpentry Shop**

(a)   To prepare a dovetail joint in carpentry shop.

(b)   To prepare a cross-lap joint in carpentry shop.

4.   Fitting Shop

(a)   To prepare a matching joint in fitting shop.

(b)   To prepare a square by chipping & filling.

5.   Machine Shop

(a)   To prepare a cylindrical job of dia. 25 mm to 22.5 mm on lathe using turning operation.

(b)   Drilling Practice

6.   Welding

(a)   To prepare a T-joint by arc welding.

(b)   To prepare an L-shape corner joint by Arc welding.

7.   Sheet Metal Shop

(a)   To prepare a conical funnel with soldering in sheet metal shop.

COURSE OUTCOMES:
On successful completion of this course, the student
will be able to ▯   Use welding equipments to join the
structures.

•   Carry out the basic machining operations

•   Illustrate on operations of smithy, Carpentry, foundry and fittings

TEXT BOOK:

1. Jain, R.K. Production Technology.

2. Rao, P. N. Manufacturing Technology (Vol. I &II)

ETCS-111   Introduction to Artificial Intelligence with Python Lab PYTHON LIST OF EXPERIMENTS

1. Program to define an integer value and print it
2. Input two integers and find their addition
3. Python program to find sum of two numbers
4. Python program to demonstrate the example for arithmetic operators
5. Python program for simple interest
6. Python program for compound interest
7. Python program to check the given year is a leap year or not
8. Python program to find power of a number using exponential operator 9. Python program to extract and print digits in reverse order of a number
10. Python program Input age and check eligibility for voting.
11. Python program Find largest of three number using nested if else.
12. Python program Calculate discount based on the sale amount.
13. Python program Calculate discount based on the sale amount using Nested if else.
14. Python program Demonstrate an example of for loop
15. Python program Examples of loops (based on their control)
16. Python program Demonstrate an Example of break statement
17. Python program Demonstrate an Example of continue statement
18. Python program Demonstrate an Example of pass statement

19. Python Print all numbers between 1 to 1000 which are divisible by 7 and must not be divisible by 5.
20. Python | Find factorial of a given number
21. Python Find the factorial of a number using recursion
22. Python Program to print Odd and Even numbers from the list of integers.
23. Python Program to calculate n-th term of a Fibonacci Series
24. Python program for sum of square of first N natural numbers
25. Python program for sum of cube of first N natural numbers

ETSH-113   Soft Skill Lab

LIST OF EXPERIMENTS

- Work/Assignments

- SWOTanalysis

  Personal & Career Goal setting – Short term &long termPresentation

  Skill
- Dining

  EtiquettesLetter/Application/Notice/Agenda/Minuteswriting

  Reportwriting

- Listening skills using Language laboratory
- Group discussion

- Resume writing

ETSH-201   Engineering Mathematics -II

COURSE OBJECTIVE:

- the objective of this course is to familiarize the prospective engineers with techniques in ordinary and partially differential equations, Laplace and Fourier transform,
- Fourier series, complex variables it aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their discipline.

UNIT 1: ORDINARY DIFFERENTIAL EQUATION

Ordinary differential equation: definitions,order and degree of differential equation, equation, exact differential equations, equations solvable for x, y and p, Clairaut's form, second order linear differential equation with constant coefficient, Cauchy - Euler's equation, Method of variation of parameter.

UNIT 2: PARTIAL DIFFERENTIAL EQUATION

Partial differential equations: Definition and formulation, partial differential equation of the first order, Non-linear Partial differential equations, Legendre's and Charpit's method, Homogeneous linear partial differential equation with constant co-efficient, Methods for finding C.F. and P.I. of Linear Homogeneous Partial Differential Equations.

UNIT 3: LAPLACE TRANSFORM

Laplace Transform: Definition and properties of Laplace transform, shifting theorem, Transform of derivative and integrals, Multiplication by t^n, Division by t.Inverse Laplace transform, convolution theorem (without proof) and its application.

UNIT 4: FOURIER SERIES AND FOURIER TRANSFORM

Fourier series: Periodic Function, Function of arbitrary period, Even and odd functions, half range SeriesFourier Transform: definition and properties of Fourier transform, convolution, Parseval's identity for Fourier transforms, Relation between Fourier transform and Laplace transform.

UNIT 5: COMPLEX ANALYSIS

Complex Analysis: definitions, Cauchy- Riemann Equations, Harmonic functions, Elementary
Analytic function and their properties, Cauchy Integral formula (without proof),Taylor's Series, Singularities, Residues, Cauchy Residue Theorem (without proof).

COURSE OUTCOME:

- After successfully completing the course, the student will have a good understanding of the following topics and their applications:
- Analytic function, singularity, residues and complex integration
- Laplace and Fourier transform and its properties, application of Laplace and Fourier transform
- Finding the solution of ode and pde

REFERENCE BOOK:

B.S. Grewal, Higher Engineering Mathematics, Khanna publisher's,44thedition

Erwin Kresyszig, Advance Engineering mathematics, John Wiley and Sons,9th edition

ETEE-201 Basic Electrical & Electronics Engineering

COURSE OBJECTIVES:

- To explain the laws used in the analysis of DC and AC circuits.

- To understand and analyses AC & DC circuits.

- To provide students with a fundamental knowledge of Single phase transformer construction and working.

- To provide students with a fundamental knowledge of AC Fundamentals.

- To provide students with a fundamental knowledge of Electrostatics.

- Familiarize with semi conductor devices, rectifier circuits and its applications.

- Describe the basic applications of transistor.

- Define logic gates&understand the working principles of logical circuits.

- Describe the significance of Boolean algebra in digital circuits.

MODULE-1:ELEMENTARY CONCEPTS

(A)   Prerequisite: Concept of Potential difference. Current and resistance. Ohm's law, resistance temperature coefficient, insulation resistance, SI units of work Power and Energy

(B)   Electromagnetism: Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule and cork screw rule, Concept of M.M.F., flux, flux density, reluctance, permeability and field strength, their units and relationships, analogy of electrical and magnetic circuit, Energy stored in magnetic field.

MODULE-2: D. C. CIRCUITS AND AC FUNDAMENTALS

(A)   Kirchhoff's law, ideal and practical voltage and current sources. Mesh and Nodal analysis (Super node and super Mesh excluded). Source transformation. Star delta transformation.

Superposition theorem, Thevevnins's theorem Norton's theorem, maximum power transfer theorem (Source transformation not allowed for superposition theorem, Mesh and Nodal analysis.

(B)   Sinusoidal voltage and currents, their mathematical and graphical representation, concept of cycle period, frequency, instantaneous, peak, average, r.m.s. values, peak factor , and form factor, phase difference.

MODULE-3: SINGLE PHASE TRANSFORMER AND ELECTROSTATICS

A) Single phase transformers: Construction, principle of working, e.m.f equations, voltage and current ratios, losses, definition of regulation and efficiency, determination of these by direct loading method.

B) Electrostatics: electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors.

MODULE-4: ANALOG DEVICES

A) Semi conductor theory:- Intrinsic and Extrinsic Semiconductors - N type and P type materials – mechanism of hole and free electrons- majority and minority carriers,drift and diffusion current - Semi conductor diode - V -I characteristics of PN Junction diode,.

B) Rectifiers: Working and Waveforms of Half wave - Full wave - Bridge rectifiers (without filters) – Differences.

C) Transistor: Working Principle of NPN and PNP transistor - Transistor as a switch - Transistor working as an amplifier- common base - common collector- common emitter configuration - input and output characteristics.

MODULE-5: BOOLEAN ALGEBRA AND LOGIC GATES

A) Number representation: Decimal, Binary, Octal and Hexa- decimal number systems - Conversion of number from one number system to another without decimal points - BCD Codes and limitations – Conversion of BCD to decimal and vice versa .

B) Logic gates: Definition, truth table, symbol and logical equations of logic gates: AND – OR - NOT- NAND – NOR-EXOR - EXNOR (Only 2-inputs) – Universal gates.

C) Logic Simplification: Rules and laws of Boolean algebra – Demorgan's Theorem and proof - Simplification of logic functions using Boolean.

COURSE OUTCOMES:

At the end of this course, students will demonstrate the ability to

- Analyze basic DC and AC electric circuits.
- Explain the working principles of transformers.
- To understand and analyses AC & DC circuits.
- Analyze Semi conductor devices and their applications.
- Explain the working principles of Rectifiers.
- To understand Number system representation and Boolean algebra& to understand Logic gates.

TEXT / REFERENCES:

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011
4. E. Hughes, "Electrical and Electronics Technology, Pearson, 2010
5. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

ETCS-201 C Programming

COURSEOBJECTIVES:

• Understand the basic concept of C Programming, and its different modules that include conditional and looping expressions, Arrays, Strings, Functions, Pointers, and Structures.

• Acquire knowledge about the basic concept of writing a program.

• Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language

• Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

MODULE-1: INTRODUCTION TO PROGRAMMING

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code, Arithmetic expressions and precedence

MODULE-2: CONDITIONAL BRANCHING AND LOOPS & ARRAYS

 Writing and evaluation of conditionals and consequent branching, Iteration and loops Arrays (1-D, 2- D), Character arrays and Strings

MODULE-3: BASIC ALGORITHMS & FUNCTIONS

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required) Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

Module-4:RECURSION

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

Module-5: STRUCTURE & POINTERS

Structures, Defining structures and Array of Structures Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

COURSE OUTCOMES:

• To formulate simple algorithms for arithmetic and logical problems.
• To translate the algorithms to programs (in C language)

• To test and execute the programs and correct syntax and logical errors.

• To implement conditional branching, iteration and recursion.

TEXTBOOKS /REFERENCES
1.   Byron Gottfried ,Schaum's Outline of Programming with C,McGraw-Hill
2.   E.Balaguru swamy, Programming ANSIC,Tata McGraw-Hill

ETME-201 Fundamental of Mechanical & Civil Engineering

COURSE OBJECTIVE:

The main learning objective of this course is to prepare the students for:

- Applying the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
- Applying the concepts of frictional forces at the contact surfaces of various engineering systems.
- To understand the concepts of Centroid and centre of gravity.
- To study the concepts of power plant, IC engine components refrigeration's and air conditioning.
- To study the concepts of properties of fluids.
- To study the civil engineering materials and building components.

MODULE-1: FORCE SYSTEMS AND FRICTION

Introduction –Laws of Mechanics – Lami's theorem,Triangle, Parallelogram and polygon law of forces –Force system and its classifications –Equivalent systems of forces, free body diagram.

Beam and types of beams – Support and types of support, Shear force and bending moment diagram– for cantilever and simply supported beam with concentrated, distributed load and couple.

Friction-its types, Laws of friction, Co-efficient of friction, Angle of friction, Angle of repose and its relation.

MODULE-2: CENTROID, CENTRE OF GRAVITY AND MOMENT OF INERTIA

Center of gravity and Moment of inertia; Centroid and center of gravity, Moment Inertia of area and mass, Radius of Gyration

MODULE-3: THERMAL ENGINEERING

Introduction, Classification of power plants – Working principle of steam, Gas, Diesel, Hydroelectric and Nuclear power plants - Internal combustion engines as automobile power plant – Working principle of Petrol and Diesel Engines – Four stroke and two stroke cycles - Principle of vapour compression system – Layout of typical domestic refrigerator – Window and split type room Air conditioner

MODULE-4: BASIC CONCEPTS OF FLUID MECHANICS

Fluid – definition, - Properties of fluids - density, specific weight, specific volume, specific gravity, temperature, viscosity, compressibility, vapour pressure, capillary and surface tension,Fluid statics: concept of fluid static pressure, absolute and gauge

pressures - pressure measurements by manometers and pressure gauges.Bernoulli's equation and its applications.

MODULE-5: CIVIL ENGINEERING MATERIAL, SURVEY AND BUILDING   COMPONENTS
Civil Engineering Material: Brick, Stone, Cement, Concrete and its properties.
Surveying: Principles, Measurements of distances, Determination of angles, area, and leveling
Building components: Foundation and its types, bearing capacity, Requirement of good foundation
 Superstructure: Brick masonry, Stone Masonry, beams, columns, Lintels, roofing, flooring, plastering.

 COURSE OUTCOME:

Upon completion of this course, the students will be able to:
- Apply the various methods to determine the resultant forces and its equilibrium acting on a particle in 2D and 3D.
- Apply the concepts of locating Centroid / center of gravity of various sections
- Apply the concepts of frictional forces at the contact surfaces of various engineering systems.
- To study the concepts of power plant, IC engine components refrigeration's and air conditioning.
- To study the concepts properties of fluids.
- To study the Civil Engineering Material, Survey and Building Components.

 TEXT BOOKS:

1. Beer Ferdinand P, Russel Johnston Jr., David F Mazurek, Philip J Cornwell, SanjeevSanghi, Vector Mechanics for Engineers: Statics and Dynamics, McGraw Higher Education. 11thEdition, 2017
2. Vela Murali, "Engineering Mechanics-Statics and Dynamics", Oxford University Press, 2018.
3. Nag. P.K. "Power Plant Engineering" Third Edition, Tata McGraw – Hill Publishing Company Ltd., 2008
4. B. C. Punamia- Surveying part-1
5. N.S. Basak – Surveying
6. Building Material – S. K. Duggal
7. R. K. Bansal Fluid Mechanics and Machinery

 REFERENCES:

1. Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008.
2. Hibbeller, R.C., and Engineering Mechanics: Statics, and Engineering Mechanics: Dynamics, 13th edition, Prentice Hall, 2013.

ETSH-202 Technical Communication & Project Management

COURSE OBJECTIVES

To introduce the students to the fundamentals of mechanics of writing.

- To facilitate them with the style of documentation and specific formal written communication.
- To initiate in them the art of critical thinking and analysis.
- To help them develop techniques of scanning for specific information, comprehension and organization of ideas.
- To enhance their technical presentation skills.

MODULE-1:

Mechanics of Writing: Grammar rules -Articles, Tenses, Part of Speech. General Reading and Listening comprehension – rearrangement & organization of sentences.

MODULE-2:

Different kinds of written documents: Definitions- descriptions- instructions- recommendations- user manuals – reports – proposals. Formal Correspondence: Writing formal Letters. Reading & Listening Comprehension.

MODULE-3:

Technical paper writing: documentation style – document editing – proof reading – Organizing and formatting Reading and listening comprehension of technical documents technical presentations

MODULE-4:

Reading and listening comprehension of technical documents

Technical presentations

MODULE-5:

Project Writing

COURSE OBJECTIVES

- To introduce the students to the fundamentals of mechanics of writing.
- To facilitate them with the style of documentation and specific formal written communication.
- To initiate in them the art of critical thinking and analysis.
- To help them develop techniques of scanning for specific information, comprehension and organization of ideas.

- To enhance their technical presentation skills.

TEXT BOOKS:

- Essential Communication Strategies for Scientists, Engineers and Technology Professionals. II Edition. New York: IEEE press, 2002
- Technical Communication: A Reader-Centred Approach. V Edition. Harcourt Brace College Publication, 2003
- Technical Report Writing Today. VIII Edition (Indian Adaptation). New Delhi: Biztantra, 2004.
- Practical English Usage, Oxford University Press, 2000

ETME-202   ENGINEERING GRAPHICS & DESIGN
COURSE OBJECTIVE:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products
- To expose them to existing national standards related to technical drawings.

MODULE-1: PLANE CURVES

Importance of graphics in engineering applications–Use of drafting instruments; BIS conventions and specifications; Size, layout and folding of drawing sheets; Lettering and dimensioning; Scales; Plane Curves: - Basic Geometrical constructions; Curves used in engineering practices

Conics; Construction of ellipse, parabola and hyperbola, cycloid, involutes of square and circle; Drawing oftangents and normal to the above curves.

MODULE-2: PROJECTION

Types of projection; Orthographic projection; Orthographic projection; First and Third angle projection; Projection of points and Lines; Line inclined to one plane and both planes.

MODULE-3: PROJECTION OF PLANES AND SOLIDS

Projection of Planes: Circle, Polygons; Projection of Polyhedrons: Prisms, Pyramids; Projection of Solids: Cylinders, Cones.

MODULE-4: SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES

Section of right solids by normal and inclined planes; Intersection of cylinders; Parallel line and radial - line method for right solids; Introduction of surfaces-cylinder

MODULE-5:ISOMETRIC PROJECTIONS & COMPUTER AIDED DRAFTING

Isometric Projections: Isometric scale, Isometric axes; Isometric Projection from orthographic drawing; Computer Aided Drafting (CAD): Introduction, Benefit; Software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders; transformations and editing commands like move, rotate, mirror, array; solution of projection problems on CAD

COURSE OUTCOME:

On successful completion of this course, the student will be able to

•   Familiarize with the fundamentals and standards of Engineering graphics

•   Perform freehand sketching of basic geometrical constructions and multiple views of objects.

•   Project orthographic projections of lines and plane surfaces.

•   Draw projections and solids and development of surfaces.

- Visualize and to project isometric and perspective sections of simple solids.

TEXT BOOK:

1. Bhatt, N.D. Engineering Drawing.

2. Dhawan, R.K. A Textbook of Engineering Drawing.

3. Venugopal, K. Engineering Drawing and Graphics.

ETCS-202 Basics of Internet of Things (IoT)

COURSE OBJECTIVE:

- The Internet is evolving to connect people to physical things and also physical things to other physical things all in real time.
- It's becoming the Internet of Things (IoT).
- The course enables student to understand the basics of Internet of things and protocols.
- It introduces some of the application areas where Internet of Things can be applied.

- Students will learn about the middleware for Internet of Things.

MODULE - 1 INTRODUCTION

Introduction, Definition and Characteristics of IoT, Some basic terminologies related to IoT, The technology behind IoT, Design principles of IoT:Physical design of IoT, Logical design of IoT, Functional blocks of IoT, , Advantage & Disadvantage of IoT. Applications of IoT.

MODULE-2 IOT& M2M

IoT& M2M ,M2M Communication, Key features of M2M, M2M Applications, Difference between IoT and M2M, Sensing, Actuation, Basic of Networking. M2M ecosystem.

MODULE-3 IOT ARCHITECTURE

IOT ARCHITECTURE - IoT Open source architecture (OIC)- OIC Architecture & Design principles- IoT Devices and deployment models- IoTivity : An Open source IoT stack - Overview- IoTivity stack architecture- Resource model and Abstraction.

MODULE-4 IOT AND ITS COMPONENT

 IoT and its component –Introduction, RFID, Applications of RFID, Wireless Sensor network (WSN & VSN), Participatory Sensing Technology, Embedded platform for IoT. Interfacing a gas sensor to Arduino.

MODULE- 5 IOT APPLICATION DEVELOPMENT AND DESIGN CHALLENGES

IoT Design methodology, Requirement and process model of IoT, Process specification, Information model for IoT application. IoT applications- smart city street lights-control and monitoring, Home automation, E-health, Smart farming.

COURSE OUTCOMES:

- Able to understand the application areas of IOT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics.

TEXT BOOKS /REFERENCES:

- Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press,2012.

- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet ofThings", Springer, 2011.

- David Easley and Jon Kleinberg, "Networks, Crowds, and Markets: Reasoning About a HighlyConnected World", Cambridge University Press, 2010.

- Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applicationsand Protocols", Wiley, 2012. References:

- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014

- CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1- 4493-9357-1

ETEE-211 Basic Electrical & Electronics Engineering Lab

LIST OF EXPERIMENTS:

A. BASIC ELECTRICAL ENGINEERING-

1. Verification of Ohm's Law.

2. Verification of KVL (Kirchhoff's Voltage Law) and KCL (Kirchhoff's Current Law).

3. Verification of Superposition theorem.

4. To Verify Maximum Power Transfer theorem.

5. Measurement of power and power factor of single-phase ac circuit using three voltmeter methods.

6. Verification of the venin's theorem.

7. To verify Norton's theorem.

8. To measure power and power factor in a single-phase A.C circuit using wattmeter.

B. BASIC ELECTRONICS ENGINEERING-

1. CRO – Applications.

2. V- I characteristics of Silicon & Germanium PN junction diodes.

3. V-I characteristics of Zener diode.

4. Characteristics of BJT in Common Emitter Configuration.

5. Characteristics of JFET in common source configuration.

6. Half and Full wave rectifier without filter.

7. Half wave and Full wave rectifier with Filter.

8. Characteristics of Common Emitter BJT amplifier.

ETME-211 Fundamental of Mechanical & Civil Engineering Lab

LIST OF EXPERIMENT

1. To verify the parallelogram law of forces.
2. To verify the lami's theorem.
3. To determine the coefficient of Friction of an inclined Plane.
4. To study about the model of two stroke petrol engine.
5. To study about the four-stroke petrol engine and diesel engine.
6. To Verify the Bernoulli's Theorem.
7. To determine the compressive strength of Brick
8. To determine the horizontal angle with prismatic and surveyor compass.
9. To determine the area by chain survey.

10. To measure horizontal and vertical angles in the field by using Theodolite.

ETCS-211 C PROGRAMMING LAB

S. No	Experiment Name
A	Theory: Variable, Data type, Keyword, Operator, Hello world Program, Control Structure, Array, Pointer
1	Write a C program to find the sum of individual digits of a positive integer.
2	Write a C program to generate Fibonacci series.
3	Write a C program to generate all the prime numbers between 1 and n is a value supplied by the user.
4	Write a C program to find the roots of a quadratic equation.
5	Two integer operands and one operator form user, performs the operation and then prints the result.
6	Write a C program to find the factorial of a given integer by using recursive and non-recursive functions.
7	A C program to find both the largest and smallest number in list of integers
8	Write A C- Program To Determine If The Given String Is A Palindrome Or Not
9	Example of Array In C programming to find out the average of 4 integers
10	Write a program in c to Addition of two matrix in C
11	Write a C program to Implement the following searching method. i) linear search ii) Binary search
12	Write C programs that implement the following sorting methods to sort a given listof integers in ascending order by using Bubble sort.

ETSH301	ENGINEERING MATHEMATICS-III	L	T	P	C	HOURS PER WEEK
		3	1	0	4	4

Objectives of the Course: -

The objective of this course is to familiarize the students with statistical techniques. Itaimstoequipthestudentswithstandardconceptsandtoolsatanintermediateto advancedlevelthatwillservethemwelltowardstacklingvariousproblemsinthedis cipline.

Module I: Basic Probability

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multi nominal distribution, Poisson approximation to the binomial distribution, in finite sequences of Bernoulli trials, sums of independent random variable s; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

Module II: Continuous   Probability Distributions and Bivariate Distributions

Continuous random variables and their properties, distribution functions and densities,

normal,bi variate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes'rule

Module III: Basic   Statistics: Measures of Central tendency
Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression–Rank correlation.

Module IV: Applied Statistics
Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Module V: Small samples
Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

 ReferenceBooks

1. **B.S.Grewal,**HigherEngineeringMathematics,KhannaPublisher's, 36[th]edition, 2010.

2. **Erwin Kresyszig,** Advance Engineering Mathematics, John Wiley and Sons, 9th edition,2006.

ETCE301	STRUCTURAL MECHANICS-I	L	T	P	C	HOURS PER WEEK
		3	1	0	4	7

Course Objective:-To familiarize the student with the various stresses that may act on a material such as compressive stress, tensile stress, tangential stress, etc and the response of a material to each of these types. The course will define basic concepts and calculations that will come handy in longterm to civil engineering students.

MODULE –I Simple & Principal Stress and Strains: -Concept of Elastic body stress and Strain, Hooke's law, Types of stress and strains, Elastic constants, Stresses in compound bars, Composite and tapering bars, Temperature stresses, Complex Stress and Strains- Two dimensional and three-dimensional stress systems, Principal Planes, Principal Stresses and Strains, Mohr's circle of

stresses.   **10**

MODULE –II Shear Force, Bending Moment and Deflection of Beams: - Introduction, Types of Beams, Load & Support, Support Reactions, Shear force and bending

moment Diagram for Cantilever, simply supported and overhanging beam with concentrated, distributed load and

Couple, Determination of Slope and Deflection of beams by Double Integration Method, Macaulay's Method, Area Moment Method. **9**

MODULE –III Bending and Shearing Stresses: -Theory of simple bending, Concept of pure bending and bending stress, Equation of bending, Neutral axis, Section-Modulus, Differential equation of the elastic curve, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading, Bending stress distribution across a section of beam, Shearing Stress & shear stress distribution across a section in

Beams. **9**

MODULE –IV Torsion of Shafts, Thin Shell& Spring: -Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Torsion of solid and hollow circular shafts, Analyses of problems based on combined Bending and Torsion, Thin Pressure Vessels: cylinders and spheres, Stress due to internal pressure, Change in diameter and volume, Introduction of spring, Types of spring, Closed coil helical spring, Laminated Spring.

7

MODULE –V Columns and Struts: -Introduction, Theory of columns, Slenderness ratio, Direct and bending stresses in short columns, Kern of a section. Buckling and stability, Euler's buckling/crippling load for columns with different end conditions, Rankin's formula, Eccentric loads and the Secant Formula-Imperfections in columns

Course Outcomes: Develop basic concept of forces acting on simple structural elements and also the concept of combined stresses in materials used in civil engineering. Apply the engineering properties of material and calculate the stress, shear force, B.M., deflection, bending and shear stress and torsion of different section like beam, column etc.

ETCE311   PRACTICAL OF STRUCTURAL MECHANICS-I

List of Experiments: -

1. To determine the tensile strength of metals and materials by Universal Testing machine
UTM
2. To determine the Compressive and Tensile Strength of Materials.
3. To determine the Brinell Hardness of Materials.
4. To determine the Rockwell Hardness of Materials
5. To determine the Toughness of the materials.
6. To determine the stiffness of the spring.
7. To determine the deflection of Beam by the use of deflection-beam apparatus.
8. To determine the compressive strength of metals and materials by Universal testing machine
UTM
9. To determine bending strength of metals and materials by Universal testing machine UTM
10. To determine shearing strength of metals and materials by Universal testing machine UTM

Text/Reference Books:
1. S. Ramamrutham, R. Narayanan, Strength of Materials, Dhanpat Rai Publications.

2. Rajput R. K., Strength of Materials, S. Chand.
3. Sadhu Singh , Strength of Material , Khanna Publishers
4. Punmia B.C., Mechanics of Materials, , Laxmi Publications (P) Ltd. 5. S.S Bhavikaati, Strength of Materials, Vikas Publisher, new Delhi
6. R. Subramaniam, Strength of Materials, Oxford University Press.

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE302	BUILDING MATERIAL & CONSTRUCTION TECHNIQUE	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective:-The course relates to the fundamentals related to concrete and concrete material, besides dealing with masonry, reinforcement, etc. The course begins with an outline of what concrete is, what are the processes involved in formation of concrete, various materials that are used in concrete formation, properties of each ingredient of concrete, standard tests to be applied to concrete and concrete ingredients. The course then moves on to design-mix, special concretes, Nondestructive testing, The prevalent techniques for damp proofing, termite proofing and fire resistance will also be explained. etc.

MODULE –I Introduction:- Building Materials:- Stones, Bricks, Cement, Timber, Introduction of Concrete & its properties, Grades, Advantage & disadvantages of concrete, Ingredients of concrete, Workability, Strength properties of Concrete, Admixtures, Nominal proportion of
Concrete, Preparation of concrete, Compaction, Curing. Inspection & testing of materials as per IS
Specifications.   **8**

MODULE -II Fresh and Hardened Concrete:-Introduction, Workability of Fresh Concrete, Testing of concrete, Factors affecting to Properties of Concrete, Rheology of concrete, Compressive & Tensile strength, Stress and strain characteristics, Shrinkage and temperature effects, Creep of concrete Permeability, Durability,

Thermal properties & micro-cracking of concrete. Various classical methods of concrete mix design, I.S. code method Basic considerations and factors influencing the choice of mix design, Acceptance criteria for concrete   **9**

MODULE -III Advance Construction Materials:- Lightweight concrete, Ready mix concrete, Vacuum concrete, Ferrocement, Fiber reinforced concrete, Polymer concrete composites, Shortcrete & Guinting, Prestressed concrete, Heat resistant concrete, Mass concrete, D.P.C. materials, Building materials made by Industrial & agricultural waste, Clay products P.V.C. materials, Use of
fly ash in mortars, concrete, Fly ash bricks, Stabilized mud blocks.   **8**

MODULE -IV Production and Quality Control of Concrete: -Production of crushed stone aggregate batching, Equipments for production and concreting, Curing at different temperatures, Concreting underwater, Hot & cold weather condition, Statistical quality control, Field control,
Non-destructive testing, Repair technology for concrete structures, Inspection & Testing of Concrete   **9**

MODULE -V Masonry and Walls:- Brick masonry, Bonds, Jointing, Stone masonry, Casting and laying, masonry construction, Brick cavity walls, Code provisions regarding load bearing and non load bearing walls, Common defects in construction and their effect on strength, Designed Brick masonry, precast stone masonry block, Hollow concrete block, Plastering and pointing, white and color washing, distempering, Doors, Windows and Ventilators: Types based on material etc., size location, fittings, construction sunshades, sills and jambs, RCC doors/windows frames, Stairs types,
rule of proportionality.   **10**

Course Outcomes: - Define the fundamental science and engineering principles relavents to civil engineering materials. Select the proper construction material, enhanced the workability and quality of material and use the material in proper manner.

ETCE312   PRACTICAL OF BUILDING MATERIAL & CONSTRUCTION TECHNIQUE

List of Experiments: -

1. To determine the fineness of cement.
2. To determine the normal consistency of cement.
3. To determine the initial and final setting time of cement.
4. To determine compressive strength of cement.
5. To determine tensile strength of cement.
6. To determine the soundness of cement
7. To determine the fineness modulus of fine aggregate & course aggregate
8. Determining workability of concrete.
9. Compressing strength of concrete cube.
10. To determine the Workability of concrete by-
a) Slump cone test
b) Compaction factor
c) Vee Bee test

Suggested Reading: -
 1. M L Gambhir,Concrete Technology Theory and Practice, McGraw-Hill Education.
 2. M S Shetty, Concrete Technology. S. Chand Technical
 3. SS Bhavikatti, Concrete Technology, IK International
 4. Sinha, S N Reinforced Concrete Design, Tata McGraw Hill Education Private Limited.
 5. Rai Mohan, M.P. Jai Singh, Advances in Building Materials & Construction.

 Additional Learning Sources: -
 1. Web links to e-learning: NPTEL.
 2. Web links to e-learning: NCTEL.

ETCE303	ENGINEERING GEOLOGY	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective: To impart the basic knowledge about minerals and rocks-their inherent properties, deformation and structures**.**

MODULE-I General Geology: -Objects and scope of geology the crust and the interior of the earth Origin and age of the earth Sub-aerial land, sub-terrain weathering, Denudation and deposition, wind, river, glacial and marine erosion Geological classification of soil and concept of
earthquake, Plate- tectonics.   **8**

MODULE -II Mineralogy and Crystallography: -Fundamentals of mineralogy Study of common rock form minerals Ores and minerals of economic importance to civil engineering Elements of crystallography and introduction to crystal systems.
8

MODULE –III Earthquake, Mass Movements and Site Investigation: -Introduction of Earthquake Causes, types, intensity and magnitude of earthquake Engineering designs and precautions Landslides, stability of hill slopes and road cuttings Factors in site selection, alignment and construction of dam Factors in site reservoir, bridge and tunnel.   **12**

MODULE –IV Geology of India & Structural Geology: -Physical features of India Brief geological history of India Occurrence of important ores and minerals in India Structures related to rocks Dip, Strike and outcrops Classification and detailed studies of geological structures i.e. folds,
Faults, Joints, Unconformity and their importance in Civil Engineering.   **9**

MODULE –V Geotechnical Properties of Rocks and Rock Masses:-Rocks as construction material Common tests Occurrence and distribution of the building stones Road and rail ballast in India Engineering properties and geo-mechanical classification of rock mass.

Course Outcomes:-Learn about earth processes with which the civil engineers and the structures made by them. Identify physical and mechanical properties of rocks through experimentation and will be able to quantify the properties. Find the actual site for construction by knowing the geological properties of site through site Investigation.

ETCE313 -PRACTICAL OF ENGINEERING GEOLOGY

List of Experiments:-
1. Identification of simple rock-forming minerals and important ores.
2. Identification of Sedimentary rocks.
3. Identification of Metamorphic rocks.
4. Identification of Igneous rocks.
5. To Study of Topographic and geological map
6. To study of Geological section of horizontal
7. To study of Geological section of vertical rocks
8. To study of Geological section of inclined rocks
9. To study of Geological section of Unconformable rocks
10. To study of Geological section of Folded rocks 11. To study of Geological section of Faulted rocks
12. Field Visit / Geological Excursion.

Text books/References:
1. Prabin Singh, (2000), Engineering and General Geology, Kataria Pubs. Delhi.
2. M.C. Kesavalu, (2000), Text Book of Engineering Geology, CBS Pubs. New Delhi
3. P.D., Krynine and W.R. Judd, (2000), Principles of Engineering Geology and Geotechnics, CBS
Pubs.New Delhi."
4. IS: 2386, Part I to VIII. (1963), IS: 7422, Part I to V (1974), Govt. of India
5. M. MasroorAlam (2013), Fundamental of Engineering Geology and Geo-engineering, Axioe books,India"

.

Additional Learning Sources:-
1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE304	BUILDING PLANNING AND DRAWING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective: - To understand the concept of building planning and architecture, various building codes to be followed while planning a building and have the knowledge of various building components.

MODULE –I Drawing of Various Building Elements:-Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs

and staircase, trusses, flooring, roofs etc.   **9**

MODULE –II Provisions & Other Factor Building Planning: -National Building Code, Building bye-law open area, Setbacks, FAR terminology, Principle of architectural composition (i.e. Unity,

contrast, etc.), Principles of planning, Orientation.   **7**

MODULE –III Building Services: -Introduction of Building Services like water supply and drainage, Electrification, Ventilation and lightening and staircases, Fire safety, Thermal insulation,

Acoustics of buildings.   **8**

MODULE –IV Design and Drawing of Building: - Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, Detailing of doors, windows, ventilators and staircases etc.
15

 MODULE –V Perspective Drawing: -Elements of perspective drawing involving simple problems

one point and two-point perspectives energy efficient buildings.

5 Course Outcomes: - Visualize the structure to the owner before the construction by proper drawing of all component of structure in different views. Study about

ETCE314 PRACTICAL OF BUILDING PLANNING AND DRAWING

List of Experiments: -

1. Sketches of various building components.
2. One drawing sheet of doors
3. One drawing sheet of windows
4. One drawing sheet of stairs
5. One drawing sheet of foundations
6. One drawing sheets each for services and interiors of buildings.
7. One drawing sheet containing detailed planning of one/two bed room residential building
   (common to all student)
8. One drawing sheet of residential building
9. One drawing sheet of institutional building
10. Use of AutoCAD for preparation of drawings.

Text books/References:
1. S. Ramamrutam & R.Narayanan; Basic Civil Engineering, Dhanpat Rai Pub.
2. Duggal, Surveying, Tata McGraw Hill New Delhi.
3. Punmia, B.C., Surveying, Standard book depot.
4. S.C. Rangwala, Building Construction, Charotar publications House, Anand.

5. SheshaPrakash and Mogaveer; Elements of Civil Engg&Engg. Mechanics; PHI
6. Grucharan Singh, Building Construction, Standard Book House, New Delhi

Additional Learning Sources: -
1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE401	ENGINEERING HYDRAULICS-I	L	T	P	C	**HOURS PER WEEK**
		3	**0**	**0**	**3**	**6**

Course Objective:-The main objective of this course is to understand the basics of the fluid mechanics such as fluid and flow properties, fluid behavior at rest and in motion and fundamental equations like mass, energy and momentum conservation of the fluid flow.

MODULE –I Basic Fluid Properties & Fluid Statics:-Engineering Units of measurement Mass density, Specific weight, Specific volume, Specific gravity, Viscosity, Surface tension, Capillarity, Bulk modulus of elasticity, Pressure and vapour pressure. Pressure at a point, Pressure variation in static fluid Absolute and gauge pressure, manometers, Forces on plane and curved surfaces Buoyant force, Stability of floating and submerged bodies Relative equilibrium. **11**

MODULE –II Kinematics of Flow & Forces on Immersed Bodies:-Types of flow-ideal & real , Steady &unsteady, U uniform & non uniform, one, two and three dimensional flow Path lines, Streak lines, streamlines and stream tube, Continuity equation for one and three dimensional flow Rotational &irrotational flow, circulation Stagnation point, separation of flow, sources & sinks Velocity potential, stream function Types of drag, drag on a sphere, a flat plate, a cylinder and an aerofoil development of lift, lifting vanes, Magnus effect. **9**

MODULE –III Dynamics of Flow:-Euler's equation of motion along a streamline and derivation of Bernoulli's equation "Application of Bernoulli's equation, energy correction factor Linear momentum equation for steady flow; momentum correction factor The moment of momentum equation, forces on fixed and moving vanes and other applications Velocity measurement (Pitot tube, Prandtl tube, current meters etc.)Flow measurement (orifices, nozzles, mouth pieces, orifice meter, nozzle meter, venturimeter, weirs and notches). **8**

MODULE –IV Dimensional Analysis and Dynamic Similitude:-Dimensional analysis, dimensional homogeneity   Use of Rayleigh method and Buckingham-pi theorem Calculation of dimensionless numbers, Similarity law Specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, rotodynamic machines etc. **7**

MODULE –V Laminar Flow & Potential Flow:-Introduction to laminar & turbulent flow, Reynolds experiment & Reynolds number "Relation between shear & pressure gradient Laminar flow through circular pipes Laminar flow between parallel plates Laminar flow through porous media, Stokes law. Introduction of Potential Flow, its measurement & application   **10**

Course Outcomes: Knowing the different properties of fluid, fluid pressure, under kinematic and dynamics condition, Find the forces and flow behavior on hydraulic structure. Apply fundamental concepts of fluid statics in analyzing the force on hydraulic structure such as water tanks, retaining walls, sluice gates, dams, etc. and also check their stability.

ETCE411   PRACTICAL OF ENGINEERING HYDRAULICS-I

List of Experiment:-
1. To determine the local point pressure with the help of pitot tube.
2. Verification of Impulse momentum principle.
3. To find out the terminal velocity of a spherical body in water.
4. Calibration of Venturimeter
5. Determination of Cc, Cv, Cd of Orifices
6. Calibration of Orifice Meter
7. Calibration of Nozzle meter and Mouth Piece
8. Reynolds experiment for demonstration of stream lines & turbulent flow
9. Determination of metacentric height   10. Verification of bernoulli's equation **Text books/References:**
1. Modi& Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechnics and machinery; TMH
3. White ; Fluid Mechanics ; TMH
4. R.J. Garde, "Fluid Mechanics" RPH, Roorkee, India.
5. R. K. Bansal, Fluid Mechanics and Hyd. Machines, Laxmi publisher, New Delhi.

 Additional Learning Sources:-

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE402	STRUCTURAL MECHANICS-II	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective: - To develop an appreciation of need, importance and scope of generalized state of stress and strain, Analysis of statically determinate structure, Stress analysis of thick, Compound Cylinder, Theories of failure, Deflection of Beam by conjugate Beam method, Unsymmetrical bending, Shear centre, Curved beam& Energy Method.

MODULE-I Generalized State of Stress and Strain, & Analysis of Statically Determinate Structure: -Generalized state of stress and strain, Stress and strain tensor, Yield criteria Stress space. Stability of dams, retaining walls and chimneys. **8**

MODULE-II Stress Analysis of Thick, Compound Cylinder & Theories of Failure: -Stress analysis of thick and compound cylinder, and theories of failure; Tresca, Von-Misses, Hill criteria, Heigh- westerguard's. **8**

MODULE-III Deflection **of Beam** -Conjugate Beam method. **6**

MODULE-IV Unsymmetrical Bending, Shear Centre & Curved Beam:- Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal

sections, Stress distribution and position of neutral axis. **10**

MODULE-V Energy Method: -Strain energy, elastic, complementary and total strain energy, Strain energy of axially loaded bar, Beam in bending, shear and torsion; General energy theorems

Castigliano's theorem, Maxwell Bettie's reciprocal theorem; Virtual work and Unit load method for deflection, Application to problems of beams and frames. **12**

Course Outcomes: Apply the basic principle of structural mechanics in analysis of simple structural members. Apply different theories (Tresca, Von-Misses, Hill criteria,

Heigh- westerguard's) and methods (Strain energy, conjugate beam etc.) to calculate shear force, bending moment and deflection on different parts of structure.

ETCE412   PRACTICAL OF STRUCTURAL MECHANICS-II

List of Experiment:-

1: To determine the impact value of the given specimens by Izod impact testing machine

2: To determine the transverse modulus of elasticity by plotting the load deflection curve

3:To study the deflected shapes of columns for different end conditions

4: To determine the buckling load on columns for different end conditions

5: Verification of bending moment and shear force in beams

6: To determine the shear modulus by plotting the torque twist diagram for a circular shaft

7: To determine the Brinell's Hardness number for different materials

8: To understand the behavior of a mild steel bar under tension by plotting stress-strain curve

9: To understand the behavior of a mild steel bar in compression by plotting stress-strain curve 10: Verification of deflection in beams

Text books/References: 1. Kazmi, S. M. A.,
'Solid Mechanics' TMH, Delhi, India.

2. Singh Surendra, 'Strength of Materials', Vikas Publishing House Pvt. Ltd., New Delhi.

3. Rajput R. K., 'Strength of Materials', S. Chand & Company Ltd., New Delhi..

4. Singh Sadhu; Strength of Materials

5.Ramamrutham; Strength of Materials,

 Additional Learning Sources:-
1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE403	SURVEYING	L	T	P	C	**HOURS PER WEEK**

			3	0	0	3	6

Course Objective: -To learn the different techniques of linear and angular surveying, leveling, Traversing, Hydrographic Surveying.

MODULE –I Introduction of Surveying & Chain surveying: - Definition, Objects of surveying, Principles of surveying, Uses of Survey classification of surveying, Primary –plain, Geodetic. Secondary – based on instruments, Method, Object, Nature of field, Principle of chain survey, Study and use of instruments for linear Measurements- Chain, Tape, Ranging rod, Arrows, Pegs, Cross Staff , Optical square, Line ranger, Survey lines, Check lines, Tie lines, Base line, Offsets & Obstacles, Errors in chain surveying & applying corrections for chain & tape.   **10**

MODULE –II Compass Surveying: - Definition & principle of compass survey, Meridian, Bearing of lines, Fore bearing & back bearing, Whole circle bearing and Reduced bearing, Conversion of bearings, Finding included angles from bearings, Prismatic & Surveyor compass – Component, Construction and use, Local attraction, Correction of bearings affected due to local attraction.   **8**

MODULE –III Leveling:- Definitions – level surface, Level line, Horizontal line, Vertical line, Datum surface, Reduced level, Bench mark and its types, Dumpy & Auto level – Components,
Construction & their temporary adjustments, Line of sight, Line of collimation, Bubble tube axis, Leveling staff -telescopic and folding type, Foresight, Back sight, Intermediate sight, Change point, Height of collimation, Method of reduction of levels – Height of instrument method and Rise and fall method, Arithmetical checks, Numerical problems, Computation of missing readings, Classifications of leveling - Simple, Differential, Profile, Cross sectional, Fly and Check leveling   **9**

MODULE –IV Traversing:- Traversing by theodolite, Field work checks, traverse computations, latitude and departures, adjustments, computations of co-ordinates, plotting & adjusting or traverse, Omitted measurements, Measurement EDM, Trigonometrical leveling,   **8**

MODULE –V Hydrographic Surveying:- Soundings, Methods of observations, Computations and plotting. Principles of photographic surveying: aerial photography, Tilt and height distortions,
Introduction of Remote sensing, GPS and GIS.   **8**

Course Outcomes: Perform linear and angular measurement to estimate earth work and prepare required platform for construction by help of different survey

equipments. Apply the knowledge gained in execution of different engineering projects like construction of roads, railways, canal etc.

ETCE413   PRACTICAL OF SURVEYING

List of Experiment:-

1. Familiar with different instruments used for surveying
2. Measure horizontal distance by tape
3. Measure horizontal distances by chain on plain ground
4. Perform detail chaining between two points
5. Measure bearing of traverse by surveyor compass
6. Measure bearing of traverse by prismatic compass
7. Measure level of area by Dumpy level
8. Measure level of area by Auto level
9. Profile leveling, contouring & cross sectioning
10. Theodolite traversing

Text books/References:
1. Kanetkar, T.P. Surveying &Levelling, Vol. I & II.
2. Duggal; Surveying vol I and II; TMH
3. Basak; Surveying and Leveling; TMH
4. Devis R.E., Surveying theory & Practice, Mc.Graw Hill, New York
5. David Clark & J Clendinning, Plane & Geodetic surveying Vol. I & II, constable & Co. London.
6. Roy, S.K., Fundamentals of surveying, prentice - Hall of India New Delhi
7. Punmia, B.C. Punmia, Surveying Vol. I, II, III, Laxmi Publications New Delhi
8. Arora,K.R. Surveyhing Vol. I & II, standard book House, New Delhi

 Additional Learning Sources:-
1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

		L	T	P	C	HOURS PER WEEK
ETCE404	**TRANSPORTATION BRIDGE AND TUNNEL**	**3**	**0**	**0**	**3**	3

Course Objective: To introduce the elements related to railway engineering and airport engineering. Take knowledge of rails, rail joints, geometric design railway tracks, points and crossings.

MODULE –I Introduction, Tractive Resistances & Permanent Way:-Principles of Transportation, Transportation by Roads, railways, Airways, Waterways, their importance and limitations , Route surveys and alignment, Railway track development and gauges, Hauling capacity and tractive effort,
Rails: types, welding of rails, wear and tear of rails, rail creep,
Sleepers: types and comparison, requirement of a good sleeper, sleeper density,
Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.
Ballast: Requirement of good ballast, various materials used as ballast, quantity of ballast, different
methods of plate laying, material trains, calculation of materials required, relaying of track.   **14**

MODULE -II
Geometric Design, Station & Yards; Points and Crossings & Signaling and Interlocking:- Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency ,Various types of curves, speed on curves, Types, locations, general equipments, layouts, Marshalling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards,
 Principles of signaling and inter-locking.   **8**

Module –III Bridge Site Investigation and Planning, Loading Standards &Component Parts:- Selection of site, alignment, Collection of bridge design data: essential surveys, Hydraulic design, Scour depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges, Design loads and forces, Impact factor, Bridge super structure and sub-structures, abutments, piers, wing walls, return walls, approaches, floors & flooring system.   **8**

MODULE –IV Bridge Foundations, Construction, Testing and Strengthening of Bridges: Different types of foundation: piles and wells, Sinking of wells, coffer-dams, Choice of bridges and choice of materials, details of construction underwater and above water, Erection of bridges, girders, Equipments and plants, Inspection and Data collection, Strengthening of bridges, Bridge failure.   **6**

MODULE –V Tunnels:-Selection of route, Engineering surveys, alignment, Shape and size of tunnel, Bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts, Construction, tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking Operation, Drainage and ventilation.   **8**

Course Outcomes: Design, plan and construct railway track, railway crossing, signal control, railway yard, platform, tunnel and bridge.Develop technical skills for operation and design of railway crossing, signals.

Text books/References:

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnuswamy; Bridge Engineering; TMH
5. Arora&Saxena, Railway Engineering - DhanpatRai& Sons
6. Antia K.F. , Railway Track
7. Bindra S.P. Principles and Practice of Bridge Engineering   - DhanpatRai& Sons
8. Alagia J.S. Bridge Engineering - Charotar Publication House, Anand
9. Saxena S.C. (Dr.) Railway, Bridges & Tunnels
10.R. SrinivasanHarbour, Docks & Tunnel Engineering
.

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE405	REINFORCED CEMENT CONCRETE -I	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective: The objective of this subject is to introduce the theory and application of analysis and design of reinforced concrete elements. The course focuses on the understanding the behavior of reinforced concrete components and systems subjected to gravity loads.

MODULE –I Basic Principles of Structural Design:-Introduction of R.C.C and its Assumptions, Mechanism of load transfer, Various properties of concrete and reinforcing steel, Introduction to WSM and LSM of design method, Partial safety factor for load and material, Calculation of various loads for structural design of singly reinforced beam.   **10**

MODULE –II Design of Beams:-Doubly reinforced rectangular & Flanged Beams, Lintel, Cantilever, simply supported and continuous beams, Beams with compression reinforcement, Redistribution of moments in continuous beams, Introduction of Deep beams, Design of beam for
shear and bond.   **10**

MODULE –III Design of Slabs:-Introduction of slab, Slabs spanning in one direction, Cantilever, Simply supported and Continuous slabs, Slabs spanning in two directions Circular slabs, Waffle
slabs & Flat slabs, Yield line theory.   **10**

MODULE –IV Columns & Footings:- Introduction of column & Effective length of columns, Short and long columns- Square, Rectangular and Circular columns, Design of Isolated and combined footings, Design of Strap footing, Columns subjected to axial loads and bending
moments, Design of Raft foundation.   **9**

–V Staircases:-Introduction of staircase and relation between riser and trade, Staircases
with waist slab having equal and unequal flights with different support conditions, Slab-less tread-riser staircase.   **6**

"NOTE :-All the designs for strength and serviceability should strictly be as per the latest version of IS:456.   Use of SP-16 (Design aids).

Course Outcomes: Understand the difference between the structural behavior of different reinforced concrete structural elements through demonstration, experiments and analysis. Analyze

and design different elements of RCC structures elements under gravity loads and submit the designs in complete manner.

ETCE415 PRACTICAL OF REINFORCED CEMENT CONCRETE –I

List of Experiments:- Design and detailing
based on theory class.

Text books/References:

1. Jain, A.K. "Reinforced Concrete- Limit State Design", Nem Chand & Bros. Roorkee. 2. Varghese ,P.C. Limit State Design ,Prentice Hall of India, New Delhi
3. Rammuttham, Plain & reinforced concrete
4. Raju N.K, Structural Design & Drawing
5. Ramchandra & V.Gehlot, Design of Concrete Structure, Scientific Publisher, Jodhpur

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

FIFTH SEMESTER

ETCE501	STRUCTURAL ANALYSIS-I	L	T	P	C	HOURS PER WEEK
		3	1	0	4	4

Course objective:-To develop an understanding of various types of structures and their built to facilitate the performance of various activities connected with residence, transportation, storage, healthcare etc. in the field of civil engineering.

MODULE –I Virtual Work and Energy Principles:- Principles of Virtual work applied to deformable bodies, strain energy and complementary energy, Energy theorems, Maxwell's Reciprocal theorem, Analysis of Pin-Jointed frames for static loads.   **8**

MODULE –II Indeterminate Structures-I:- Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by theorem of three moments, Effect of sinking and rotation of supports, Moment distribution method (without sway).   **10**

MODULE –III Indeterminate Structures- II:- Analysis of beams and frames by slope Deflection method, Column Analogy method.   **8**

MODULE –IV Arches and Suspension Cables:- Three hinged arches of different shapes, Eddy's Theorem, Suspension cable, stiffening girders, Two Hinged and Fixed Arches - Rib shortening and temperature effects.   **10**

MODULE–V Rolling Loads and Influence Lines:- Maximum SF and BM curves for various types of Rolling loads, focal length, EUDL, Influence Lines for Determinate Structures- Beams, Three Hinged Arches.   **8**

Course Outcomes: Apply fundamental concept of mechanics statics, mathematics of deformable body and principle of dynamics to the solution of fundamental civil engineering structural analysis problems. Understand the significance of the basic mechanical properties of structural materials. Develop the ability to analyse cable and arch structures.

Text books/References:
1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
3. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.

4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.

5. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill International, Tokyo

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.

2. Web links to e-learning: NCTEL.

ETCE502	SOIL MECHANICS	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective: To impart knowledge and skill for soil identification, classification other physical properties of soils, viz Grain size, Effective stress, Capillarity, Permeability,Compaction,Seepage, Stress distribution, Lateral Earth Pressureand Consolidation.

MODULE -1 Introduction, Index Properties& Classification:-Definition and scope of soil mechanics, Origin and Classification of soils, Soil water relationship (phase system of soil), Index properties and their determination, Grain size analysis Soil consistency, determination of consistency limit thixotropy, sensitivity and Activity number, Classification of soil based on Unified soil classification system & IS soil classification system, clay mineral & Soil structure.   **11**

MODULE -2 Effective stress, Capillarity &Permeability:-Total, neutral and effective stress, Capillarity in soil**,** Permeability Darcy's law, factors affecting permeability. Laboratory determination of permeability, Permeability of stratified soils Quick sand conditions and liquefaction of soil.   **7**

MODULE -3 Compaction, Seepage through soil & Soil stresses:-Theory of compaction, laboratory compaction tests, optimum moisture content and zero air void line. Field methods and compaction control, Seepage and seepage pressure. Flownets, uses of a flownet, Seepage in anisotropic soil, Seepage through non-homogeneous soil, Stresses in soil mass due to surface loading. Boussinesq and Westergaard's formulaefor point load. Pressure bulb. Vertical pressure under various uniformly loaded area. Newmark's influence chart. Approximate methods.   **11**

MODULE -4 Shear Strength of Soils & Stability of Slopes:-Mohr - Coulomb's theory of shear failure of soils, Mohr's stress circle, Measurement of shear strength, Shear box test, Triaxial compression test, unconfined compression test, Vane shear test, Measurement of pore pressure, pore

pressure parameters, critical void ratio, Liquefaction, Infinite and finite slopes, Types of slope failures, Rotational slips, Stability number, Effect of ground water, Selection of shear strength parameters in slope stability analysis, Analytical and graphical methods of stability analysis,
Stability of Earth dams.   **9**

MODULE - 5 Compressibility and Consolidation:-Spring analogy, Equation of one dimensional consolidation. Coefficient of consolidation, coefficient of compression, compression index, precompression pressure. Over consolidation ratio, Consolidation Settlement analysis. Basics of three-
dimensional consolidation, Sand drains.   **7**

Course Outcomes: Apply fundamental concept of mathematics, law of mechanics and fluid mechanics to obtain the solution of soil mechanics problems. Check the physical and engineering properties like void ratio, unit weight, water content, consistency, effective stress, permeability, compaction and consolidation of soil to finalize the types, dimensions and depth of Foundation.

ETCE512 - PRACTICAL OF SOIL MECHANICS List of
Experiments:-

1. Determination of water content of soil by oven drying method.
2. Determination of water content of soil by Pycnometer method.
3. Determination of water content of soil by Rapid moisture meter method.
4. Determination of specific gravity of soil by Pycnometer method.
5. Determination of in-situ density by Core cutter method
6. Determination of in-situ density by Sand replacement method
7. Determination of particle size distribution by sieving (Grain size analysis) 8. Determination of liquid limit, Plastic limit, and Shrinkage limit of fine soil.
9. Determination of co-efficient of permeability
10. Determination of maximum dry density and optimum moisture content by Standard Proctor compaction method
11. To determine shear strength parameters of the given soil by direct shear test.
12. To determine shear strength parameters of the given soil by triaxial test.
13. To determine shear strength parameters of the given soil by vane shear test.

Text books/References:

1. Gopal Ranjan and A.S.R.Rao, "Basic and Applied Soil Mechanics", New Age International (P) Ltd,New Delhi.
2. Soil Mech. & Found. by Dr. B.C.Punmia- Laxmi Publications, Delhi.
3. Soil Mech. & Found. Engg. by Dr. K.R. Arora - Std. Publishers Delhi.
4. V.N.S.Murty, "Soil Mechanics and Foundation Engineering", SaiKripa Technical Consultants,Banglore.
5. Alam Singh, "Soil Engineering in Theory and Practice", Asia Publishing House, New Delhi.

Additional Learning Sources:-

1. Web links to e-learning**:** NPTEL.
2. Web links to e-learning: NCTEL.

		L	**T**	**P**	**C**	**Hours Per Week**
ETCE503	**Environmental Engineering -I**	**3**	**0**	**0**	**3**	**6**

Course Objective: To make the students gain basic knowledge of water quality: physical, chemical and biological parameters & air quality and its standards and how to control air pollution.

MODULE –I Sources of Water and their Demand:-Ground and Surface sources, Intakes structures for surface water source & ground water source, Water Quantity/Demand, Design period, Population forecast, Variation of quantity of water demand, Factor affecting water demand.   **8**

MODULE –II Water Quality: - Physical, chemical and biological parameters, Examination of physical, chemical and biological characteristics of water, Water-borne diseases, Water standards for different uses, Conveyance of water, pipe materials, pumps - operation & pumping stations.   **8**

MODULE –III Water Purification: - Philosophy of treatment, Unit operations & process, Introduction to physical, chemical and biological processes, Plain sedimentation, Coagulation and flocculation, Filtration: Slow and Rapid sand filters, Disinfection, Softening, Introduction of adsorption and Reverse Osmosis and other treatment methods.   **12**

MODULE –IV Water Distribution System: -Water Storage, pumping and Transportation of water, Pipe fittings, Valves and appurtenances, Analysis of distribution system, Hardy cross method, Leak detection, maintenance of distribution systems, Service reservoir capacity and height of reservoir   **9**

MODULE **–V Air and Noise pollution: -**Introduction of air pollution and pollutant, Types of air pollutant, Sources of pollutant, Analysis of air pollutant, Control measure of air pollution- Natural & Engineering system, Introduction of noise pollution, Sources, Effect, Control measure.   **8**

Course Outcomes: Supply best quality water for communities by knowing physical, chemical and biological properties of water. Also design the Different units of water treatment plant and water distribution system. Helps in prevention of water born dieses thus improving the health condition of the people.

ETCE513 -PRACTICAL OF ENVIRONMENTAL ENGINEERING -I

List of Experiments:-

1. To determine the amount of total, fixed and volatile solids present in the given sample.
2. To determine the amount of suspended & dissolved solids present in the given sample
3. To find out the turbidity of the given sample
4. To determine the pH of water
5. To determine the residual chlorine for the given water sample
6. To determine the amount of Dissolved Oxygen present in the given sample
7. To determine the amount of Chemical Oxygen Demand present in the given sample 8. 7. To determine the amount of Bio-chemical Oxygen Demand present in the given sample
9. To determine the electrical conductivity of water.
10. To determine the total hardness present in the given sample

Text books/References:

1. Garg S.K., Environmental Engineering (VolI), Water Supply Engineering, Khanna Publishers, New Delhi.
2. Garg S.K., Environmental Engineering (Vol II), Sewage Disposal & Air Pollution Engineering, Khanna Publishers, New Delhi.
3. Punmia B.C Water Supply Engineering Laxmi Publications (P) Ltd. New Delhi
4. Peavy H.S, Rowe D.R. and Tchobanoglous G, Environmental Engineering, Tata McGraw Hills, New Delhi.
5. G.S. Birdi, Water Supply & Sanitary Engg.Laxmi Publications (P) Ltd. New Delhi
6. CPHEEO: Manual on water supply and treatment, Ministry of Urban Development

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE504	ENGINEERING HYDRAULICS-II	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective:-The main objective of this course is to understand the basic concepts of pipe flow problem, flow through open channel, boundary layer and theory of boundary layer flow and Turbines & Pumps.

MODULE –I Pipe Flow Problems & Pipe Network:- Losses due to sudden expansion and contraction, losses in pipe fittings and valves, concepts of equivalent length, hydraulic and energy gradient lines, siphon, pipes in series, pipes in parallel, branching of pipes Water Hammer (only quick closure case). Transmission of power. Hardy Cross Method.   **9**

MODULE –II Uniform Flow in Open Channels:- Channel geometry and elements of channel section, velocity distribution, energy in open channel flow, specific energy, types of flow, critical flow and its computations, uniform flow and its computations, Chezy's and Manning's formulae, determination of normal depth and velocity, Normal and critical slopes, Economical sections, Saint Vegnet equation.   **8**

MODULE –III Non Uniform Flow in Open Channels:- Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow hydraulic jump in rectangular channels and its basic characteristics, surges in open channels & channel flow routing, venturi flume   **8**

MODULE –IV Boundary Layer Theory:- Introduction, Development of boundary layer over a flat plate, boundary layer thickness, displacement, momentum and energy thicknesses, Application of momentum equation to boundary layer flow, local and mean drag coefficients, Hydro-dynamically rough and smooth surfaces, boundary layer separation and its control.   **8**

MODULE –V Turbines & Pumps:- Classifications, definitions, similarity laws, specific speed and Unit quantities, Pelton turbine-their construction and settings, speed regulation, dimensions of various elements, Action of jet, torque, power and efficiency for ideal case, characteristic curves. Reaction turbines: construction & settings, draft tube theory, runaway speed, simple theory of design and characteristic curves, cavitations. Various types and their important components, manometric head, total head, net positive suction head, specific speed, shut off head, energy losses, cavitations', principle of working and characteristic curves. Principle of working, Coefficient of discharge, slip, single acting and double acting pump, Manometric head, Acceleration head.   **12**

Course Outcomes: Select the suitable hydraulic machines for water supply and power generation also design the pipe network for supplying water. Carried out the model study of various hydraulic structures such as weir, barrage, dams, spillways etc. Apply the theory of boundary layer flow to estimate the lift and drag on various shapes of the objects.

ETCE514 -PRACTICAL OF ENGINEERING HYDRAULICS-II

List of Experiments:-

1. Study and validate of losses in flow through pipes
2. Study of Hardy Cross Method
3. Analyse the flow profile in open channel
4. Study of hydraulic jump and hump in open channel
5. Study of back water curve in open channel
6. To determine operation characteristics of Pelton wheel turbine
7. Study of Francis turbine
8. Study on the impact of jet
9. Study of Kaplan turbine
10. Study through visit of any water pumping station/plant

Text books/References:

1. Modi& Seth; Fluid Mechanics; Standard Book House, Delhi
2. Som and Biswas; Fluid Mechnics and machinery; TMH
3. White ; Fluid Mechanics ; TMH 4. R.J. Garde, "Fluid Mechanics" RPH, Roorkee, India.
5. R. K. Bansal, Fluid Mechanics and Hyd. Machines, Laxmi publisher, New Delhi.

Additional Learning Sources:-
1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

		L	T	P	C	Hours Per Week
ETCE505	**ADVANCED SURVEYING**	**3**	**0**	**0**	**3**	**6**

Course Objective:-To impart knowledge and skill for Modern equipments for surveying, curve, Tachometry Surveying, Astronomy, Photogrammetry.

MODULE –I Curves:- Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolite, compound curves, reverse curves, transition curves, cubic spiral and lemniscates, vertical curves, setting out **9**

MODULE –II Tachometry:-Tachometric systems and principles, stadia system, uses of anallactic lens, tangential system, subtense system, instrument constant, field work reduction, direct-reading tachometers, use of tachometry for traversing and contouring **9**

MODULE –III Plane table survey and Contouring-
Introduction of plane table survey, Instruments and uses ,Principle of surveying, Methods of plane tabling, closing errors and its adjustment, two point problem and three point problem

Concept & definition of contour line; contour interval & horizontal equivalent; factors governing contour interval, characteristics of contours; Methods of contouring; Interpolation of contours; Use of contours maps. **8**

MODULE –IV Photogrammetry and Surveying Astronomy:- Principle, definitions and classifications of terrestrial and aerial photogrammetry, flight planning for aerial photography, scale and relief displacements of vertical aerial photographs, stereoscopic vision on vertical photographs, computation of position, length and elevations of objects using photographs and photo mosaic Definitions of astronomical terms coordinate systems for locating heavenly bodies. **10**

MODULE –V Modern Equipments for Surveying: - Digital levels and theodolite, Electronic Distance measurement (EDM), Total Station and Global Positioning Systems (GPS), Digital Plannimeter **8**

Course Outcomes: Use the advance survey equipments like digital theodolite, EDM, Total station, Tachometer, Plannimeter for survey works.

ETCE515 - PRACTICAL OF ADVANCED SURVEYING

List of Experiments:-

1. Setting out of a simple curve

2. Setting out of a Compound curve

3. Prepare drawing of field measurements by radiation method in plane table survey

4. Prepare drawing of field measurements by intersection method

5. Prepare drawing of field measurements by resection method in plane table

6. Prepare drawing of field measurements by traversing.

7. Study the working principle of EDM.

8. Study the working principle of Total station.

9. Study the working principle of digital Plannimeter.

10. Measure Distance, Direction, Elevation, Area etc by the use of Modern Equipments of Surveying

Text books/References:

1. Kanetkar, T.P. and Kulkarini, S.V., Surveying and Leveling-Part-I & II, Pune Vidyarthi GrihaPrakashan, Pune

2. Schofield, W. Engineering Surveying: Theory and Examination Problems for Students, Butterworth, Heinemann,Oxford.

4. Chandra, A.M. Advance Surveying, New Age International Publishers N. Delhi.

5. Duggal, S.K. Surveying Vol. II, Tata McGraw Hill Publishing Company Ltd. New Delhi.

6. Lillesand T.M. and Kiefer R.W. Remote Sensing and image interpretation.

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.

2. Web links to e-learning: NCTEL.

SIXTH SEMESTER

ETCE601	STRUCTURAL ANALYSIS-II	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

Course Objective: -To develop an understanding of various types of structures and their built to facilitate the performance of various activities connected with residence, transportation, storage, healthcare etc. in the field of civil engineering.

MODULE –I MDM With Sway &Kani's Method.: - Moment distribution method in analysis of frames with sway, analysis of box frames, analysis ofportals with inclined members, analysis of beams and frames by Kani's method.   **10**

MODULE–II Plastic Theory: - Plastic analysis of beams and frames.   **9**

MODULE –III Analysis of Tall Structure: - Analysis of tall frames, wind and earthquake loads, codal provisions for lateral loads. Approximate analysis of multistory frames for vertical and lateral loads.   **8**

MODULE –IV Matrix Method of Structural Analysis: - force method and displacement method.
                                                                          9

MODULE –V ILD for Intermediate Structures: - Influence lines for intermediate structures, Muller Breslau principle, Analysis of Beam-Columns.

Course Outcomes: Find the plastic behavior of structural members and also find the deflection and slope with sway condition. Review of design concept and application.

Text books/References:
1. Ghali A & Neville M., Structural Analysis - A Unified classical and matrix Approach, Chapman and Hall, New York.
2. Wang C.K. Intermediate structural analysis, McGraw Hill, New York.
3. Kinney Streling J. Indeterminate structural Analysis, Addison Wesley.
4. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Company, New Delhi.
5. Norris C.H., Wilbur J.B. and Utkys. Elementry Structural Analysis, McGraw Hill International, Tokyo.

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTE

ETCE602	ENVIRONMENTAL ENGINEERING -II	L	T	P	C	HOURS PER WEEK
		3	1	0	4	4

Course Objective:-To make the students gain basic knowledge of Waste Water Quality: Physical, Chemical and Biological parameters & Solid waste management.

MODULE-I Sewage & Sewerage System:- Sewerage schemes and their importance, Collection & conveyance of sewage, Storm water quantity , Fluctuation in sewage flow, Flow through sewer, Design of sewer, Construction & maintenance of sewer, Sewer appurtenances, pumps & pumping stations. **10**

MODULE II Characteristics of Waste Water& Disposal Standard:- Characteristics and analysis of waste water, Physical, chemical & biological parameters, Oxygen demand i.e. BOD & COD, TOC, TOD, ThOD, Relative Stability, population equivalent, Natural methods of waste water disposal i.e. by land treatment & by dilution, Cycles of decomposition, Self-purification of stream,
Oxygen sag analysis. **10**

MODULE –III Waste Water Treatment: - Unit operations & process, Preliminary treatment, Primary treatment, Secondary treatment, Tertiary treatment, Screens, grit chamber, floatation tank, Skimming Detritus tank etc, Sedimentation and chemical clarification, theory & design. **8**

MODULE –IV Biological Treatment: - Introduction, Types, Significance, Activated Sludge process, Oxidation ditch, Stabilization ponds, Aerated lagoon, Anaerobic lagoons, septic tank & imhoff tank, UASB, Sources & treatment of sludge, sludge thickening and digestion sludge drying beds, sludge disposal. **9**

MODULE –V Municipal Solid Wastes: -Characteristics, generation, collection and transportation of solid Wastes, engineered systems for solid waste management (reuse/ recycle, energy recovery, treatment and disposal) **8**

Course Outcomes: Identify and select the relevant environmental problem. Understand the limitations of different technologies involved in the solution of environmental problems. Design the sewerage system and waste water treatment plants and units.

Text books/References:
1. Garg S.K., Environmental Engineering (Vol II), Sewage Disposal & Air Pollution Engineering, Khanna Publishers, New Delhi.
2. Punmia B.C Waste Water Engineering Laxmi Publications (P) Ltd. New Delhi
3. Peavy H.S, Rowe D.R. and Tchobanoglous G, Environmental Engineering, Tata McGraw Hills, New Delhi.
4. Hammer Mark J, Water & Waste Water Technology, Prentice - Hall of India, New Delhi
5. Metcalf & Eddy, Waste Water Engineering, McGraw Hill Book Company New Delhi

ETCE603	STEEL STRUCTURE DESIGN -I	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective:-To introduce the theory and application of analysis and design of steel structures.

MODULE -I Connections:- Various loads and mechanism of the load transfer, partial load factors, structural properties of steel, Design of structural connections -Bolted, Riveted and Welded connections.   **10**

MODULE-II Design of Compression & Tension Members:-Design of compression members, Tension members, Roof Trusses - Angular & Tubular, Lattice Girders.   **9**

MODULE-III Design of Flexural members:-Design of simple beams, Built-up beams, Plate girders and gantry girders.   **8**

MODULE-IV Design of Column & Foundation:- Effective length of columns, Design of columns-simple and compound, Lacings & battens, Design of footings for steel structures, Grillage foundation.   **9**

MODULE-V Design of Industrial Shed & Transmission Towers:- Design of Industrial building frames, multistory frames, Bracings for high rise structures, Design of transmission towers.   **8**

Course Outcomes: Recognize the design philosophy of the steel structure. Understand he structural behavior of different structural elements and their analysis. Design the components to meet desired needs economically.

ETCE613- **PRACTICAL OF STEEL STRUCTURE DESIGN –I**

List of Experiments:- Design and detailing
based on theory class.

Text books/References:

1. Subramanian, "Steel Structures- "Design and Practice", Oxford, University Press
2. M.R. Shriyekar, "Limit State Design in Structural Steel", PHI, New Delhi
3. K.S. Sairam"Design of Steel Structures", Pearson, Delhi, India
4. Duggal S.K. "Design of Steel Structures", Tata McGraw-Hill Publishing Company Ltd, New Delhi
5. Kazmi, S.M.A and Jindal R.S "Design of Steel Structures" PHI, New Delhi, India
6. Arya and Ajmani "Design of Steel Structures", NCB, Roorkee, India
7. Ram Chandra "Design of Steel Structures", Vol. I & II, Standard Book house Delhi, India
8. I.S: 800-2007- Code of Practice for General Construction in Steel, BIS, New Delhi, India
9. I.S: 808-1989- Dimensions for Hot Rolled Steel Beam, Column, Channel and Angle Sections, BIS, New Delhi, India

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE604	WATER RESOURCE & IRRIGATION ENGINEERING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective:-To develop an appreciation of need, importance and scope of hydrology in Indian perspective. To develop an understanding of various components of hydrological cycle their behavior and factors affecting. To discuss the importance of estimation of runoff, analysis of rainfall data and various hydrographs such as Unit hydrograph, flood hydrograph and synthetic,Unit hydrograph.

MODULE-I Introduction: -Hydrologic cycle and processes, Precipitation, Infiltration and Evapotranspiration, Forms of precipitation, measurement, analysis, depth-area-duration and intensity-duration frequency relations.   **9**

MODULE-II Evaporation: -Process, Measurement and estimation, Infiltration process, Measurement and estimation, Evapotranspiration measurement and estimation, Stream flow measurements.   **9**

MODULE-III Runoff and Hydrographs: - Factors affecting flow hydrograph, Rainfall Runoff correlations, Flow duration curve, Mass curve, Unit hydrograph, its analysis and S-curve hydrograph, Synthetic and instantaneous Unit hydrographs.   **9**

MODULE-IV Energy Dissipators: - Principles of energy dissipation Energy dissipators based on tail water rating curve and jump height curves, Spillway crest gates - vertical lift and radial gates, their design principles, Design of canal regulating structures, Design of Channel transitions, Design of Sarda type Falls, Design of cross drainage works viz Syphon aquaduct and Canal syphon.   **9**

MODULE-V Channel, Groundwater hydrology &**Flood Routing**: - time series analysis of droughts and floods. , flow equations confined and unconfined flow, Well hydraulics Steady and
unsteady flow, Well losses, Specific capacity.   **9**

Course Outcomes: Realize the importance of optimal water use for growing the crops and apply methods for saving lands from water logging. Apply the knowledge for efficient design methods for convey of water with lesser loss in irrigation canal. Design he hydraulic structure to be constructed at the junction of canal.

ETCE614 - PRACTICAL OF WATER RESOURCE & IRRIGATION ENGINEERING

List of Experiments: -

1. Rainfall measurement by rain-gauge.
2. Evaporation loss test by evaporimeter.
3. Stream flow measurement.
4. Practice on Khosla theory.
5. Problem on uplift pressure calculation using Bligh theory.
6. Practice on energy curve.
7. Study of evapotranspiration.
8. Study the principle of different rain gauge.
9. Study about cross drainage work in canal.
10. Study about different irrigation loss.

Text books/References:

1.Subramanya, K,Engineering Hydrology , Tata McGraw Hill Pub., New Delhi.

2. Chow,V.T, Applied Hydrology, McGraw Hill International, New York.

3.Singh, V.P.Elementary Hydrology, Prentice Hall.

4.Raghunath,H.M., Groundwater, Wiley Easter Ltd.

5.Todd, D.K.,Groundwater Hydrology, John Wiley and sons.

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.

2. Web links to e-learning: NCTEL.

ETCE605	Highway Engineering	L	T	P	C	Hours Per Week
		3	0	0	3	6

Course Objective: -The students will be able to define different terms in Highway, know about highways classification, know about the factors covering location of highways and their alignment, Know Sign and Signals, Understand about Highway materials, Road constructions, Road drainage.

MODULE-I Highway Planning, Alignment & Geometric Design:-Importance & modes of Transportation, Brief history of highway developments, Scope of Highway Engineering, Classification roads and road patterns, Highway Planning & survey, Importance to Geometric Design, Right of way; Width of formation Width of pavement; Number of Traffic Lanes; Camber; Gradient, Design speed, Sight distance, Super elevation, Design of super elevation, Methods of providing super elevation, Extra widening at curves, SetBack Distance, Design of horizontal curves, Design of vertical curves. **15**

MODULE-II Highway Material and Construction:- Properties of sub-grade and pavement component material, Tests on stone aggregate and bituminous materials, Construction of various layers, Earthwork, WBM, GSB, WMM, various types of bituminous layers, Interfacial treatment- seal coat, tack coat, prime coat, wearing coats, grouted macadam, bituminous concrete specification, construction and maintenance , joints in rigid pavements. **10**

MODULE-III Traffic Engineering: - Traffic characteristics, road user & vehicular characteristics, Traffic studies on flow, speed, travel time - delay and O-D study, PCU, peak hour factor, parking study, Accident study and analysis, statistical analysis of traffic data, Traffic operations, traffic control devices , Signal design, Highway lightening, Types of intersections and channelization, Highway capacity and level of service of rural highways and urban roads. **7**

MODULE IV Design of Highway Pavements: -Introduction of pavement, Advantages and disadvantages of rigid pavements, Design factors for flexible and rigid pavements, Group Index and CBR methods for flexible pavement design, Analysis of wheel load stresses in rigid pavement, Westergaard's method for design of rigid pavement. **7**

MODULE –V Airport Engineering: - Airport planning and Airport layout- runway orientation, Wind Rose diagram, Basic runway length, corrections for runway length, Airport classification & Lightning System, Geometric design, Airport capacity, Aircraft parking systems. **6**

Course Outcomes: Understand the basic concepts of geometric design of highway by applying fundamental concepts of mathematics and laws of mechanics. Apply condition monitoring and

maintenance of road pavements. Apply technical skills for operations and design of road junction. Conduct experiments on materials for highway engineering.

ETCE615 - PRACTICAL OF HIGHWAY ENGINEERING

List of Experiments:-

1. To determine the specific gravity and water absorption of the given aggregate.
2. To determine aggregate impact value of given aggregate.
3. To determine the Deval attrition value.
4. To determine Los Angeles abrasion value of the aggregate.
5. To determine flakiness index of a given aggregates sample.
6. To determine elongation index of given aggregate sample.
7. To determine grade of given bitumen by penetration test.
8. To determine ductility of the given bitumen.
9. To find out optimum bitumen content of given mix by marshall stability test.
10. To determine softening point of a given bitumen sample.
11. To determine the viscosity value of the given bitumen sample.
12. To determine the stripping value of aggregates by static immersion method.
13. To determine the crushing strength of road aggregates

Suggested Reading:-

1. Khanna, S.K. and Justo, C.E.G., "Highway Engineering", Nem Chand & Bros.
2. Kadiyali, L.R., "Traffic Engineering and Transportation Planning", Khanna Publishers.
3. Sharma, S.K., "Principles and Design of Highway Engineering", S. Chand & Co.
4. Khanna, S.K. &Arora, M. G. "Airport Planning and Design", Nemi Chand &Bros.Roorkee, India.
5. Papacostas, C.S. and Prevedouros, P.D., "Transportation Engineering and Planning", Prentice Hall.

Additional Learning Sources:-
1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETCE616	AUTO-CAD	L	T	P	C	HOURS PER WEEK
		0	0	3	1.5	3

Course Objective:- The objective of the course is to make the students learn basics of Civil Engineering Drawing Using Auto CAD

MODULE-I Introduction to Auto-Cad:- Loading and configuring AUTO CAD Starting a new drawing, Setting Units, Limits command, O-snap, Snap, Grid, Ortho, Cords, etc.Data Entries,
Absolute coordinates, Relative and polar coordinates.   **9**

MODULE –II Study of Entity Drawing Commands: - Line, Spline, Pline, Circle, Arc, Ellipse, Donut, Polygon, Chamfer, Offset, Fillet etc. Study of utility commands: Explode, Layer, Undo,
Redo, Save, Quit, Color, Line type, etc. Editing commands: Erase, Move, Copy, Array, Rotate, Mirror, Break, Extend, Trim, Stretch, Change etc.   **9**

MODULE-III Hatching Commands: - Hatch, Batch, Hatch edit, Dimensioning commands: Linear dimensioning, Angular dimensioning, Diameter dimensioning, Radius dimensioning.   **6**

MODULE-IV Creating Texts and Defining Block Attributes: - All commands related to text and characters.   **3**

MODULE-V Isometric Drawing: - Isometric projection, ISO- AXIS, etc. Civil Engineering drawing practice through Sessional.   **3**

Course Outcomes: Understand the basic commands for drawing using Auto CAD software. Apply all basic commands for drawing plan and elevation.

Text books/References:

1. Nighat Yasmin, Introduction to AutoCAD 2014 for Civil Engineering Applications. Schroff Development Corp.
2. Sham Tickoo, Anurag, AUTOCAD 2013 FOR ENGINEERS AND DESIGNERS. Dream tech Press.
3. Donnie Gladfelter, AutoCAD 2014 and AutoCAD LT 2014.Wiley.
4. Brian C. Benton, George Omura, Mastering AutoCAD and AutoCAD LT - 2014.Wiley.
5. Ellen Finkelstein, Auto CAD 2012 &AutoCAD Lt 2012.Wiley India Pvt Ltd.

SEVENTH SEMESTER

ETCE701	REINFORCED CEMENT CONCRETE-II	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective:- To make students conversant with the design of structures like Continuous beam, Tanks, Prestress Concrete Structures, Bridges, Silo, Bunker and Retaining walls.

MODULE –I Earth Retaining Structures: -Introduction of retaining wall and its types, Stability of retaining wall, Design of cantilever retaining wall, Design of counter fort types retaining walls.
9

MODULE –II Water Tanks:-Introduction of Water tank and its types, Design criteria for water tank, Design of water tank resting on the ground, Design of elevated water tank, Design of underground water tank, Design of INTZ water tank.   **10**

MODULE –III Silos and Bunkers: -Introduction of Bins and its types, Design criteria for bunker and silo, Design of Bunker, Design of Silo.   **9**

MODULE –IV Prestressed Concrete: -Introduction of prestressed concrete, Prestressing concepts materials, Systems of prestressing, Analysis of beam sections at transfer and service loads, Losses of prestressing.   **8**

MODULE –V Design of Continuous Beam, Multistory Buildings & Bridge: - Design of continuous beam and building frame, Moment redistribution, Detailing of earthquake resistant construction, Ductility criterion, T-beam & Slab bridges- for highway loading (IRC Loads)   **9**

NOTE :-All the designs for strength and serviceability should strictly be as per the latest version of IS:456. Use of SP-16 (Design aids).

Course Outcomes: Identify the various types of deformations in different structures like compression tension hoop occurring at a particular structure at least qualitatively. Remember the values of minimum and maximum cement consumption in section of the beam and column and tank walls ordinarily used in every structure.

ETCE701 - **PRACTICAL OF REINFORCED CEMENT CONCRETE-II**

List of Experiments: - Design and detailing
based on theory class.

Text books/References:

1. Advanced R.C.C. Design by N.K. RAJU

2. Jain, A.K "Reinforced Concrete-Limit State Design" NCB, Roorkee, India   3.
   N.KrishnaRaju, Prestressed Concrete, Tata McGraw Hill, New Delhi

4. Essentials of Bridge engineering – D.J. Victor

5. Rammuttham, Plain & reinforced concrete

Additional Learning Sources:-

1. Web links to e-learning: NPTEL.

2. Web links to e-learning: NCTEL.

ETCE702	DESIGN OF HYDRAULIC STRUCTURE	L	T	P	C	HOURS PER WEEK
		3	1	0	3	3

Course Objective: -Give thorough idea of designing and detailing of some typical irrigation structures. To understand the significance of efficient and proper design of irrigation works (a) Earthen canals (b) Lined Canals (c) Stable alluvial channel (d) Canal regulation structures (e) Cross drainage works (f) Diversion headwork, to understand the effect of uplift pressure in the design of hydraulic structures on permeable soils.

MODULE –I Gravity Dams: Design Criteria, Forces acting on gravity dams, Elementary profile, Low and high gravity dams, Stability analysis, Practical profile, Evaluation of profile by method of zoning, Foundation treatment, Construction joints, Galleries in gravity dams.   **10**

MODULE –II Earth Dams: Types, Causes of failure and design criteria, Soils suitability for earth dam construction, Construction methods, Foundation requirements, Typical earth dam sections, Estimation of seepage through and below the dam, seepage control, Stability of slopes by slip circle method of analysis, Pore pressures, Sudden draw down, Steady seepage and construction pore pressure condition.   **10**

MODULE –III Spillways: Ogee spillway and its design, details of syphon, Shaft, Chute and side channel spillways, Emergency spillways, Design of outlets and rating curves.   **8**

MODULE –IV Energy Dissipaters: Principles of energy dissipation Energy dissipaters based on tail water rating curve and jump height curves Spillway crest gates - vertical lift and radial gates, their design principles. Design of canal regulating structures, Design of Channel transitions, Design of Sarda type Falls, Design of cross drainage works viz Syphon aquaduct and Canal syphon.   **9**

MODULE –V Canal Structures and Hydropower Plants: Design of canal falls, Regulators, Cross drainage works, Introduction of Hydropower development, General features of hydro-electric schemes, Selection of turbines.   **6**

Course Outcomes: Understand the preparation of the different types of structures of irrigation and water resources projects approval from the government. Design the different types of Dams like gravity dams, earthen dams, Spillways and Energy dissipaters. Designing of canal structures and hydropower plants structures.

Text books/References:

1. P.N. Modi, "Irrigation Water Resources and Water Power"

2. Bharat Singh, "Irrigation Engineering"

3. S. K., "Garg Irrigation Engg. and Hydraulic Structures"

4. K.C. Patra, "Hydrology and water Resources Engineering"

5. Punmia&PandeyB.B.Lal, Irrigation & Water Power Engg.

ETCE703	FOUNDATION ENGINEERING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

Course Objective: - The objectives of the course is to introduce the theory and application of analysis and design of Shear Strength of Soils, slope stability analysis, shallow and deep foundations and machine foundations.

MODULE –I Lateral Earth Pressure: -Earth Pressure, Earth Retaining Structures and Sheet Pile Walls, Active, passive and earth pressure at rest. Rankine, Coulomb, Terzaghi and Culmann's theories. Analytical and graphical methods of determination of earth pressures on cohessionless and cohesive soils. Effect of surcharge, water table and wall friction. Arching in soils.   **8**

MODULE –II Shallow Foundations: -Introduction, Type of foundations shallow and deep, Bearing capacity of foundation on cohesion less and cohesive soils, General and local shear failures, Factors effecting Bearing capacity, Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on Bearing capacity, Total and differential settlements, Test for Bearing capacity.   **9**

MODUL-III -Deep Foundation: - Pile foundation, Types of piles, Estimation of individual and group capacity of piles in cohesion less and cohesive soils, Static and dynamic formulae, Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design, Piles under tension, inclined and lateral load Caissons, Well foundation. Equilibrium of wells, Analysis for stability tilts and shifts.   **9**

MODULE –IV Soil Improvement Techniques, Soil Exploration and Foundations on Expansive and Collapsible soils: - Compaction, Factors affecting compaction, Lift thickness, Various equipment for field compaction and their suitability, Soil stabilization: Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilization and stabilization by grouting , Geo-synthetics, types, functions, materials and uses, Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams, Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils, CNS layer.   **9**

MODULE –V Sheet piles/Bulkheads and Machine Foundation: -   Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications, Modes of vibration, Mass-spring analogy, Natural frequency, Effect of vibration on soils, Vibration isolation, Criteria for design, Design of block foundation for impact type of machine.   **9**

Course Outcomes: Apply fundamental concept of mathematics statics and mechanics to understand the essential of the method of bearing capacity and stability analysis. Analyze and design verity of geotechnical engineering structure including foundation, pile, retaining walls etc.

Text books/References:

1. GopalRanjan and A.S.R.Rao, "Basic and Applied Soil Mechanics", New Age International (P) Ltd, New Delhi.
2. B.C.Punmia (Dr.) "Soil Mech. & Found. Engg", Laxmi Publications, Delhi.
3. Dr. K.R. Arora (Dr.) "Soil Mech. & Found. Engg" , Std. Publishers Delhi.
4. V.N.S.Murty, "Soil Mechanics and Foundation Engineering", SaiKripa Technical Consultants, Banglore.
5. Alam Singh, "Soil Engineering in Theory and Practice", Asia Publishing House, New Delhi.

Additional Learning Sources: -

1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETSH721	ENGINEERING BIOLOGY	L	T	P	C	HOURS PER WEEK
		3	1	0	4	4

Course Objective: To convey that Biology is as important a scientific discipline as Mathematics, Physics and Chemistry, classification per se is not what biology is all about. The underlying criterion, such as morphological, biochemical or ecological be highlighted, "Genetics is to biology what Newton's laws are to Physical Sciences". Mendel's laws, Concept of segregation and independent assortment, all forms of life has the same building blocks and yet the manifestations are as diver e as one can imagine, Molecules of life, without catalysis life would not have existed on earth. The molecular basis of coding and decoding genetic information is universal.

Module 1: Introduction & Classification Bring out the fundamental differences between science and engineering by drawing a comparison between eye and camera, Bird flying and aircraft. Mention the most exciting aspect of biology as an independent scientific discipline. Why we need to study biology? Discuss how biological observations of 18th Century that lead to major discoveries. Examples from Brownian motion and the origin of thermodynamics by referring to the original observation of Robert Brown and Julius Mayor, these examples will highlight the fundamental importance of observations in any scientific inquiry.

Hierarchy of life forms at phenomenological level. A common thread weaves this hierarchy Classification. Discuss classification based on (a) cellularity- Unicellular or multicellular (b) ultrastructure- prokaryotes or eucaryotes. (c) Energy and Carbon utilization -Autotrophs, heterotrophs, lithotropes (d) Ammonia excretion – aminotelic, uricotelic, ureotelic (e) Habitata-acquatic or terrestrial (e) Molecular taxonomy- three major kingdoms of life. A given organism can come under different category based on classification. Model organisms for the study of biology come from different groups. E. coli, S. cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus   **10**

Module 2: Genetics Concept of allele, Gene mapping, Gene interaction, Epistasis, Meiosis and Mitosis be taught as a part of genetics. Emphasis to be give not to the mechanics of cell division nor the phases but how genetic material passes from parent to offspring, Concepts of recessiveness and dominance. Concept of mapping of phenotype to genes, Discuss about the single gene disorders in humans. Discuss the concept of complementation using human genetics.   **8**

Module 3: Biomolecules & Enzymes In this context discuss monomeric units and polymeric structures. Discuss about sugars, starch and cellulose. Amino acids and proteins, Nucleotides and

DNA/RNA, Two carbon units and lipids

Enzymology: How to monitor enzyme catalysed reactions. How does an enzyme catalyse reactions? Enzyme classification, Mechanism of enzyme action, Discuss at least two examples. Enzyme kinetics and kinetic parameters, why should we know these parameters to understand biology?

RNA catalysis   **9**

Module 4: Information Transfer Molecular basis of information transfer, DNA as a genetic material, Hierarchy of DNA structure- from single stranded to double helix to nucleosomes, Concept of genetic code, Universality and degeneracy of genetic code, Define gene in terms of complementation and recombination   **8**

Module 5: Microbiology Concept of single celled organisms, Concept of species and strains, Identification and classification of microorganisms Microscopy, Ecological aspects of single celled organisms, Sterilization and media compositions, Growth kinetics   **7**

Course Outcomes

After studying the course, the student will be able to:

- Describe how biological observations of 18th Century that lead to major discoveries.
- Convey that classification *per se* is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
- Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
- Classify enzymes and distinguish between different mechanisms of enzyme action.
- Identify DNA as a genetic material in the molecular basis of information transfer.
- Analyse biological processes at the reductionistic level ▢ Apply thermodynamic principles to biological systems. ▢ Identify and classify microorganisms.

Text books/References:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2014.

2. E. E. Conn, P. K. Stumpf, G. Bruening and R. H. Doi, "Outlines of Biochemistry", John Wiley and Sons, 2009.

3. D. L. Nelson and M. M. Cox, "Principles of Biochemistry", W.H. Freeman and Company, 2012.

4. G. S. Stent and R. Calendar, "Molecular Genetics", Freeman and company, 1978

5. L. M. Prescott, J. P. Harley and C. A. Klein, "Microbiology", McGraw Hill Higher Education, 2005.

EIGHTH SEMESTER

ETCE801	QUANTITY SURVEYING AND COSTING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	6

Course Objective: To make students conversant with the design of structures like Continuous beam, Tanks, Prestress Concrete Structures, Bridges, Silo, Bunker and Retaining walls.

MODULE-I -**Introduction: -** Purpose and importance of estimates, Principles of estimating, Methods of taking out quantities of items of work, Mode of measurement, measurement sheet and abstract sheet, Bill of quantities, Types of estimates, plinth area rate, cubical content rate, Preliminary, original, revised and supplementary estimates for different projects.   **9**

MODULE –II -**Rate Analysis: -**Task for average artisan, Various factors involved in the rate of an item, material and labour requirement for various trades, Preparation for rates of important items of work, Current schedule of rates. (C.S.R.).   **9**

MODULE-III -**Detailed Estimates: -**Preparing detailed estimates of various types of buildings, R.C.C. works, Earth work calculations for roads and estimating of culverts Services for building such as water supply, Drainage and electrification.   **10**

MODULE-IV-**Cost of Works: -**Factors affecting cost of work, Overhead charges, Contingencies and work charge establishment, Various percentages for different services in building, Preparation of DPR.   **10**

MODULE-V-**Valuation: -**Purposes, depreciation, Sinking fund, scrap value, Year's purchase, gross and net income, Dual rate interest, Methods of valuation, Rent fixation of buildings.   **7**

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Course Outcomes: Understand and interpret civil engineering construction drawing. Prepare bill of quantity, bill of materials, and labour statement adhering to specification and construction drawing. Develop insight in tendering of new projects and related contract documents.

ETCE811 - PRACTICAL OF QUANTITY SURVEYING AND COSTING

List of Experiments: -

1. Preparation of detailed estimate.
2. Detailed estimate for services of plumbing and water supply or Electrification work.
3. Detailed estimate for earth work for the road construction or arched culvert.
4. Rate analysis for at least 8 items of construction.
5. Preparation of DPR of Civil Engineering Project.

Text books/References:

1. Dutta B.N., Quantity Surveying & Costing
2. Rangawala S.C., Estimating & Costing

3. Birdi G.S., Estimating & Costing for Civil Engg.
4. Chakraborty, Quantity surveying & costing

Additional Learning Sources:-
1. Web links to e-learning: NPTEL.
2. Web links to e-learning: NCTEL.

ETSH801	CONSTRUCTION PLANNING AND MANAGEMENT	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

Objective:- To impart the knowledge of, Preliminary and detailed investigation methods, Construction equipments, Tenders & Contracts, Specifications & Public Works Accounts and Site Organization & Systems Approach to Planning.

MODULE-I-Preliminary and Detailed Investigation Methods:- Methods of construction, Form work and centering, Schedule of construction, Types of construction projects, Job layout, principles of construction management, Modern management techniques like CPM/PERT with network analysis. **10**

MODULE-II-Construction Equipments:- Factors affecting selection, Investment and operating cost, Output of various equipments, Brief study of equipments required for various jobs such as earth work, Dredging, Conveyance, Concreting, Hoisting, Pile driving, Compaction and grouting. **7**

MODULE-III-Tenders & Contracts: - Different types of Tenders & Contracts, Notice inviting tenders, Contract document, Departmental method of construction, Rate list, Security deposit and earnest money, Conditions of contract, Arbitration, administrative approval, technical sanction, Tendering and construction contracts. **10**

MODULE-IV Specifications & Public Works Accounts: - Importance, Types of specifications, Specifications for various trades of engineering works, Various forms used in construction works, Measurement book, Cash book, materials at site account, Imprest account, Tools and plants Various types of running bills, Secured advance, Final bill. **9**

MODULE-V-Site Organization & Systems Approach to Planning: - Accommodation of site staff, Contractor's staff, Various organization charts and manuals, Personnel in construction, Welfare facilities, Labour laws and human relations, Safety engineering, Problem of equipment management, assignment model, Transportation model and waiting line modals with their applications, Shovel truck performance with waiting line method. **9**

Course Outcomes: Understand the necessity of CPM and PERT in different engineering projects. Analyze the equipment used for projects for hoisting, compacting and grouting of materials. Preparation of tenders, their approval and sanction.

Text books/References:

1. Seetharaman, S. Construction Management.
2. Weist& Levy CPM & PERT.
3. Punmia, B.C. Construction Planning Management
4. Srinath, L.S. CPM.
5. Shrivastava, UKConstruction Planning and Management.

ETCE821A	COMPUTATIONAL METHODS IN STRUCTURAL ENGINEERING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

MODULE – I Matrix formulation for the principle of virtual work and energy principles:- Principle of contragradience, stiffness and flexibility matrices, Degree of Freedom, Axial, bending, shear and torsional deformations, Local and Global Element stiffness matrices for bar, beam, shaft, grid, shear wall, beam column, beam with rigid ends, beam on elastic foundation and elements with special boundary conditions, Non-prismatic and curved elements, forces and displacements in general coordinate axes, structure stiffness matrix.   **10**

MODULE- II -Basics of the Direct Stiffness method: - Analysis of pin jointed frames, rigid jointed structures, plane grids and composite structures for different loads including temperature, shrinkage, prestressing forces. Elastic stability analysis of 2-D rigid jointed frames, (Sway &Nonsway)   **8**

MODULE- III Concepts of Bandwidth, various storage schemes & equation solvers: -
Reduction in order of stiffness matrix - use of substructures, static condensation method, Exploiting symmetry, skew symmetry and cyclic symmetry in structures, Imposition of Constraints – Lagrange Multiplier and Penalty Methods.   **8**

MODULE- IV-Analysis of continuum structures: - Fundamental equations of theory of elasticity (2D), basic concepts of Finite Element Analysis, derivation of generalised element stiffness matrix and load vectors, convergence requirements, stiffness matrices for various elements using shape functions, Triangular and Rectangular elements. (PSPS)   **8**

MODULE- V-Two Dimensional Iso parametric elements, shape functions for Simplex: Lagrangian and Serendipidity family elements in natural coordinates, computation of stiffness matrix for iso-parametric elements, degrading of elements, plate bending elements.   **8**

Text books/References:
1. Ghali A & Neville M., Structural Analysis - A Unified Classical and Matrix Approach, Chapman and Hall, New York.
2. Weaver William & Gere James M., Matrix Analysis of Framed structures, CBS Publishers and Distributors, New Delhi.
3. Cook R.D., Concepts and Applications of Finite Element Analysis, Wiley, New York.
4. Gallagher R., Finite Element Analysis Fundamentals, Prentice-Hall, Englewood Cliffs, NJ.
5. Rubenstein M.F., Matrix Computer Analysis of structures, Prentice Hall, Englewood Cliffs, N.J. 6. Zeinkiewicz O.C & Taylor R.L., The Finite Element Method, McGraw Hill, London

ETCE821B	TRAFFIC ENGINEERING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

MODULE-I-Traffic Characteristics: - (i) Road user's characteristics - general human characteristics, physical, mental and emotional factors, factors affecting reaction time, PIEV theory. (ii) Vehicular characteristics: Characteristics affecting road design-width, height, length and other dimensions. weight, power, speed and braking capacity of a vehicle. **10**

MODULE –II-Traffic Studies: - (i)Spot Speed Studies and Volume Studies. (ii) Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies. (iii) Origin and destination Studies (O& D) : Various methods, collection and interpretation of data, planning and sampling. (iv) Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service. (v) Parking Studies: Methods of parking studies cordon counts, space inventories, parking practices. **8**

MODULE-III-Traffic Operations and Control: - (i) Traffic regulations and various means of control. (ii) One way streets- advantages and limitations. (iii) Traffic signals- isolated signals, coordinated signals, simultaneous, alternate, flexible and progressive signal systems. Types of traffic signals, fixed time signals, traffic actuated signals, speed control signals, pedestrian signals, flashing signals, clearance interval and problems on single isolated traffic signal. **8**

MODULE-IV-Street Lighting: - (i) Methods of light distribution. (ii) Design of street lighting system. (iii) Definitions- Luminaire, foot candle, Lumen, utilization and maintenance factors. (iv) Different types of light sources used for street lighting. (v) Fundamental factors of night vision. **8**

MODULE-V-Accident Studies & Mass Transportation: - (i) Accident Studies: Causes of accidents, accident studies and records, condition and collision diagram, preventive measures. (ii) Expressways and freeways, problems on mass transportation and remedial measures, brief study of mass transportation available in the country. **8**

 Text books/References:
1. Kadiyali, L.R. Traffic Engineering and Transport Planning.Khanna Publishers, Delhi.
2. Matson, Smith, W.S. andHurdF.W. Traffic Engineering.
3. Pingnataro, G.J. Principles of Traffic Engineering
4. Drew, D.R. Traffic Flaw Theory
5. MchsneW.R. and RoessR.P. Traffic Engg.
6. Wohl and Martin, Traffic System Analysis for Engineering & Planners.

ETCE821C	INDUSTRIAL WASTE TREATMENT	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

MODULE-I-**Problem of Water Pollution: -** Effects of wastes water on streams, land, sea and sewage treatment plant, Natural purification of streams, Oxygen sag curve, Allowable organic load on streams classification of stream, Stream standards and effluent standards, Requirement of water for different purposes.　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**10**

MODULE-II-**Measurement of Waste Water Volume: -**Sampling of waste waters, grab and composite samples. analysis of waste water. Bio-chemical oxygen demand, chemical oxygen demand and pH value of waste, Toxicity of waste by bioassay method. Pretreatment of Wastes: Volume and strength reduction, Salvage of materials, Recovery of by products, Reuse of waste water.　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　　**9**

MODULE-III-**Conventional Methods of Treatment of Waste Water: -**Removal of suspended solids, Removal of inorganic and organic dissolved solids, Sludge disposal, Advance methods of treatment: such as Reverse osmosis, Ion exchange, Electro-dialysis, Algal harvesting etc. Low-cost treatment plants, Common effluent treatment plant, Design and operation.　　　　　　　**8**

MODULE-IV Combined Treatment of Waste Water Sewage: - Energy requirement optimization and bedget, Municipal regulation, Sewer rental charge, Instrumentation in waste water treatment plants, Collection of data, Operation and maintenance of plants, Water pollution control board.　　　**8**

MODULE- V-Treatment Methods for Different Industries: -Brief study of industrial processes and treatment methods of waste water from common industries, such as textile, dairy, paper and pulp, tannery, distillery,hazardous wastes- Impact handling and disposal.　　　　　　　**7**

Text books/References:
1. Nemerow,N.L.Liquid Waste of Industries- Theories, Practice and Treatment.Wesley Publishing Co.
2. Besselievre E.B. and Max Schwartz,Treatment of Industrial Waste.McGraw Hill Book Company.
3. Metcalf & Eddy, Waste Water Engg. - Treatment Disposal & Reuse. Tata McGraw Will, New Delhi.
4. Arceivala,Waste Water Treatment. Tata McGraw Will, New Delhi.
5. Lund H.F. Industrial Pollution Control, hand book. Tata McGraw Will, New Delhi.

ETCE822A	STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

MODULE –I- Single DOF Systems: -Undamped and Damped, Response to Harmonic and periodic excitations, Response to Arbitrary, Step, Ramp and Pulse Excitations. **11**

MODULE –II Numerical Evaluation of Dynamic Response: - Time stepping methods, methods based on Interpolation of Excitation, Newmark's and Wilson - q method, Analysis of Nonlinear Response, Introduction to frequency domain analysis. **10**

MODULE –III Elements of Seismology: - Definitions of the basic terms related to earthquake (magnitude, intensity, epicenter, focus etc.), seismographs Earthquake Response of structures - Nature of dynamic loading resulting from earthquake, construction of Response spectrum for Elastic and Inelastic systems. **8**

MODULE –IV Multiple DOF Systems: - Stiffness and Flexibility matrices for shear buildings, free and forced vibrations-undamped and damped, Modal and Response History Analysis, Systems with distributed mass & elasticity. **8**

MODULE –V Earthquake Resistant Design of Structures: -Design of structures for strength &servicability, Ductility and energy absorption, Provisions of IS: 1893 and IS : 4326 for aseismic design of structures, Code for ductile detailing IS : 13920. **7**

Text books/References:
1. Chopra A.K., Dynamics of structures - Theory and Applications to Earthquake Enginering, Prentice Hall of India, New Delhi.
2. Berg G.V. Elements of Structural Dynamics, Prentice Hall of India, Englewood Cliffs, NJ
3. Paz Mario, Structural Dynamics, CBS Publishers, Delhi
4. Clough R.W. &Penzien J., Dynamics of structures McGraw Hill, New York.

ETCE822B	PAVEMENT DESIGN	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

MODULE –I -Equivalent Single: - Wheels Load concepts and applications, Relationship between wheel arrangements and loading effects, tyre contact area, Effect of load repetition, Effect of transient loads, Impact of moving loading, Factors to be considered in Design of pavements, Design wheel load, soil, climatic factors, pavement component materials, Environmental factors, Special factors such as frost, Freezing and thawing. **10**

MODULE –II Flexible Pavements: - Component parts of the pavement structures and their functions, stresses in flexible pavements, Stress distribution through various layers, Boussinesque's theory, Burmister's two layered theory, methods of design, group index method, CBR method,

Burmister's method and North Dakota cone method. **10**

MODULE –III Rigid Pavements: -Evaluation of subgrade, Modulus-K by plate bearing test and the test details, Westergaard's stress theory stresses in rigid pavements, Temperature stresses, warping stresses, frictional stresses, critical combination of stresses, critical loading positions. **8**

MODULE –IV Rigid Pavement Design: - IRC method, Fatigue analysis, PCA chart method. AASHTO Method, Reliability analysis. Pavement Joints: Types of joints, contraction and warping joints, dowel bars and tie bars, Temperature reinforcements, filling and sealing of joints. **8**

MODULE –V Evaluation and Strengthening of Existing Pavements: - Benkleman beam method, Serviceability Index Method. Rigid and flexible overlays and their design procedures. **8**

Text books/References:
1. Principles of pavement design by E.J.Yoder& M.W. Witczak 2. AASHO, "AASHO Interim Guide for Design of Pavement Structures", Washington, D.C.
3. Portland Cement Association, Guidlines for Design of Rigid Pavements, Washington
4. DSIR, Conc. Roads Design & Construction
5. Srinivasan M. "Modern Permanent W

ETCE822C	AIR QUALITY MONITORING & CONTROL	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

MODULE - I Air Pollution Problem: - Economics and social aspects, Historical episodes of air pollution, Sources of Air pollution, Effects of air pollution on health, animal, plants and materials.

9

MODULE - II Natural Control of Air Pollution: -Role of meteorological condition, Properties of typical air pollutants, air diffusion and concentration pollutants. General diseases caused by air pollutants, toxicity of various pollutants. Plums patterns and height of chimneys.　　　**9**

MODULE – III Atmospheric Chemistry: -Atmospheric chemistry, formation of secondary pollutants – PNN, PAN, PBN, Photolytic cycles, general diseases and toxicity of pollutants　　　**9**

MODULE – IV Reduction and Control of Air Pollution: -Sampling and Analyzing of Air Pollutants: Instruments pollution survey, standards of air pollution. Principle of air pollution control, site selection and zoning, various control methods, process and equipment changes, design and operation of various air pollution control equipments.　　　**9**

MODULE – V Air pollution control legislation and Hygiene: -Air pollution control legislation, public education pollution standards, Status of air pollution control in various countries, Industrial Hygiene: Concept and importance, factory Involved in environmental hazards, industrial ventilation occupational diseases, Control methods.　　　**8**

Text books/References:
1. Faith W.L, John Wiley & Sons,Air Pollution.
2. McCabe L.C. Air Pollution. Mc. Graw Hill, International
3. Stern A.C. Air Pollution. Academic Press N. York
4. Raju, BSN,Fundamentals of Air Pollutions. Oxford & IBH Publishing Co. Pvt. Ltd. 5. Rao M.N. and Rao HVN, Air Pollution. Tata McGraw Hill
6. Wark and Warner,Air Pollution.

ETCE822D	ADVANCE WATER RESOURCES ENGINEERING	L	T	P	C	HOURS PER WEEK
		3	0	0	3	3

MODULE –I Precipitation and Measurement: -Optimal Rain gauge Network Design, Adjustment of Precipitation Data, Depth Area-Duration Analysis, Design Storm, Probable Maximum Precipitation, Probable Maximum Flood, Flood Frequency Analysis, Risk Analysis,   **10**

MODULE – II Flood: -Flood Management, Flood Routing through Reservoirs, Channels Routing Muskingum Method, Introduction to Stochastic Models in Hydrology like AR, ARMA, ARIMA etc. Concept of Correlogram.   **9**

MODULE – III System Analysis: - Need, Water Resources Systems, Optimisation Techniques, Linear Programming, Feasible Solutions, Graphical Method, Simplex Method, Use of of LP in Water Resources, Introduction to Reservoir Operation, Rule curves, Linear Decision Rule   **9**

MODULE – IV Dynamic Programming: - Introduction, its utility in Resource Allocation and other Decision-Making Problems, Optimal Operating, Policies, Use of D. P. in Reservoir, Operation.   **8**

MODULE –V Network Analysis: -Network Methods, Project Optimality Analysis. Updating of Network, Utility in Decision Making.   **8**

Text books/References:
1. Subramany K., Engg. Hydrology.
2. Philiphs&Ravindran, Operations Research
3. Hire D.S. & Gupta, Operation Research
4. Kottegoda N. T. Stochastic Water Resources Technology.
5. Singh V.P. Elementary Hydrology