



2017

SYLLABUS SCHEME

B. TECH IN CIVIL ENGINEERING



**VEER MADHO SINGH BHANDARI
UTTARAKHAND TECHNICAL UNIVERSITY**



SHIVALIK
COLLEGE OF ENGINEERING

EVALUATION SCHEME & SYLLABUS

W.E.F. ACADEMIC SESSION 2009-10

SCHEME OF EXAMINATION

&

SYLLABI

for

**B.Tech Ist Year (Common to All B.Tech Courses)
(Effective from the session: 2009-2010)**



Uttarakhand Technical University, Dehradun

UTTRAKHANDTECHNICAL UNIVERSITY, DEHRADUN
STUDY AND EVALUATION SCHEME
B.Tech Ist Year (Common to All B.Tech Courses)
(Effective from the session: 2009-2010)
Year: I, Semester-1

S.No	Course Code	Subject	Periods			EVALUATION SCHEME				Subje ct Total	CR EDI T
						SESSIONAL EXAM			Exter nal Exam.		
			L	T	P	CT	TA	Total			
1	TMA 101	Mathematics - I	3	1	0	30	20	50	100	150	4
2	TPH 101 / TCY 101	Engg.Physics / Engg.Chemistry	3	1	0	30	20	50	100	150	4
3	THM 101	Basic Technical Communication – I	3	0	2	40	10	50	100	150	3
4	TEE 101 / TME 101	Basic Electrical Engineering / Mechanical Engineering	3	1	0	30	20	50	100	150	4
5	TCS 101 / TEC 101	Fundamentals of Computer & Programming / Fundamentals of Electronic Engineering	3	1	0	30	20	50	100	150	4
*	TES 101	Environmental Studies	2	0	0	-	-	-	-	-	-
Practicals											
1	PPH 101 / PCY 101	Physics / Chemistry	0	0	2	-	-	25	25	50	2
2	PEE 101 / PME 101	Basic Electrical Engineering / Mechanical Engineering	0	0	2	-	-	25	25	50	2
3	PCS 101 / PEC 101	Fundamentals of Computer & Programming / Fundamentals of Electronic Engineering	0	0	2	-	-	25	25	50	2
4	PWS 101/PED 101	Workshop Practice / Engineering Drawing	0	0	2	-	-	25	25	50	2
		TOTAL	-	-	-					950	27

UTTRAKHANDTECHNICAL UNIVERSITY, DEHRADUN
STUDY AND EVALUATION SCHEME
B.Tech Ist Year (Common to All B.Tech Courses)
(Effective from the session : 2009-2010)
Year: I, Semester-II
UTTRAKHANDTECHNICAL UNIVERSITY, DEHRADUN

S.No	Course Code	Subject	Periods			EVALUATION SCHEME				Subj ect Tota l	CRE DIT
						SESSIONAL EXAM			Exter nal Exa m.		
			L	T	P	CT	TA	Total			
1	TMA 201	Mathematics - II	3	1	0	30	20	50	100	150	4
2	TCY 201 / TPH 201	Chemistry / Physics	3	1	0	30	20	50	100	150	4
3	THM 201	Advanced Technical Communication	3	0	2	30	20	50	100	150	3
4	TME 201 / TEE 201	Basic Mechanical Engineering / Electrical Engineering	3	1	0	30	20	50	100	150	4
5	TEC 201 / TCS 201	Fundamentals of Electronic Engineering / Fundamentals Computer & Programming	3	1	0	30	20	50	100	150	4
*	TES 201	Environmental Studies	2	0	0	30	20	50	-	50	-
Practicals											
1	PCY 201 / PPH 201	Chemistry / Physics	0	0	2	-	-	25	25	50	2
2	PME 201 / PEE 201	Basic Mechanical Engineering / Electrical Engineering	0	0	2	-	-	25	25	50	2
3	PEC 201 / PCS 201	Fundamentals of Electronic Engineering / Fundamentals Computer & Programming	0	0	2	-	-	25	25	50	2
4	PED201/P WS 201	Engineering Drawing / Workshop Practice	0	0	2	-	-	25	25	50	2
		TOTAL	-	-	-	-	-			1000	27

MATHEMATICS –I (TMA101)

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3 1 0

UNIT-1

Matrices

10L

Elementary row and column transformations Rank of matrix, linear dependence, Consistency of linear system of equations, Characteristic equation, Cayley-Hamilton theorem, Eigen values and Eigen vectors, Diagonalization, Complex and unitary matrices.

UNIT-2

Differential Calculus-I

9L

Leibnitz theorem, Partial Differentiation, Euler's theorem, Change of variables, Expansion of functions of several variables.

UNIT-3

Differential Calculus-II

9L

Jacobian, Approximations and errors, Extrema of functions of several variables, Lagrange method of multipliers

UNIT-4

Multiple Integrals

6L

Double and triple integrals, Change of order, Change of variables, beta and gamma functions, Application to area, volume, Dirichlet integral and applications.

Vector Calculus

6L

Point functions, Gradient, divergence and curl of a vector and their physical interpretation, Line, surface and volume integrals, Green, Stokes and Gauss divergence theorem.

References:

- Advanced Engineering Mathematics, Kreyszig, Wiley India
- A Text book of Engineering Mathematics (Vol.1) by Peter V. O'Neil, Cengage Learning
- B. S. Grewal: higher Engineering Mathematics, *Khanna Publications*.
- N. Piskunov: Differential & Integral Calculus, *Moscow Peace Publications*.
G Shankar Rao, Text book of engineering mathematics, BS Publication, Hyderabad

UNIT-I**(8L)****Relativistic Mechanics:**

Inertial and Non-inertial Frames, Postulates of Special Theory of Relativity, Galilean and Lorentz Transformation, Length Contraction and Time Dilation, Addition of Velocities, Mass Energy Equivalence and Variation of Mass with Velocity. **Radiation:** Kirchoff's Law, Stefan's law (only statement), Energy spectrum of Blackbody Radiation, Compton Effect.

UNIT-II**(8L)**

Interference: Coherent Sources, Conditions of Interference, Fresnel's Biprism Experiment, Displacement of Fringes, Interference in Thin Films – Wedge Shaped Film, Newton's Rings.

Diffraction: Single and n-Slit Diffraction, Diffraction Grating, Raleigh's Criterion of Resolution, Resolving Power of Grating.

UNIT-III**(7L)**

Polarization: Phenomenon of Double Refraction, Ordinary and Extra-ordinary Rays, Nicol Prism, Production and Analysis of Plane, Circularly and Elliptically Polarized Light, Fresnel Theory, Optical Activity, Specific Rotation, Polarimeter. **Laser:** Principle of Laser Action, Einstein's Coefficients, Construction and Working of He-Ne and Ruby Laser.

UNIT-IV**(8L)**

Electromagnetic: Ampere's Law and Displacement Current, Maxwell's Equations in Integral and Differential Forms, Electromagnetic Wave Propagation in Free Space and Conducting Media, Poynting Theorem. **Magnetic Properties of Materials:** Basic Concept of Para-, Dia and Ferro-Magnetism, Langevin's Theory of Diamagnetism, Phenomenon of Hysteresis and Its Applications

UNIT-V**(9L)****Superconductivity:-**

Essential properties of superconductors (zero resistivity), London equations, penetration depth and coherence length, Meissner effect, critical field, critical current Isotope effect, heat capacity, Type I and Type II superconductors, Characteristics of superconductors in superconducting state, applications of superconductors. **Wave Mechanics :** Wave Particle Duality, de Broglie Concept of Matter Waves, Heisenberg Uncertainty Principle, Schrödinger Wave Equation and Its Applications: Particle in a Box.

Reference Books:

- Introduction to Special theory of Relativity Robert Resnick – Wiley India
- Physics of Atoms, Wehr Richards & Adia
- Fundamentals of Physics, Halliday, Wiley India
- Engineering Electromagnetics, William Hayt, 7th Ed.(TMH)
- Ashutosh Asthana, Engg. Physics, BS Publication, Hyderabad

UNIT – I GENERAL & ORGANIC CHEMISTRY

Molecular orbital diagram of diatomic molecules, valence bond theory & molecular orbital Theory linear combination of atomic orbitals, hybridization, hydrogen bonding, band theory of solids, liquid crystals with their classification applications, Bragg's Law, Fullerenes & their application, Nature of organic molecules, attacking reagents, inductive effect, electromeric, mesomeric (resonance) effect, hyper conjugation, reaction intermediates types of organic reaction (substitution, addition, elimination reaction & organic rearrangements), Saytzeff's rule, organic name reactions (cannizzaro's reaction, aldol condensation, Pinnacol-pinnacol rearrangement, Beckmann's rearrangement, Hoffmann's rearrangement), Optical isomerism & confirmations, E-Z nomenclature, R-S configuration.

UNIT – II PHYSICAL & WATER CHEMISTRY**10****L**

Rate of reaction, order & molecularity of reaction, Zero order, First Order, Second order reaction, steady state approximation, concept of activation energy, energy barrier, cell potential, liquid junction potential, conductance & its variation with dilution, Transport no. Kohlraush's Law and its application, pH, buffer solution, calculation of pH of buffer mixture solubility & solubility Product, Nernst distribution law & its application, corrosion, its type, Mechanism & control, Theory of Electrochemical corrosion. Hardness of water, boiler feed water, Softening of water (Calgon Process, Zeolite process, Lime Soda process & Ion exchange process), Reverse osmosis, treatment of boiler feed water.

UNIT – III CHEMISTRY OF ENGINEERING MATERIALS**7**

L Introduction & classification of polymers, Types of Polymerization, bulk solution, suspension & emulsion, copolymers, vulcanization, PVC, Polyamides, Polyurethane, Polyethylene, Poly propylene, PET, Resins (Phenol Formaldehyde), PMMA, PAN, Rubber, Conducting and Biodegradable polymers, Pyroceramics, Toughened glass, Strengthening of glass, Refractories, Nano Composites, Protective Coatings, Fe, Al, Cu, Pb & Zn alloys, Organometallics & their applications.

UNIT – IV FUELS & COMBUSTION**8 L**

Classification of Fuels, calorific value of fuel, gross & net calorific value, determination of calorific value using Bomb calorimeter, Coal, Biomass and Biogas, Bio Fuel, Esterification & Transesterification, Introduction of Lubricants, Mechanism of Lubrication, Classification of Lubricant, Bio Lubricant, Flash and Fire Point, Pour Point, Cloud Point, Aniline point, Viscosity index.

UNIT – V ANALYTICAL METHODS AND APPLICATIONS**7 L**

Titrimetric analysis with reference to acid-base, redox, precipitation and complexometric titrations. Elementary ideas and simple applications of UV, visible, mass and NMR spectral techniques NMR spectral techniques.

REFERENCE BOOKS

- Engineering Chemistry – Wiley India
- Engineering chemistry by Sivasankar, TMH, New Delhi.
- Organic Chemistry by Morrisson & Boyd, Pearson Publication.
- Organic Chemistry by Loudon, Oxford University Press.
- C Parameswara Murthy, C V Agrawal and etal., Engineering Chemistry, BS Publication, Hyderabad

BASIC ELECTRICAL ENGINEERING
(TEE101/201) EE 101
(AUTUMN/ SPRING) L T P

L T P
3 1 0

UNIT-1

D.C. Network Theory :

4

Circuit theory concepts-Mesh and node analysis. Network Theorems- Super-position theorem. Thevenin's theorem, Norton's theorem, Maximum, Power Transfer theorem, Star Delta transformation.

Steady State Analysis of A.C. Circuits :

5

Sinusoidal and phasor representation of voltage and current: single phase A.C. circuit behavior of resistance, inductance and capacitance and their combination in series & parallel and power factor, series parallel resonance-band width and quality factor : magnetic circuit.

UNIT-2

Three Phase A.C. Circuits :

4

Star-Delta connections, line and phase voltage/current relations, three phase power and its measurement.

3. Measuring Instruments:

4

Construction and principle of operation of voltage and current measuring instruments; introduction to power and energy meters.

UNIT-3

Transformer :

6

Principle of operation, types of construction, phasor diagram, equivalent circuit, efficiency and voltage regulation of single phase transformer, O.C. and S.C. tests.

Rotating Machine

Unit-4

D.C. Machines

6

Principle of electromechanical energy conversion, types of d.c. machines, E.M.F. equation, Magnetization and load characteristics, losses and efficiency, Starter and speed control of d.c. motors, their applications.

Synchronous Machines: Principle of Operation of Alternator and synchronous motor. **2**

UNIT-5

Three phase induction Motor 4

Principle of operation, types and methods of starting, slip-torque characteristics, applications. **Single phase Motors :** Principle of operation and methods of starting of induction motor, Stepper motor and Universal motor **3**

References :

1. Dr. R. K. Singh and Dr. P.S. Subramanyam, Basic Electrical Engineering, BS Publication, Hyderabad.
2. Gaikwad, Basic Electrical Engineering, Wiley India
3. A.e. Fitzgerald, D.E., Higginbotham and A Grabel, -Basic Electrical Engineering - Mc Graw Hill.
4. H. Cotton, -Advanced Electrical Technology|| Wheeler Publishing.

MECHANICAL ENGINEERING
ME 101 (Autumn / Spring)

LTP
3 1 0

UNIT-1

Fundamental Concepts and Definitions

8L

Definition of thermodynamics, System, Surrounding and universe, Phase, Concept of continuum, Macroscopic & microscopic point of view. Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Property, State, Path, Process, Cyclic and non cyclic processes, Reversible and irreversible processes, Quasi static process, Energy and its forms, Enthalpy.

UNIT-2

8L

Zeroth law:

Zeroth law, Different temperature scales and temperature measurement **First law:** First law of thermodynamics. Processes - flow and non-flow, Control volume, Flow work and non-flow work, Steady flow energy equation, Unsteady flow systems and their analysis. **Second law:** Limitations of first law of thermodynamics, Essence of second law, Thermal reservoir, Heat engines. COP of heat pump and refrigerator. Statements of second law and their equivalence, Carnot cycle, Carnot theorem, Thermodynamic temperature scale, Clausius inequality. Concept of entropy.

UNIT-3

8L

Properties of steam:

Properties of steam, Phase transformation process and its graphical representation on P-V, T-V & T-s diagram, Mollier diagram and Steam Tables, Processes involving steam in closed and open systems.

Introduction to I.C. Engines: Two & four stroke S.I. and C.I. engines. Otto cycle, Diesel cycle, Dual cycle.

UNIT-4

9L

Force system and Analysis

Basic concept: Review of laws of motion, transfer of force to parallel position, resultant of planer force system, Free Body Diagrams, Equilibrium. **Friction:** Introduction, Laws of Coulomb friction, Equilibrium of bodies involving dry friction.

Structure Analysis

Beams: Introduction, Shear force and bending moment, Shear force and bending moment diagram for statically determinate and indeterminate beams.

Trusses: Introduction, Simple Trusses, Determination of forces in simple truss members, Method of joints and Method of section.

UNIT-5

9L

Stress and Strain Analysis

Simple stress and strain: Introduction, Normal shear stresses, Stress-strain diagrams for ductile and brittle materials, Elastic constants, One dimensional loading of members of varying cross section, Strain energy, Thermal stresses.

Compound stress and strains: Introduction, State of plane stress, Principal stress and strain, Mohr's circle for stress and strain.

Pure Bending of Beams: Introduction, Simple bending theory, Stress in beams of different cross sections. **Torsion:** Introduction, Torsion of Shafts of circular section, Torque and Twist, Shear stress due to Torque.

Reference:

1. Agarwal, Basic Mechanical Engineering, Wiley India

3. Holman, J.P. : Thermodynamics, Mc Graw Hill book Co. NY.

4. Singh Onkar, Bhavikatti S.S., Chandra Suresh : Introduction to Mechanical Engineering: Thermodynamics, Mechanics and Strength of Materials, New Age International Publishers

5. Yadav R. : Thermodynamics and Heat Engines, Vol I & II (SI Edition) Central Publishing House Allahabad.

FUNDAMENTALS OF COMPUTER & PROGRAMMING (TCS 101/201)

L T P
3 1 0

UNIT-I

8L

Introduction to Computer Systems; Data representation: Number systems, character representation codes, Binary, hex, octal codes and their inter conversions. Binary arithmetic, Floating point arithmetic, signed and unsigned numbers IEEE standards, CPU organization, ALU, registers, memory, the idea of program execution at micro level. Concept of computing, contemporary Operating Systems such as DOS, Windows, UNIX etc. (only brief user level description). Introduction to organization and architecture of mainframe, mini and micro systems.

UNIT-II

8L

Concept of flow chart and algorithm; Algorithms to programs: specification, top-down development and stepwise refinement, Introduction to the design and implementation of correct, efficient and maintainable programs, structured Programming,, Use of high level programming language for the systematic development of programs, programmability and programming languages, Object codes, compilers. Introduction to the Editing tools such as vi or MS-VC editors.

UNIT-III

10L

C: Data types, Identifiers, Storage class, Constant, Operators, expression, Statements, console I/O statements, Selection statements: if-else, switch, Iteration Statements: for, while, do-while, Jump statements: return, go to, break, continue, comments. Function, Call by value, Call by reference, arguments to main(), return statements, recursion, function prototypes, , preprocessor directives.

UNIT-IV

6L

Arrays:

Single dimensional arrays, two dimensional arrays, multidimensional arrays, variable length arrays. Strings, array of strings. Structures: array of structures, passing structure to function, structure pointers, structure within structures. Unions, bit fields, enumerations.

UNIT-V

8L

Pointers: pointer variables, pointer operator, pointer expression, array of pointers, multiple indirection, pointers to functions, dynamic allocation functions.

File I/O : Streams and files, file system basics, fread, fwrite, fseek, random access I/O, fprintf(), fscanf(), standard streams.

Reference Book

- Gupta: Computer Concepts & C Programming, Comdex
- Jones, C Programming with problem solving, Wiley India
- Let Us C : Yashwant Kanetkar [BPB]
- Mastering C ,K.R.Venugopal,S.R.Prasad[TMH]
- Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, [India Edition]

UNIT-1

Semiconductor materials and properties

4L

Group-IV materials, Covalent bond, electron-hole concepts
Basic concepts of energy bands in materials, concepts of forbidden gap
Intrinsic and extrinsic semiconductors, donors and acceptors impurities

UNIT-2

Junction diode and diode applications

5L

p-n junction, depletion layer, v- i characteristics, diode resistance, capacitance diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage).

Diode Applications

4L

rectifiers (half wave and full wave), calculation of transformer utilisation factor and diode ratings, filter (C – filter), calculation of ripple factor and load regulation
clipping circuits, clamping circuits, voltage multipliers

UNIT-3

Breakdown diodes

4L

breakdown mechanisms (zener and avalanche), breakdown characteristics,
zener resistance, zener diode ratings, zener diode application as shunt regulator

UNIT-4

Bipolar Junction Transistor

5L

Basic construction, transistor action, CB, CE and CC configurations, input/output Characteristics, concept of Biasing of transistors-fixed bias, emitter bias, potential divider bias

Transistor Amplifier

Graphical analysis of CE amplifier, concept of voltage gain, current gain, h-parameter model (low frequency), computation of A_i , A_v , R_i , R_o of single transistor CE and CC amplifier configurations.

Field Effect Transistor

6L

JFET: Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristics equation CG, CS and CD configurations, Introduction to self and fixed biasing

MOSFET: depletion and enhancement type MOSFET-construction, operation and characteristics. Computation of A_v , R_i , R_o , of single FET amplifiers using all the three configurations

Switching theory and logic design

4L

Number systems, conversions of bases, Boolean algebra, logic gates, concept of universal gate, concept of K- Map

Operational Amplifiers

4L

Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders,

Reference Books:

1. R. K. Singh & Lal Kishor, Basic Electronics Engineering, B S Publication, Hyderabad.
2. Gaikwad, Basic Electronics, Wiley India
3. A Mottershead, 'Electronic devices and circuits'. PHI, 2000.
4. Morris Mano, 'Digital Computer Design', PHI, 2003.

BASIC TECHNICAL COMMUNICATION (THM 101)

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3 0 0

RELEVANCE OF TECHNICAL COMMUNICATION FOR TECHNOCRATS

English Communication is an integral part of today's life. The advent of new technologies has led to the rapid development of a global village. A budding technocrat must be equipped with English language proficiency so that he / she can make a mark in this global village. Engineering students come from different backgrounds with different mother tongues. It is imperative for them to overcome their native accentual patterns and gain proficiency in speaking standard English. They also need to acquire optimum writing skills. Hence proper training in English speaking and writing is necessary. This goes hand in hand with the development of reading and listening skills. The course of Basic Technical Communication will help in the development and improvement of the communication skills and linguistic competence of engineering students.

OBJECTIVES:-

1. To help students perform better in all academic subjects through greater command over the English language.
2. To promote efficiency in English language with the development of the four skills of communication i.e., LSRW (Listening, Speaking, Reading and Writing).
3. To prepare students face the challenges of their professional lives in an increasingly globalised world.

UNIT – I: COMMUNICATION

- 1) Communication – Definition. Process of communication,
- 2) Types of communication—Verbal and Non-Verbal communication; Formal and Informal communication (grapevine) and their significance.
- 3) Barriers to Communication—Semantic barriers, Physical barriers, Psychological barriers, Interpersonal barriers and Organizational barriers. Language as a tool of communication.
- 4) Importance of communication with reference to students, professionals business etc.
- 5) Technical communication: Definition, Oral and Written technical communication. Difference between general writing and technical writing.
- 6) Computer-aided Technical Communication.
- 7) Style in Technical Communication. Features of technical writing.
- 8) Importance of Technical Communication

UNIT-2: READING SKILLS

- 1) Importance of Reading Skills, Types of Reading Skills, Methods of Improving Reading Skills, Objectives of Improving Reading Skills
- 2) Vocabulary Building: Antonyms, Synonyms, Homophones, Word formation (Prefixes and Suffixes). One Word substitution,
- 3) Jargon/Technical Terminology – Use of Jargon and examples of Jargon.
- 4) Paragraph: Definition. Requirements of a paragraph -- Understanding, Unity, Coherence and Emphasis in a paragraph. Identifying the Topic Sentence. Development of a Paragraph using Deductive order, Inductive order, Chronological Order (Time Order), Spatial Order (Space Order), Expository Order, Question and Answer Order, Comparison and Contrast Order. Devices used to impart Coherence and Emphasis in a Paragraph. Analysis of a given Paragraph in terms of Unity, Coherence and Emphasis.
- 5) Developing Reading Skills and Reading Comprehension through the study of thematic and value based critical reading of the following essays –

1. Of Discourse by Francis Bacon
2. Unity of Minds by Dr. A.P.J. Abdul Kalam

UNIT-3:- WRITING SKILLS.

- 1) Importance of Writing Skills, Types of Writing Skills, Methods for Improving Writing Skills, Objectives of Improving Writing Skills
- 2) Functional Grammar- Parts of Speech.
- 3) Common Grammatical Errors: Errors of Syntax, Concord etc.
- 4) Sentence and Paragraph construction. Writing Expository, Argumentative, Deductive etc. Paragraphs.
- 5) Précis Writing
- 6) Letter writing: Formal and Informal Letters.
- 7) Developing Writing Skills through the study of thematic and value based critical reading of the following short stories–
 1. After Twenty Years by O. Henry
 2. The Open Window by Saki (H.H. Munro)

UNIT 4:- LISTENING SKILLS

- 1) Importance of Listening Skills, Process of listening, listening and hearing, Active and Passive Listening. Types of Listening: Academic listening, Appreciative listening, Attentive Listening, Critical Listening, and Discriminative listening etc.
- 2) Methods for Improving Listening Skills, Objectives of Improving Listening Skills.
- 3) Barriers to listening: Semantic barriers, Physical barriers, and Psychological barriers.
- 4) Listening Comprehension: Identifying general content, Identifying specific information.
- 5) Listening for Note taking and drawing inferences.
- 6) Developing listening skills and listening comprehension through the study of thematic and value based critical reading of the following one-act play.
 1. The Refund by Fritz Karinthy

7) Practice of Listening Skills through Language Laboratory

1. Listening to a recording of a telephone conversation for identifying specific information as well as details.
2. Listening to a recording of a railway / airport announcement for selective listening and identifying specific information.
3. Listening to a recording of a radio / television news bulletin for identifying specific as well as over-all information
4. Listening to a recording of the description of a place, event or incident for note-taking, identifying details, descriptions and overall idea.
5. Listening to a recording of a lecture / talk on for note taking and identifying facts and drawing conclusions.
6. Listening to a recording of a television panel discussion on any topic for identifying facts, analyzing those drawing inferences and explaining the conclusion of the discussion in a logical manner.
7. Listening to passages that are read out for practicing note taking and identifying general and detailed content.
8. Listening to dialogues that are read out for identifying specific, general and detailed content.

UNIT-5:- SPEAKING SKILLS.

- 1) Importance of Speaking Skills, Types of Speaking, Methods for Improving Speaking Skills, Objectives of Improving Speaking Skills
- 2) Organs of Speech, Mechanism of Speech.
- 3) Phonetics: Classification of English Sounds, Vowel (short vowels and long vowels), Consonants, Diphthongs, Phonemes, Allophones, Phonetic transcription.
- 4) Syllable: Definition, Types of Syllable. Monosyllabic, Polysyllabic words etc.
- 5) Stress, Rhythm, Intonation: Rising Tone, Falling Tone and Rising-Falling Tone.
- 6) Everyday Conversation: Tips and characteristics of a good conversation. Common manners and etiquette.
- 7) Debate, Making a speech, Role play,
- 8) Extempore, JAM Session (just a minute session).
- 9) **Practice of Speaking Skills through Language Laboratory**
 1. Practicing the following modules through self-learning software:
 - a. Grammar with special emphasis on Tenses
 - b. Pronunciation: of consonants, vowels, syllables and individual words c. Word Stress: based on accentual patterns
 - d. Rhythm in speech based on content words and strong words e. Intonation: rising, falling and rising-falling tone
 - f. Pause groups
 - g. Speech making / public speaking
 2. Introducing self and others keeping in mind kinesics.
 3. Common conversation practice (making small talk etc.).
 4. Asking for permission.
 5. Making requests.
 6. Describing events / people / places
 7. Extempore.
 8. JAM Session (Just a Minute Session).
 9. Role play
 10. Holding informal discussions.
 11. Logical presentation of one's views on a given topic.
 12. Delivering a speech using Stress, Rhythm and Intonation.

Note: The two class tests for theory will be of 10 marks each and two class tests of Basic Technical Communication will be of 10 marks each so that the total marks for class test will be of 40 marks and 10 marks will be for tutorial/attendance/home assignments. The subject faculty is requested to send the class test marks indicating both for theory and lab separately.

(b) Kindly make following changes in the structure of B.Tech. Ist year syllabus. In the subject of THM 101 Basic Technical Communication indicate

SUGGESTED REFERENCES BOOKS:

- Kavita Tyagi & Padma Misra Basic Technical Communication, PHI, New Delhi
- Norman Lewis: Word Power Made Easy, W.R Goyal Pub. & Distributors.
- Rutherford A: Basic Communication Skills; Person Education, N. Delhi
- Joans Daniel: English Pronouncing Dictionary, Cambridge
- John Seely: The Oxford Guide to Writing and Speaking. OUP, Delhi
- Mohammad Aslam: Introduction of English Phonetics and Phonology Cambridge
- Y Kameswari, Successful Career Soft Skills and Business English, BS Publications, Hyderabad

**ENVIRONMENTAL STUDIES (TES
101/201)**

UNIT-1 NATURAL RESOURCES:

8 L

Renewable and Non-renewable Resources :

Natural resources and associated problems.

- a) **Forest resources :** Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
- b) **Water resources :** Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
- c) **Mineral resources :** Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
- d) **Food resources :** World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.
- e) **Energy resources :** Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
- f) **Land resources :** Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
 - Role of an individual in conservation of natural resources.
 - Equitable use of resources for sustainable lifestyles.

UNIT- 2 ECOSYSTEMS

6 L

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystems :-
 - a. Forest ecosystem
 - b. Grassland ecosystem
 - c. Desert ecosystem
 - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT- 3 BIODIVERSITY AND ITS CONSERVATION

4 L

- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation
- Hot-spots of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.

- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

UNIT- 4 ENVIRONMENTAL POLLUTION & SOCIAL ISSUES

7 L

- Definition
- Cause, effects and control measures of :-
 - a. Air pollution
 - b. Water pollution
 - c. Soil pollution
 - d. Marine pollution
 - e. Noise pollution
 - f. Thermal pollution
 - g. Nuclear hazards
- Disaster management : floods, earthquake, cyclone and landslides.
- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.

REFERENCE BOOK

- M Ajni Reddy, Text book of environmental Science, BS Publication, Hyderabad
- Environmental Studies by Daniel, Wiley India
- Environmental Studies by Erach Bharucha, University Press.
- Fundamental of Ecology, E.P.Odum, Cengage Learning.
- Environmental Science and Engineering by Wright, Pearson Publication.
- First Ecology by Beeby and Brennan, Oxford University Press.
- Environment Science by Miller, Cengage Learning, New Delhi.
- Hand book of Environmental laws, Rules, Guidelines, Compliances and Standards Vol. 1 & Vol. 2, Bharat Publication, New Delhi.

ENGINEERING DRAWING (PED 101/201)

L T P
0 0 2

1. Introduction

Graphics as a tool to communicate ideas, Lettering and dimensioning, Construction of geometrical figures like pentagon and hexagon.

2. Orthographic Projection

Principles of orthographic projections, Principal and auxiliary planes, First and Third angle projections. Projection of points. Pictorial view. Projection of lines parallel to both the planes. Parallel to one and inclined to other, Inclined to both the planes. Application to practical problems. Projection of solid in simple position, Axis or slant edge inclined to one and parallel to other plane, Solids lying on a face or generator on a plane. Sectioning of solids lying in various positions, True shape of the section. Development of lateral surfaces, sheet metal drawing.

3. Isometric Projection

Principles of isometric projection, Isometric projection using box and offset methods.

1. Bhatt. N.D.: Elementary Engineering Drawing, Charothar Publishing.
2. D A Hindoliya, Text book of Engg. Graphics, BS Publication, Hyderabad

WORKSHOP PRACTICE (PWS 101/201)

L T P
0 0 2

1. Carpentry Shop: 1. Study of tools and operation and carpentry joints. 2. Simple exercise using jack plain. 3. To prepare half- lap corner joint, mortise and tennon joints. 4. Simple exercise on woodworking lathe.

2. fitting Bench Working Shop : 1. Study of tools and operations 2. Simple exercises involving filling work. 3. Making perfect male-female joint 4. Simple exercise involving drilling/tapping/dieing.

3. Black Smithy Shop : 1. Study of tools and operations 2. Simple exercises based on black smithy operations such as upsetting, drawing down, punching, bending, fullering & swaging.

4. Welding Shop : 1. Study of tools and operations . 2. Simple butt joint. 3. Lap joint. 4. oxy acetylene welding.

5. Sheet metal shop : 1. Study of tools and operations. 2. Making funnel complete with soldering. 3. Fabrication of tool box, tray, electrical panel box etc

6. Machine Shop : 1. Study of tools and operations. 2. Plane turning. 3. Step turning. 4. Taper turning 5. Threading. 6. Single point cutting tool grinding.

Reference:

1. Hajra, Bose, Roy: Workshop Technology Vol 1 & 2, Media Promoters
2. Raghuvanshi B.S.: Workshop Technology, Vol 1 & 2, Dhanpatrai

C Programming Lab (PCS-101\PCS201)**List of Experiments**

1. Practice of all internal and External DOS Commands
2. Practice of all UNIX commands and write simple shell script.
3. WAP to perform simple arithmetic operations using different data types.
4. WAP to swap two numbers without using third variable.
5. WAP to find out whether the given number is prime or not.
6. WAP using conditional operator to determine whether a year is leap year or not.
7. WAP to print the ASCII code and their equivalent characters.
8. WAP to print corresponding days of a week using switch case.
9. WAP to print factorial of a number using recursion.
10. WAP to print Fibonacci series using function.
11. WAP to print an array and find greatest element of the array.
12. WAP to arrange elements of a given array in ascending order.
13. WAP for Matrix multiplication and find the inverse of resultant matrix.
14. WAP to print name, price & no. of pages of 3 books using structures.
15. WAP to remove the trailing blanks in a string input by the user, and print the resulting string using pointer.

CHEMISTRY PRACTICALS (CPY 101/201)

L T P
0 0 2

LIST OF EXPERIMENTS

1. Determination of alkalinity in the given water sample.
2. Determination of temporary & permanent hardness in water sample using EDTA as standard solution.
3. Determination of available chlorine in bleaching powder.
4. Determination of chloride content in the given water sample by Mohr's method.
5. Determination of iron content in the given ore by using external indicator.
6. Determination of Acid & Base no. in lubricating oil by potentiometric method.
7. Determination of Equivalent weight of Iron by the chemical displacement method. The equivalent weight of copper is 63.5
(Note : The procedure to be followed in carrying the above experiment is given as annexure)
8. Determination of viscosity index of lubricating oil.
9. Determination of iron concentration in sample of water by colorimetric method.
The method involves the use of KCNS as colour developing agent & the measurements are carried out at λ_{max} 480nm.

Note : The general procedure of estimation is given on pp653-8 of the textbook Of Quantitative Chemical Analysis by A.I.Vogel 6th Edition, Publisher : Pearson Education Ltd.2000

10. Determination of heat of neutralization of Hydrochloric acid & Sodium hydroxide

11. Determination of flash & fire point of lubricating oil
12. Determination of Carbon residue of lubricating oil.
13. Determination of Sulphated ash of motor oil.
14. Determination of saponification value of lubricating oil & vegetable oil.
15. Separation of metal ions by paper chromatography.

MATHEMATICS-II (TMA-201)

L T P
3 1 0

Unit-1

Differential Equations

8

Ordinary differential equations of first order, Exact differential equations, Linear differential equations of first order, Linear differential equations of nth order with constant coefficients, Complementary functions and particular integrals, Simultaneous linear differential equations, Solutions of second order differential equations by changing the dependent and independent variables, Method of variation of parameters.

Unit-2

Laplace Transform

10

Laplace transform, Existence theorem, Laplace transform of derivatives and integrals, Inverse Laplace transform, Laplace transform of periodic function, Unit step function, Convolution theorem, Applications to solve simple linear and simultaneous linear differential equations.

Unit-3

Infinite Series

8

Introduction, Sequences, Series: Convergence, Series of positive terms, Comparison tests, Integral tests, Comparison of ratio's, D'Alembert ratio test, Raabe's test, Cauchy root test, Alternating series: Leibnitz rule, Power series, Uniform convergence, Weierstrass's M-test, Properties of uniformly convergent series.

Unit-4

Fourier Series and Partial Differential Equations

8

Periodic functions, Trigonometric series, Fourier series of periodic function, Euler's formula, Functions having arbitrary period, Change of intervals, Even and odd functions, Half range sine and cosine series.

Introduction to partial differential equations, Linear partial differential equations with constant coefficients of second order and their classifications: parabolic, hyperbolic and elliptic with illustrative examples.

Unit-5

Applications of Partial Differential equations

8

Method of separation of variables for solving partial differential equations, One dimensional wave equation, Laplace equation in two dimensions, Heat conduction equations of one dimension and two dimension.

References:

1. A Text book of Engineering Mathematics (Vol.2) by Peter V. O'Neil, Cengage Learning.
2. B. S. Grewal: Higher Engineering Mathematics, *Khanna Publications*.
3. C. Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya.

4. E. Kreyszj: Advanced Engineering Mathematics, Wiley Eastern.
5. M.D. Raisinghan: Ordinary & Partial Differential Equations, S. Chand Publication.

ADVANCED TECHNICAL COMMUNICATION

L T P
3 0 2

MAXIMUM MARKS -100

UNIT 1 : TECHNICAL COMMUNICATION

1. Introduction to technical communication, types of technical communication, history of the development of technical communication.
2. Difference between general and technical communication, importance of technical communication.
3. Characteristic features of technical communication. Elements of style in technical communication.
4. Process of preparing a technical document.
5. Elements, features and objectives of scientific articles, research papers, dissertation and thesis.

UNIT 2:-BUSINESS COMMUNICATION

1. Importance and Features of Business Communication
2. Business Correspondence – Principles, Features, Types, Format and layout of Business letter.
3. Types of Business Correspondence – letters of Enquiry, Quotation, Order, Instructions, Sales, Credit, Complaint, Collection etc.
4. Some more types of Business Correspondence -- Notice, Agenda, Minutes, Memorandum.
5. Job Application letters -- Covering letter, Resume, Bio-data and C.V.

UNIT 3:- TECHNICAL PROPOSAL and TECHNICAL REPORT

1. Technical Proposal – Introduction, purpose, features, types, format, importance, process of preparation. Writing technical proposals.
2. Technical Report -- Features, Types, Style, Format, Relevance. Writing Technical Reports.

UNIT 4:-LITERATURE

1. Critical reading and thematic, value-based study of the Novella, ‘**Animal Farm**’ by George Orwell.
2. Critical review, study of theme, plot, symbolism, characterization, style of writing etc.

UNIT 5:- SOFT SKILLS

This unit should be covered in classroom teaching as well as judicious use of language lab, (There should be optimum use of software’s related to accent, presentation skills etc.)

1. Kinesics, Para language, Proxemics.
2. Presentation skills - Features, Types, Structure, Aids and Importance.
3. Interpersonal communication skills – Role of Personality and its various attributes like EQ, attitude, motivation, stress management and accepting criticism in determining efficacy of interpersonal communication.

- ### ❖ Practice of Soft Skills using Language Laboratory

- ## SUGGESTED REFERENCE BOOKS

- Kavita Tyagi & Padma Misra, Advance Tech. Communication, PHI, New Delhi
- Gupta Advanced Technical Communication, Cambridge University Press, N. Delhi
- George Orwell Animal Farm, Penguin Publishing Company, N. Delhi
- Sharma & Mohan Business Correspondence and Report Writing, TMH, N Delhi.
- Rubens Science & Technical Writing, Foundation books, Cambridge, N. Delhi
- Daniel Riordan Technical Communication, Cengage Learning, N. Delhi
- Raman & Sharma Technical Communication, OUP, N. Delhi
- Wallace, Masters Personality Development, Cengage Learning, N. Delhi
- Robert Barrass Students Must Write, Foundationbooks, Cambridge, N. Delhi
- Bhaskar Rao, Successful Career Soft Skills and Business English, BS Publications, Hyderabad
- Chakrawarthy: Soft Skills for Professionals, Wiley India

PHYSICS PRACTICALS

(Autumn / Spring)

ASP 11

L T P
0 0 2

List of Experiments (At least Ten)

1. To determine the wavelength of monochromatic light by Newton's ring.
2. To determine the wavelength of monochromatic light with the help of Fresnel's biprism.
3. To determine the focal length of two lenses by nodal slide and locate the position of cardinal points.
4. To determine the specific rotation of cane sugar solution using half shade polarimeter.
5. To determine the wavelength of spectral lines using plane transmission grating.
6. To determine the specific resistance of the material of given wire using Carey Foster's bridge.
7. To determine the variation of magnetic field along the axis of a current carrying coil and then to estimate the radius of the coil.
8. To verify Stefan's Law by electrical method.
9. To calibrate the given ammeter and voltmeter.
10. To study the Hall effect and determine Hall coefficient, carrier density and mobility of a given semiconductor material using Hall-effect set up.
11. To determine energy band gap of a given semiconductor material.
12. To determine E.C.E. of copper using Tangent or Helmholtz galvanometer.
13. To draw hysteresis curve of a given sample of ferromagnetic material and from this to determine magnetic susceptibility and permeability of the given specimen.
14. To determine the ballistic constant of a ballistic galvanometer.
15. To determine the viscosity of a liquid.

Note : Additional experiments may be added based on contents of syllabus.

CHEMISTRY PRACTICALS
(Autumn / spring)

ASP 13

L T P
0 0 2

LIST OF EXPERIMENTS (AT LEAST TEN)

1. Determination of alkalinity in the given water sample.
2. Determination of temporary and permanent hardness in water sample using EDTA as standard solution.
3. Determination of available chlorine in bleaching powder.
4. Determination of chloride content in the given water sample by Mohr's method.
5. Determination of iron content in the given ore by using external indicator
6. pH-metric titration.
7. Determination of Equivalent weight of Iron by the chemical displacement method. The equivalent weight of copper is 63.5
(Note : the procedure to be followed in carrying the above experiment is given as annexure)
8. Viscosity of an addition polymer like polystyrene by Viscometer.
9. Determination of iron concentration in sample of water by colorimetric method. The method involves the use of KCNS as colour developing agent and the measurements are carried out at λ_{\max} 480 nm.
Note : The general procedure of estimation is given on pp 653-8 of the textbook of Quantitative Chemical Analysis by A.I. Vogel 6th Edition, Publisher : Pearson education Ltd. 2000)
10. Determination of heat of neutralization of Hydrochloric acid and Sodium hydroxide
11. Determination of amount of dissolved oxygen in water
12. Separation of metal ions by paper chromatography
13. Preparation of iodoform from acetone
14. Preparation of Sodium Cobaltinitrile salt.
15. Element detection & functional group identification in organic compounds

BASIC ELECTRICAL + ELECTRONICS LAB
EE P 11 (Autumn / Spring)

List of Practical

L T P
0 0 2

FEP 11

Fundamentals of Electronics Lab (Any Ten)

1. Study of diode characteristics.
2. To study a half wave and full wave rectifier circuit.
3. Determination of ripple factor of capacitive and non capacitive filter for HW and FW diode rectifier circuit.
4. Study of characteristics of Zener Diode as constant voltage.
5. Verification of Application of Zener Diode as shunt regulator.
6. Study of Clipper and Clamper Circuit with different waveforms.
7. Determination of characteristics of BJT in CB and CE configuration.
8. Determination of characteristics of FET in CS and CD configuration.
9. Study of BJT as single stage amplifier and determination of A_v , V_i , R_i and R_o .
10. Study of AND, NAND, OR, NOR and EXOR gates.
11. Verification of Universal gates.

List of Practical

L T P
0 0 2

FEP 11

Fundamentals of Electrical Engineering Lab (Any Ten)

1. Verification of Network Theorems.
2. Study of diode characteristics. Study of phenomenon of resonance in RLC series circuit.
3. Measurement of power in a three phase circuit by two wattmeter method.
4. Measurement of efficiency of a single phase transformer by load test.
5. Determination of parameters and losses in a single phase transformer by OC and SC test.
6. Study of characteristic of DC Motor.
7. Study of characteristic of AC Motor.
8. DC generator characteristics.
9. 10. Speed control of dc shunt motor.
10. Study running and reversing of a three phase induction motor.
11. Study of a single phase energy meter.

MECHANICAL ENGINEERING LAB
MEP 11 (Autumn / Spring)

List of Practical

L T P
0 0 2

A minimum of 10 experiments from the following :

1. Study of Steam engine and steam turbine models.
2. Study of 2-stroke and 4-stroke I.C.E. models.
3. Study of Fiat engine and/ or Diesel engine prototype.
4. Study of a vapour compression Refrigeration unit tutor/refrigerator.
5. Study of a window type air conditioner.
6. To conduct the tensile test on a UTM and determine ultimate Tensile strength, percentage elongation for a steel specimen.
7. To conduct the compression test and determine the ultimate compressive strength for a specimen.
8. To conduct the Impact test (Izod / charpy) on the Impact testing machine and to find the impact strength.
9. To determine the value of acceleration due to gravity by Atwood's Machine apparatus.
10. To verify the principle of moment by Bell Crank Lever Apparatus
11. To determine the moment of inertia of a flywheel apparatus about its axis of rotation
12. To verify Newton's second law of motion by Fletcher's Trolley apparatus
13. To find out coefficient of friction by combined inclined plane & friction slide apparatus
14. To determine the velocity ratio, mechanical advantage & efficiency of a single purchase crab apparatus & draw graph between load vs effort, mechanical advantage and efficiency.
15. To determine the velocity ratio, mechanical advantage & efficiency of a double purchase crab apparatus.

COMPUTERS LABORATORY

(Autumn / Spring)

CSP 11

L T P
0 0 2

List of Practicals

1. Practice of some internal and External DOS Commands
2. Write simple batch program.
3. File and program management in windows
4. Familiarization with the ftp ,http etc. supported by various protocols
5. Practice of some UNIX commands
6. Write simple shell script
7. Introduction to text editing and word processing
8. Exposure to advance feature supported by some editors
9. Net Surfing
10. Creation and usage of E - mail account
11. Write small program using C language
12. Handling of data structure in C
13. Familiarizing mail account using PINE, deleting, creating folder/ mail-messages, adding signature, creating directory of addresses.
14. Compressing data file using WINZIP & WINRAR
15. Introduction to various extension of files as TXT, EXE, BAK, BAT, BMP, DOC, XLS, PPT, PDF, HTML, JPEG, MPEG, MP3, DAT & AVI

Note : List may be modified according to new software available.

SCHEME OF EXAMINATION

For

B. Tech. (Civil Engineering)

YEAR II, SEMESTER –III

(Effective from the session: 2010-2011)



Uttarakhand Technical University, Dehradun

COURSES AND EVALUATION SCHEME
B.TECH CIVIL ENGINEERING
YEAR II, SEMESTER –III
(EFFECTIVE FROM SESSION :-2010-2011)

S. No.	Course No.	Subject	Periods			Evaluation				Subject Total	Credit
						Sessional	Exam		Exam		
			L	T	P	CT	TA	Total	ESE		
Theory											
1.	TMA 301	Mathematics-III	3	1	0	30	20	50	100	150	4
2	THU-301	Engineering Economics	2	1	0	15	10	25	50	75	3
3	TCE 301**	Fluid Mechanics	3	1	0	30	20	50	100	150	4
4	TME 303###	Solid Mechanics	3	1	0	30	20	50	100	150	4
5	TCE 302	Building Material & Construction	3	1	0	30	20	50	100	150	4
6	TCE 303	Basic Surveying	2	1	0	15	10	25	50	75	3
Practical /Design											
7	PCE 351	Fluid Mechanics Lab	0	0	2		25	25	25	50	1
8	PCE 352	Building Materials Lab	0	0	2		25	25	25	50	1
9	PCE 353	Surveying Lab	0	0	3		25	25	25	50	2
10	PCE 354	Building Planning & Drawing	0	0	3		25	25	25	50	2
11	GP-301	General Proficiency (NSS/NCC/Sports/Cultural)	-	-	-		-	50	-	50	-
		Total								1000	28

**Common to Mechanical Engineering

##Common to Mechanical, Biochemical & Chemical Engineering

TMA-301

MATHEMATICS –III

L	T	P
3	1	0

Unit – I : Function of Complex variable

Analytic function, C-R equations, Cauchy's integral theorem, Cauchy's integral formula for derivatives of analytic function, Taylor's and Laurent's series, singularities, Residue

theorem, Evaluation of real integrals of the type $\int_0^{2\pi} f(\cos \theta \sin \theta) d\theta$ and $\int_{-\infty}^{\infty} f(x) dx$ **10**

Unit – II : Statistical Techniques - I

Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves etc., Correlation, Linear, non –linear and multiple regression analysis, Probability theory. **08**

Unit – III : Statistical Techniques - II

Binomial, Poisson and Normal distributions, Sampling theory (small and large), Tests of significations: Chi-square test, t-test, Analysis of variance (one way) , Application to engineering, medicine, agriculture etc.

Time series and forecasting (moving and semi-averages), Statistical quality control methods, Control charts, X, R, p, np, and c charts. **08**

Unit – IV : Numerical Techniques – I

Zeroes of transcendental and polynomial equation using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, difference tables, Newton's forward and backward interpolation , Lagrange's and Newton's divided difference formula for unequal intervals. **08**

Unit – V : Numerical Techniques –II

Solution of system of linear equations, Gauss- Seidal method, Crout method. Numerical differentiation, Numerical integration , Trapezoidal , Simpson's one third and three-eight rules, Solution of ordinary differential (first order, second order and simultaneous) equations by Euler's, Picard's and forth-order Runge- Kutta methods. **08**

Reference Books :-

1. R.K. Jain & S.R.K. Iyenger, Advance Engineering Mathematics, Narosa Publication House, 2002.
2. Chandrika Prasad, Advanced Mathematics for Engineers, Prasad Mudralaya, 1996.
3. E. Kreysig, Advanced Engineering Mathematics, John Wiley & Sons, 2005.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2005.
5. Devi Prasad, An introduction to Numerical Analysis, Narosa Publication house, New Delhi, 2006.
6. T. Veerajan & T. Ramchandran, Theory & Problems in Numerical Methods, TMH, New Delhi, 2004.
7. S.P.Gupta, Statistical Methods, Sultan and Sons, New Delhi, 2004.
8. Devore, Probability and Statistics, Thomson(Cengage) Learning, 2007.
9. Walpole, Myers, Myers & Ye, Probability and Statistics for Engineers & Scientists,
10. Peter V. O'Neil, Advance Engineering Mathematics Thomson (Cengage) Learning, 2007.
11. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi , 2003.
12. J.N. Kapur, Mathematical Statistics, S. Chand & company Ltd., 2000

THU-301

ENGINEERING ECONOMICS

L	T	P
2	0	0

1. Unit-I

Time value of money : Simple and compound interest, Time value equivalence, Compound interest factors, Cash flow diagrams, Calculation, Calculation of time –value equivalences. Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, payback period comparison. (8)

2. Unit-II

Use and situations for equivalent annual worth comparison, Comparison of assets of equal and unequal life. Rate of return, Internal rate of return, comparison of IRR with other methods, IRR misconceptions. (8)

3. Unit-III

Analysis of public Projects: Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis. (9)

4. Unit-IV

Depreciation, computing depreciation charges, after tax economic comparison, Break-even analysis; linear and non-linear models. Product and Process Costing, Standard Costing, cost estimation, Relevant Cost for decision making, Cost control and Cost reduction techniques. (8)

Reference Book :

1. Horn green, C.T., Cost Accounting, Prentice Hall of India
2. Riggs, J.L., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996

TCE-301

FLUID MECHANICS

L	T	P
3	1	0

Unit-I: Introduction : Fluid and continuum, Physical properties of fluids, Rheology of fluids.

Kinematics of Fluid flow : Types of fluid flows: Continuum & free molecular flows. Steady and unsteady, uniform and non-uniform, laminar and turbulent flows, rotational and irrotational flows, compressible and incompressible flows, subsonic, sonic and supersonic flows, subcritical, critical and supercritical flows, one, two and three dimensional flows, streamlines, continuity equation for 3D and 1D flows, circulation, stream function and velocity potential, source, sink, doublet and half-body.

Unit-II: Fluid Statics: Pressure-density-height relationship, manometers, pressure transducers, pressure on plane and curved surfaces, centre of pressure, buoyancy, stability of immersed and floating bodies, fluid masses subjected to linear acceleration and uniform rotation about an axis.

Dynamics of Fluid Flow: Euler's Equation of motion along a streamline and its integration, Bernoulli's equation and its applications- Pitot tube, orifice meter, venturi meter and bend meter, Hot-wire anemometer and LDA, notches and weirs, momentum equation and its application to pipe bends.

Unit-III: Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, Buckingham's Pi theorem, important dimensionless numbers and their significance, geometric, kinematics and dynamic similarity, model studies.

Unit-IV: Laminar and Turbulent Flow: Equation of motion for laminar flow through pipes, Stokes' law, transition from laminar to turbulent flow, turbulent flow, types of turbulent flow, isotropic, homogenous turbulence, scale and intensity of turbulence, measurement of turbulence, eddy viscosity, mixing length concept and velocity distribution in turbulent flow over smooth and rough surfaces, resistance to flow, minor losses, pipe in series and parallel, power transmission through a pipe, siphon, water hammer, three reservoir problems and networks.

Unit-V: Boundary Layer Analysis: Boundary layer thickness, boundary layer over a flat plate, laminar boundary layer, application of momentum equation, turbulent boundary layer, laminar sub layer, separation and its control, Drag and lift, drag on a sphere, a two dimensional cylinder, and an aerofoil, Magnus effect.

Reference Books :

1. S Narasimhan: First Course in Fluid Mechanics, University Press
2. Som, S.K. & Biswas G.: Introduction of fluid mechanics & Fluid Machines, TMH, 2000, 2nd edition.
3. M M Das: Fluid Mechanics & Turbomachines, Oxford University Press
4. S.K. Agarwal: Fluid Mechanics & Machinery, TMH
5. Garde, R.J., "Fluid Mechanics through Problems", New Age International Pvt. Ltd, New Delhi, 2nd Edition.
6. Hunter Rouse, "Elementary Mechanics of Fluids", John Wiley & Sons. Omc. 1946
7. I.H. Shames, "Mechanics of Fluids", McGraw Hill, Int. Student, Education, 1988.
8. Vijay Gupta and S.K. Gupta, "Fluid Mechanics and its Applications", Wiley Eastern Ltd, 1984.
9. Modi, P.N., and Seth, S.H., "Hydraulics and Fluid Machines", Standard Book House, 1989.

TME- 303

SOLID MECHANICS

L	T	P
3	1	0

Unit-I

Introduction. Stress and strain: stress at point, Cauchy stress tensor, equilibrium equations, analysis of deformation and definition of strain components, compatibility relations, (8)
principal stresses and strains, stress and strain invariants, Mohr's circle representation. (3)

Unit-II

Constitutive relations: true and engineering stress-strain curves, Material properties for isotropic materials and their relations. Theories of failures for isotropic materials. (7)

Unit-III

Shear Force and Bending Moment diagrams. Axially loaded members. Torsion of circular shafts Stresses due to bending: pure bending theory, combined stresses. (7)

Unit-IV

Deflections due to bending: moment-curvature relation, load-deflection differential equation, area moment method, and superposition theorem. Stresses and deflections due to transverse shears. (8)

Unit-V

Torsion of circular shaft. Energy methods: Strain energy due to axial, torsion, bending and transverse shear. Castigliano's theorem, reciprocity theorem etc. (7)

Reference Books:

1. S. C. Crandall, N. C. Dahl, and T. J. Lardner, *An Introduction to the Mechanics of Solids*, 2e, McGraw Hill, 1978.
2. E. P. Popov, *Engineering Mechanics of Solids*, Prentice Hall, 1990
3. I. H. Shames, *Introduction to Solid Mechanics*, 2e, Prentice Hall, 1989
4. S. P. Timoshenko, *Strength of Materials*, vols. 1 & 2, CBS publ., 1986
5. Mechanics of Materials by Bear Jhonson

TCE 302

Building Materials and Construction

L	T	P
3	1	0

Unit – 1: Classification of materials, materials and their performance, economics of the building materials. Stones, Requirement of good building stone, characteristics of stones and their testing. Common building stones. Preservation of stones.

Bricks : Manufacture of clay bricks, and their classification. Properties of clay bricks and their testing. Problems of efflorescence & lime bursting in bricks & tiles.

Gypsum : properties of gypsum plaster, building products of gypsum and their uses. Lime : Manufacture of lime, classifications of limes, properties of lime.

Pozzolona : Natural and Artificial fly ash, Surkhi (burnt clay pozzolona), rice husk and ash pozzolona, properties and specifications for use in construction.

Timber : Classification and identification of timber, Fundamental Engineering properties. Defects in timber, Factors affecting strength of timber, seasoning and preservation of timber. Wood based products.

Asphalt, Bitumen and Tar : Terminology, specifications and uses, Bituminous materials.

Unit – II : Chemistry of Plastics manufacturing process, classification, advantages of plastics, Mechanical properties and their use in construction.

Paints varnishes and distempers, Common constituents, types and desirable properties, Cement paints. Ferrous metals, Desirable characteristics of reinforcing steel. Principles of cold working. Detailed Discussion on reinforcing steel mechanical and physical properties chemical composition. Brief discussion on properties and uses of Aluminum and lead. Glass : Ingredients, properties types and use in construction.

Insulating Materials: Thermal and sound insulating material desirable properties and type.

Unit – III:Components of building area considerations, Construction Principle and Methods for layout, Damp proofing ant termite treatment, Vertical circulation means staircases ramp design and construction. Different types of floors, and flooring materials (Ground floor and upper floors). Bricks and stone masonry construction. Cavity wall hollow block and Waffle slab construction.

Unit - IV :Doors, Windows and Ventilations, Construction details types and relative advantages & disadvantages. Roofs types and treat ents, Lintels and Chhajja Functional efficiency of Buildings.

Unit - V :Natural Ventilation , Water Supply and Sanitary fittings (Plumbing), Electricity. Heating Ventilation & Air conditioning , Mechanical Lifts and Escalators , Fire Fighting , Acoustics. Plastering different types, pointing, Distempering, Colour washing, Painting etc. Principles & Methods of building maintenance

Reference Books:

1. S K Duggal : Building Materials , New Age International
2. P.C. Varghese : Building Materials , PHI
3. P.C. Varghese : Building Construction , PHI
4. B.C. Funmia : A Text Book of Building Construction, Luxmi Publications, Delhi.
- 5.O.H. Koenisberger : “Manual of tropical housing and building” Orient Longman
6. S.P. Arora at al., “A Text Book of Building Construction - Dhanpat Rai & Sons,

TCE 303

Basic Surveying

L	T	P
2	1	0

Unit – I: Importance of surveying to engineers, plane and geodetic surveying, principles of surveying, classification of surveys (2)

Principles of different methods and their accuracies, measurement by tape, Reference meridians, bearing and azimuths, magnetic declination, compass, Vernier theodolite, temporary adjustments, measurements of horizontal angle, modern trends- EDM, electronic theodolites and Electronic Total Station. (4)

Unit – II: Methods of determining elevations, Direct levelling- basic terms and definitions, principle, booking and reduction of field notes, curvature and refraction, automatic levels, Contouring- methods and uses (4)

Definition, Principles of stadia systems, subtense bar and tangential methods (2)

Unit – III:

Elements of simple circular curves, theory and methods of setting out simple circular curves, transition curves- types and their characteristics, ideal transition curve, equations of various transition curves, Introduction to vertical curves (5)

Unit – IV

Principles of traversing by compass and theodolite, computations of traverse coordinates, Principles and classification of triangulation systems, strength of figures, satellite stations, intervisibility of stations, triangulation field work (5)

Principles, plane table equipments, methods, resection by three point problem (2)

Reference Books:

1. S K Duggal : Surveying Vol 1 & 2 , TMH
2. R Subramanian : Surveying & Leveling , Oxford University Press
3. B C Punamia : Surveying & Leveling
4. C Venkatramaih : Text Book of Surveying , University Press
5. H . Kanitkar : Surveying & Levelling

PCE-351

Fluid Mechanics Lab

L	T	P
0	0	2

1. To verify the momentum equation using the experimental set-up on diffusion of submerged air jet.
2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece.
3. To calibrate an orifice meter, venturimeter, and bend meter and study the variation of the co-efficient of discharge with the Reynolds number.
4. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number.
5. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
6. To study the variation of friction factor, 'f' for turbulent flow in commercial pipes.
7. To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness.

PCE-352

BUILDING MATERIALS LAB

L	T	P
0	0	2

I. Cement (Two turns only)

1. Normal Consistency of cement.
2. Initial & final setting time of cement
3. Compressive strength of cement
4. Fineness of cement by air permeability and Le-chatalier's apparatus.
5. Soundness of cement.
6. Tensile strength

II. Coarse Aggregate (Two turns only)

1. Crushing value of aggregate
2. Impact value of aggregate
3. Water absorption of aggregate
4. Sieve Analysis of Aggregate
5. Specific gravity & bulk density
6. Grading of aggregates.

III Fine Aggregate: (one turn only)

1. Sieve analysis of sand
2. Silt content of sand
3. Bulking of sand

IV) Destructive and non destructive testing on concrete

V) Physical and mechanical properties of reinforcing steel.

VI) Bricks: 1. Water absorption.

2. Dimension Tolerances
- 3 Compressive strength
4. Efflorescence

PCE 353

SURVEYING LAB

L	T	P
0	0	3

1. Study of different types of topographical maps and to prepare conventional symbols chart.
2. To measure bearings of a closed traverse by prismatic compass and to adjust the traverse by graphical method.
3. To find out reduced levels of given points using dumpy/Auto level.
4. To perform fly leveling with a Auto /tilting level.
5. To study parts of a vernier / Electronic theodolite and practice for taking angle measurements.
6. To measure vertical angle of given points by Electronic theodolite.
7. To measure horizontal angle between two objects by repetition method with three repetitions.
8. To measure horizontal angle by method of reiteration
9. To determine the elevation of chimney top by trigonometrical levelling by taking observations in single vertical plane.
10. To set out a simple circular curve by Rankine's method
11. To study various parts and practice with Wild T-2 micro-optic theodolite and EDM (Distomat DI-1600).

PCE-354

BUILDING PLANNING & DRAWING LAB

L	T	P
0	0	3

Drafting of following Using Any CAD software

1. Symbols used in Civil Engineering drawing, Masonry Bonds
2. Doors, Windows and staircases.
3. Plumbing & Electrical fitting drawing.
4. Comprehensive Drawing of Residential building (Layout, plan, elevation & sectional elevation, plumbing & electrical fillings in out)
5. Preparation of Layout planning of different civil engineering Projects.
7. Preparation of lay out plan/Maps and building drawing using computer

SCHEME OF EXAMINATION

For

B. Tech. Civil Engineering

YEAR II, SEMESTER –IV

(Effective from the session: 2010-2011)



Uttarakhand Technical University, Dehradun

COURSES AND EVALUATION SCHEME

B. Tech. Civil Engineering

YEAR II, SEMESTER –IV

(Effective from Session 2010-11)

Sl. No.	Course code	Subject	PERIODS			Evaluation Scheme			Subject Total	Credit
						SESSIONAL EXAM		ESE		
			L	T	P	CT	TA	Total		
A) THEORY										
1	TCE-401	Hydraulics & Hydraulic Machines	3	1	0	30	20	50	100	4
2	TCE-402	Structural Analysis-I	3	1	0	30	20	50	100	4
3	TCE-403	Advanced surveying	3	1	0	30	20	50	100	4
4	TCE-404	Engineering Geology	2	1	0	15	10	25	50	3
5	TCE-405	Environmental Engineering-I	2	1	0	15	10	25	50	3
6	TCE-406	Concrete Technology	3	1	0	30	20	50	100	4
B) PRACTICAL / TRAINNG / PROJECT										
7	PCE-451	Hydraulics & Hydraulic Machines Lab	0	0	3	-	25	25	25	2
8	PCE-452	Advanced Survey Field work	0	0	3	-	25	25	25	2
9	PCE-453	Geology lab	0	0	2	-	25	25	25	1
10	PCE- 454	Concrete Lab	0	0	2	-	25	25	25	1
11	GP-401	General Proficiency (NSS/NCC/Sports/Cultural)	-	-	-	-	-	50	-	-
		TOTAL	16	06	10	-	-	-	-	28

TCE 401 HYDRAULICS AND HYDRAULIC MACHINES

L T P
3 1 0

Unit I

Introduction: Difference between open channel flow and pipe flow, geometrical parameters of a channel, Velocity and pressure distribution in an open channel, Continuity equation. (3)

Uniform Flow: Chezy's and Manning's equations for uniform flow in open channel, Equivalent roughness, most efficient channel section, simple problems of compound channel sections. (5)

Unit II

Energy and Momentum Principles: Critical depth, concepts of specific energy and specific force, application of specific energy principle for interpretation of open channel phenomena, flow through vertical and horizontal contractions. (8)

Unit III

Non-Uniform flow in Open Channel: Equation of gradually varied flow and its limitations, flow classification and surface profiles, integration of varied flow equation by analytical, graphical and numerical methods, flow in curved channels. (6)

Mobile Bed Channel Hydraulics: Difference between rigid and alluvial channels, Incipient motion condition, Different approaches to study sediment motion, Tractive force approach, Shields curve, Types of bed forms or regimes of flow, characteristics and types of sediment load. (8)

Unit IV

Hydraulic Jump, Surges, Water Waves: Classical hydraulic jump, Evaluation of the jump elements in rectangular and non-rectangular channels on horizontal and sloping beds, Use of jump as an energy dissipater, End depth in a free overfall, Equation of motion for unsteady flow, open channel surge, celerity of the gravity wave, deep and shallow water waves. (5)

Hydraulic Pumps: Rotodynamic pumps, basic equations, axial and mixed flow pumps, cavitation in pumps, characteristics curves. (3)

Unit V

Hydraulic Turbines: Introduction, Rotodynamic Machines, Including elementary concept of bulb and tubular turbines pelton Turbine, equations for jet and roter size, efficiency, spear valve, reaction turbines, Francis and Kaplan type, Head on reaction turbine, basic equation for type, Head on reaction turbine, basic equation for rotodynamic machines, similarity law and specific speed, cavitation characteristic curves. (8)

Reference Books:

- 1) Chow, V.T., "Open channel Hydraulics", McGraw Hill International
- 2) Ranga Raju, K.G., "Flow Through Open Channels", T.M.H.
- 3) Modi & Seth, "Fluid Mechanics & Fluid Machines".
- 4) R.K. Bansal, "Fluid Mechanics & Hydraulics Mechanics".
- 5) Henderson, F.M., "Open Channel Flow", McGraw Hill International
- 6) Subramanya, K., "Flow in Open Channels", Tata McGraw Hill
- 7) French, R.H., "Open Channel Hydraulics", McGraw Hill International
- 8) Graf, W.H., "Hydraulics of Sediment Transport", McGraw Hill International

TCE 402 STRUCTURAL ANALYSIS – I

L T P
3 1 0

Unit I

(3)

Classification of Structures, stress resultants, degrees of freedom, Static indeterminacy Classification of Pin jointed determinate trusses, Analysis of determinate plane and space trusses (compound and complex)

Unit II

(5)

Rolling loads, influence lines for beams and trusses, Absolute maximum bending moment, Muller-Breslau's principles & its application.

Unit III

(8)

Analysis of Arches, Linear arch, Eddy's theorem, three hinged parabolic arch, two hinged arch, spandrel braced arch, moving load & influence lines.

Unit IV

(8)

Equilibrium of light cable, General cable theorem, uniformly loaded cable, anchor cables, temperature stresses in suspension cables, three hinged stiffening girder, two hinged stiffening girder, temperature stresses in two hinged girder.

Unit V

(8)

Strain Energy of deformable systems, Maxwell's reciprocal & Betti's theorem, Castigliano's first theorem, unit load & Conjugate beam methods.

Reference Books:

1. Wilbur and Norris, "Elementary Structural Analysis", Tata McGraw Hill.
2. Jain, A.K. "Advanced Structural Analysis", Nem Chand & Bors, roorkee, India.
3. Jain, O.P. & Arya A.S., "Theory of Structure", Vol. II, Nem Chand Bros., Roorkee.
4. Reddy, C.S., "Basic Structural Analysis", Tata McGraw Hill.
5. Jain, O.P. and Jain, B.K., "Theory & Analysis of Structures", Vol. I & II Nem Chand.
6. Coates, R.C., Coutie, M.G. & Kong, F.K., "Structural Analysis", English Language Book Society & Nelson.
7. Ghali, A. & Neville, M., "Structural Analysis", Chapman & Hall Publications.
8. Kinney, J.S., "Intermediate Structural Analysis", McGraw Hill Book Company.
9. Wang, C.K. "Intermediate Sstructural Analysis", McGraw Hill Book Company.
10. Nautiyal, B.D., "Introduction to Structural Analysis", New Age International.

TCE 403

ADVANCED SURVEYING

L T P
3 1 0

Unit I

Triangulation and Trilateration

(8)

Necessity of Control Surveying, Principle of Triangulation and Trilateration classification of Triangulation Systems Station Marks, Towers and Signals, Satellite station, Intersected and Resected points, Reconnaissance, Intervisibility of stations, Angular Measurement, Base line measurement and its extension

Unit II

Adjustment Computations

(8)

Treatment of random errors, Normal law of errors, Most Probable Value, Weight of observations, Propagation of errors and variances, Principle of Least Squares, Observations and correlative Normal Equations, Adjustment of triangulation figures and level nets.

Unit III

Curves

(8)

Classification of curves, Elements of Simple Circular, Transition and Vertical curves, Theory and methods of setting out circular, transition and vertical curves, special field problems.

Unit IV

Project Surveys

(5)

General requirements and specifications for Engineering project surveys, Reconnaissance, Preliminary and Location surveys for highways, railways and canals, Correlation of surface and underground surveys in case of culverts, Bridges and Tunnels; Principles and practice of hydrographic surveys, Layout of culverts, canals, bridges and buildings.

Field Astronomy

(3)

Astronomical terms, co-ordinate systems, Spherical trigonometry, Astronomical triangle, Relationship between coordinates.

Unit V

Photogrammetry and Remote Sensing

(5)

Photogrammetry-Introduction, Scale of photograph, Tilt and height displacement, Stereoscopic vision and stereoscopes, Techniques of photo-interpretation, Principles of remote sensing, Electro Magnetic Radiation (EMR), energy interaction with atmosphere and earth features, spectral signatures, Remote sensing satellites and their data products, methods of interpretation of remotely sensed data.

GPS and GIS

(3)

Global Positioning System (GPS)-Introduction, principle, and applications of GPS in different fields of Surveying, Geographic Information System (GIS) – Introduction, Geographical concepts and terminology, Applications of GIS

Reference Books:

1. Arora, K.R., "Surveying", Vol. II & III, Standard Book House, Delhi.
2. Punmia, B.C., "Surveying", Vol. II & III Laxmi Publications, New Delhi.
3. Chandra, A.M. "Higher Surveying", New Age International Publisher, Delhi
4. Lillesand, T.M. and Kiefer, R.W., "Remote Sensing and Image Interpretation".
5. Agor, R., "Surveying", Vol. II & III, Khanna Publications, Delhi.

6. Bannister, A. And Baker, R., "Solving Problems in Surveying", Longman Scientific Technical, U.K.
7. Kennie, T.J.M. and Petrie, G., "Engineering Surveying Technology", Blackie & Sons Ltd. London.
8. Duggal S.K., "Surveying", Vol. I & II TMH
9. Basak, "Surveying" TMH.
10. Kanetkar, "Surveying"
11. Chandra, A.M. "Plane Surveying", New Age International Publisher, Delhi

TCE 404 ENGINEERING GEOLOGY

L T P
2 1 0

Unit I

Earth Sciences and its importance in Civil Engg. Minerals and their physical properties. Study of common rock forming minerals. (4)

Internal structure of the earth. Suitability of rocks as engineering materials. Building stones occurrences and characteristics, selection (4)

Unit II

Stratification, Lamination bedding. Outcrop-its relation to topography, dip and strike of bed, overlap, outlier and inlier.

Rock deformation : Folds, Faults, joints unconformity and their classification, causes and relation to engg. Behaviour of rock masses. (7)

Unit III

Earthquake causes, classification, earthquake waves, intensity and magnitude, Seismic zones for India, Geological consideration for construction of building. (4)

Underground water, sources, Aquifer, Artesian well, Ground water provinces of India and its role as geological hazard. (4)

Unit IV

Geological investigations for site selection of dams & reservoirs, tunnels, bridges and highways. Reservoir induced seismicity.

Methods of Geophysical explorations-gravity, electrical and seismic, methods. (5)

Note: In tutorial class of this subject's, students shall practice for mineral & rock identifications

Reference Books:

1. Prabin Singh, "Engineering and General Geology", Katson publishing house.
2. B.S. Sathya, Narayanswamy, "Engg. Geology" Dhanpat Rai & Co. New Delhi.
3. Legget, R.F., "Geology and Engineering", McGraw Hill, New York.
4. Blyth, F.G.M., "A Geology for Engineers", Arnold, London.
5. P.K. Mukerjee, "A Text Book of Geology", Calcutta, world publisher.
6. Krynine and Judd: "Principles of Engineering Geology & Geotechnics," Mc-Graw Hill, New York.
7. K.S. Valdiya: "Environmental Geology", Tata Mc Graw Hill, New Delhi.

8. F G Bell : Fundamentals of Engineering Geology , B S Publication
9. Tony Waltham : Fundamentals of Engineering Geology ,SPON Press

TCE – 405

ENVIRONMENTAL ENGINEERING – I

L	T	P
2	1	0

UNIT-1

Water supply: Water demands and domestic use, variation in demands; population forecasting by various methods using logistic curve method; per capita supply, basic needs and factors affecting consumption; design period.

Sources of water: Kinds of water sources and their characteristics, collection of surface and ground water; quality of surface and ground waters; factors governing the selection of a source of water supply; intakes and their design for lakes, streams and rivers, impounding reservoir and canal; determination of the capacity of impounding reservoir. (7)

UNIT 2

Transmission of water: Various types of conduits, capacity and sizes including economical sizes of rising main, structural requirements; laying and testing of water supply pipelines; pipe materials, joints, appurtenances and valves; leakages and control; water hammer and its control measures. (4)

UNIT 3

Storage and distribution of water: Methods of distribution, pressure and gravity distribution systems, concept of service and balancing reservoirs, capacity of distribution reservoirs; general design guidelines for distribution system, Hardy - Cross method, Newton - Raphson method and equivalent pipe method of pipe network analysis; rural water supply distribution system.

Water supply, plumbing systems in buildings and houses: water connections, different cocks and pipe fittings, hot water installation. Institutional and industrial water supply. (6)

UNIT 4

Wastewater collection: Systems of sanitation and wastewater collection, estimation of wastewater flows and variations in wastewater flows.

Storm water: Collection and estimation of storm water by different formulae. (6)

Flow in sewers: Flow in full and partially full sewers and design of sewers; types of sewers, materials and construction of sewers, joints and sewer appurtenances, layout and construction of sewer lines; small bore sewer systems. Planning of sewerage systems. Institutional and industrial wastewater management. (6)

Reference books:

1. Peavy, Rowe and Tchobanoglous: Environmental Engineering
2. Metcalf and Eddy Inc.: Wastewater Engineering
3. Garg: Water Supply Engineering (Environmental Engineering Vol. – I)
4. Garg: Sewage Disposal and Air Pollution Engineering (Environmental Engineering Vol- II).
5. Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development, Government of India, New Delhi
6. Manual on Sewerage and Sewage Treatment, C. P. H. E. E. O., Ministry of Urban
7. Development, Government of India, New Delhi
8. Steel and McGhee: Water Supply and Sewerage
9. Fair and Geyer: Water Supply and Wastewater Disposal

10. Arceivala: Wastewater Treatment for Pollution Control
11. Hammer and Hammer Jr.: Water and Wastewater Technology
12. Raju: Water Supply and Wastewater Engineering
13. Sincero and Sincero: Environmental Engineering: A Design Approach
14. Pandey and Carney: Environmental Engineering
15. Rao: Textbook of Environmental Engineering
16. Davis and Cornwell: Introduction to Environmental Engineering
17. Kshirsagar: Water Supply and Treatment and Sewage Treatment Vol. I and II
18. Punmia: Water Supply and Wastewater Engineering Vol. I and II
19. Birdie: Water Supply and Sanitary Engineering
20. Ramalho: Introduction to Wastewater Treatment Processes
21. Parker: Wastewater Systems Engineering

TCE 406

CONCRETE TECHNOLOGY

L	T	P
3	1	0

Unit-I: Concrete as a Building Material and its gradients :

- (i) Cement: Manufacture of Portland Cement, its composition, Hydration of cement, physical and chemical properties, concept of strength development. Gel. space Ratio, Powers Law. Gel. structure.
- (ii) Testing of Cement for general physical and chemical properties as per BIS specifications.
- (iii) Different types of cement such as Slag Cement, Portland Pozzolona Cement and high Alumina cement, their characteristics, composition, use and properties. (8)

Unit-II: Aggregates and Testing of Aggregates:

Classification, source, physical and mechanical properties. Testing of Aggregates for physical and mechanical properties. (7)

Unit-III: Production of Fresh Concrete:

- (i) Proportioning of concrete, operations involved in concrete production, Workability, Factors Affecting workability, Measurement of workability. Problem of Segregation and bleeding and Laittance. (7)

(ii) Properties of Hardened Concrete.

Strength and durability, Factors affecting strength and durability of concrete. Mechanics of setting and hardening of concrete (4)

Unit-IV: Concrete Mix Design: principle and Methods, Statistical Quality control. Concrete Rheology, Maturity concept. (4)

Introduction to special concretes:

- (a) Admixtures in concrete.
- (b) Special concrete as lightweight concrete. High Density Concrete, Sulphur Impregnated concrete Polymer concrete, Lime concrete constituents and uses.
- (c) High strength concrete (d) Fibre Reinforced Concrete (e) High performance concrete, Ready mix concrete and mass concrete (5)

Unit-V: Material testing and instrumentation:

Conventional vs. Non-Destructive Testing. Methods & Principles of NDT.

(4)

References

1. Rai Mohan and Jai Singh M.P. ?Advances in Building Materials and Construction-CBRI Roorkee.
2. Civil Engineering Materials ?Technical Teachers? Training Institute Chandigarh, Tata McGraw Hill Publishing Company Ltd., New Delhi.
3. Spence RJS and Cook DJ-?Building Materials in Developing Countries? John Wiley and Sons.
4. Shetty M.S. ?Concrete Technology, Theory and Practices.? S. Chand & Company Ltd., New Delhi.
5. Neville A.M., Properties of Concrete, Pitman Publishing Company.
6. Gambhir M.L. ?Concrete Technology? - Tata McGraw Hill Publishing Company Ltd., New Delhi.
7. Gambhir M.L. ?Concrete Manual? - Dhanpal Rai & Sons, Delhi.

PCE 451

HYDRAULICS AND HYDRAULIC MACHINES LAB

L	T	P
0	0	3

List of Experiments

1. To determine the Manning's coefficient of roughness 'n' for the given channel bed.
2. To study the velocity distribution in an open channel and to find the energy and momentum correction factors.
3. To study the flow characteristics over a hump placed in an open channel.
4. To study the flow through a horizontal contraction in a rectangular channel.
5. To calibrate a broad-crested weir and study the pressure distribution on the upstream face of the weir.
6. To study the characteristics of free hydraulic jump.
7. To study the flow over an abrupt drop and to determine the end (brink) depth for a free over fall in an open channel.
8. To study rotodynamic pumps and their characteristics.
9. To study rotodynamic turbines and their characteristics.

PCE 452 ADVANCED SURVEY FIELD WORK

L	T	P
0	0	3

1. Study and use of different types of micro-optic theodolites and total stations.
2. To carry out Triangulation and Trilateration of a given area.
3. To adjust the angular observations taken in triangulation exercise and compute the adjusted coordinates of triangulation stations.
4. To plot the coordinates at a given scale on Plane Table and their field checking.
5. To Layout a simple circular curve on the ground using linear methods.
6. To Layout a simple circular curve on the ground using Angular methods
7. To Layout a building and a culvert on the ground.
8. Study of satellite imagery and visual image interpretation.
9. GPS demonstration and coordinate observations.
10. GIS demonstration and study of its applications.

PCE 453 GEOLOGY LAB

L	T	P
0	0	2

1. Megascopic study of minerals
2. Specific Gravity
3. Megascopic study: Igneous, Sedimentary, Metamorphic
4. Stuck and Dip
5. Geological sections of maps
Site selection, dam, tunnels, highways, hill roads etc.

PCE 454 CONCRETE LAB

L	T	P
0	0	2

1. Fineness modulus and grain size distribution
2. Abrasion test on aggregate
3. Slump Test
4. Workability of concrete
5. Concrete mixed design as per Indian Standard recommendation guidelines.
6. Effect of water cement ratio on the strength of concrete

UTTARAKHAND TECHNICAL UNIVERSITY
UTTARAKHAND TECHNICAL UNIVERSITY

Program: B. Tech (Civil Engg)

Year: - Third

Semester:- V

Session:- 2011-2012

Scheme & Evaluation Pattern

SI No	Course No	Subject	Periods			Evaluation				TOTAL
			L	T	P	CT	TA	TOTAL	EXTERNAL	
Semester-V										
Theory										
1	TCE-501	Design Of RC Element	3	1	0	30	20	50	100	150
2	TCE-502	Structural analysis-2	3	1	0	30	20	50	100	150
3	TCE-503	Hydrology	3	1	0	30	20	50	100	150
4	TCE-504	Water resource engg	3	1	0	30	20	50	100	150
5	TCE-505	Environmental engg-2	3	1	0	30	20	50	100	150
6	TCE-506	Soil Mechanics and engg geology	3	1	0	30	20	50	100	150
Practical /Design										
1	PCE-501	Structural Analysis lab	0	0	3	10	15	25	25	50
2	PCE-502	Soil Mechanics lab	0	0	3	10	15	25	25	50

TOTAL= 1000

SI No	Course No	Subject	Periods			Evaluation				TOTAL
			L	T	P	CT	TA	TOTAL	EXTERNAL	
Semester-VI										
Theory										
1	TCE-601	Design of RC structures	3	1	0	30	20	50	100	150
2	TCE-602	Design of steel elements	3	1	0	30	20	50	100	150
3	TCE-603	Foundation engineering	3	1	0	30	20	50	100	150
4	TCE-604	Transportation Engg-1	3	1	0	30	20	50	100	150
5	TCE-605	Theory & Application Of GIS & GPS	3	1	0	30	20	50	100	150
6	TCE-606	Principles of management	2	1	0	15	10	25	50	75
Practical /Design										
1	PCE-601	Environmental lab	0	0	3	10	15	25	50	75
2	PCE-602	Transportation lab	0	0	3	10	15	25	25	50
3	—	Discipline	0	0	2	0	0	50	0	50

TOTAL= 1000

UTTARAKHAND TECHNICAL UNIVERSITYNAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-501

Course Title: **Design of Reinforced Concrete Elements**2. Contact Hours: **L: 3 T:1 P:2/2****DETAILS OF THE COURSE:**

S. No.	Contents	Contact hours
1	Properties of Concrete: Compressive strength, tensile strength, stress-strain behavior, modulus of elasticity, shrinkage, creep, characteristic strength, grades of concrete, design stress-strain curve of concrete, reinforcing steel, types and grades, stress-strain curve.	5
2	Basic Concepts of Reinforced Concrete Design: Working stress and limit state design methods.	3
3	Design of R.C Beams in Flexure: Singly and doubly reinforced rectangular/flanged sections, design for shear, bond and anchorage of reinforcement, limit states of deflection and cracking.	8
4	Design for Torsion: Design of RC beams subjected to torsion.	5
5	One-way and two-way slabs, design of staircases.	5
6	Design of compression members for axial loads and axial load plus uniaxial moment.	6
7	Foundation types, design of isolated footings, introduction to combined footings.	4
8	Stability analysis of retaining wall, design of gravity, cantilever types retaining walls.	6
	TOTAL	42

SUGGESTED BOOKS:

S. No.	Name of Books / Author / Publisher	Year of publication
1	Shah,V.L. et.al., “Limit State Theory and Design of Reinforced Concrete”, Structures Publications.	2007
2	Pillai ,S.U. and Menon, D., “Reinforced Concrete Design”, Tata McGraw-Hill.	2003
3	Varghese,P.C., “Limit State Design of Reinforced Concrete”, Prentice-Hall.	2002
4	Park, R. and Pauley, T., “Reinforced Concrete Structures”, John Wiley.	1976
5.	Gambhir, M.L., “Fundamentals of Reinforced Concrete Design”, Prentice-Hall of India.	2006

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-502

Course Title: **Structural Analysis- II**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF THE COURSE :

S. No.	Contents	Contact hours
1	Influence Lines: Analysis for different types of moving loads, use of influence line diagrams, application to determinate structures.	7
2	Muller-Breslau principle with application to determine and redundant structures. Qualitative ILD for continuous beams, frames and arches.	6
3	Displacement approach; basic principles.	3
4	Slope deflection method.	4
5	Moment distribution method, frame with/without sway, use of symmetry and anti-symmetry.	5
6	Matrix displacement method, basic principles, application to planar structures-trusses, beams and frames. Introduction to computer program and applications to 2D building frames.	13
7	Plastics analysis of beams and frames.	4
	TOTAL	42

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Wang, C.K., "Intermediate Structural Analysis", McGraw Hill.	1987
2	Norris, C.H. et.al., "Elementary Structural Analysis", Tata McGraw Hill.	2003
3	James, M. Gere, "Mechanics of Materials", 5 th Ed., Nelson Thorens.	2002
4	Reddy, C.S., "Basic Structural Analysis", Tata MCGraw Hill.	2000
5	Weaver, W. Jr. and Gere, J.M., "Matrix Analysis of Frames Structures", CBS Publishers.	2000

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-503 Course Title: **Hydrology**

2. Contact Hours: **L: 2 T: 0 P:**

DETAILS OF THE COURSE :

S. No.	Contents	Contact hours
1	Hydrology Cycle and Budget: Definitions, Space – time scales in hydrology, hydrologic cycle and budget.	2
2	Precipitation Measurement and Analysis : Precipitation variability, rainfall and snow measurement techniques, design of precipitation gauging network, consistency of rain record, filling up of missing record, estimation of mean areal rainfall, IDF and DAD analysis, snow measurement and determination of snow melt.	5
3	Hydrologic Abstraction: Infiltration, factors affecting infiltration, measurement of infiltration, empirical and analytical models of infiltration, evaporation: its measurement and estimation, evapo-transpiration: its measurement and estimation, interception and depression storage, rain harvesting; Procedure and its design.	5
4	Stream Flow: Measurement of stream flow, factors affecting stream flow, hydrograph analysis, base flow separation, unit hydrograph and curve number methods of stream flow determination, synthetic unit hydrograph, hydrological modeling for stream flow estimation, and methods for peak discharge estimation.	7
5	Frequency Analysis : Return period, random variable, checks for persistency, frequency distributions, frequency analysis of hydrological data.	6
6	Regression and Correlation Analysis : Dependent and independent variables, simple correlation coefficient, method of least squares, variance analysis, partial correlation coefficient, simple and multiple regression analysis.	4
7	Ground Water: Aquifers, hydraulic conductivity, transmissivity, well hydraulics.	6
8	Flood Routing: Governing equations, reservoir flood routing, hydrologic routing: Muskingum method.	6
	TOTAL	41

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Singh, V.P., “Elementary Hydrology”, Prentice Hall	1992
2	Chow, V.T., Maidment, D.R. and Mays, W.L., “Applied Hydrology”, McGraw Hill.	1988
3	Wanielista, M., Kersten, R. and Eaglin, R., “Hydrology”, John Wiley	1997
4	Ojha, C.S.P., Berndtsson R. and Bhunya, P., “Engineering Hydrology”, Oxford University Press.	2008

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT. /CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-504

Course Title: **Water Resources Engineering**

2. Contact Hours: **L: 3 T: 1 P: 2/2**

DETAILS OF THE COURSE:

S. No.	Contents	Contact hours
1	Water Resources of India, need of Irrigation and Power of India, need of harnessing water, importance and impact of irrigation and hydropower on environment, planning of water resources projects.	4
2	Soil water relationships, consumptive use (evapo-transpiration), water assessment of crops, requirement and frequency of irrigation, method of irrigation.	4
3	Canal irrigation, Planning, alignment and capacity of irrigation canal systems, delivery of water to farms, management of canal irrigation including operation, maintenance and performance evaluation of canal irrigation system.	8
4	Hydraulics and design of stable channels including alluvial ones, introduction of concept related to sediment transport in alluvial channel carrying clear and sediment-laden water.	8
5	Surface and sub-surface flow considerations for design of hydraulic structures.	6
6	Design of Diversion headwork, design of canals regulation structures, types and design of falls and design of sarda falls, glacis falls, types of cross-drainage structures and their design.	10
7	General Features of hydropower scheme.	2
	TOTAL	42

SUGGESTED BOOKS:

S. No.	Name of Books / Author / Publisher	Year of publication
1	Singh, B., “Fundamentals of Irrigation Engineering”, 9 th Ed., Nem Chand & Bros.	1997
2	Asawa, G.L., “Irrigation and water Resources Engineering”, New Age International.	2005
3	Ranga Raju, K.G., “Flow through open Channels”, 2 nd Ed., Tata McGraw-Hill.	2003
4	Varshney, R.S., “Hydro power Structures including canal Structures and small Hydro”, 4 th Ed., Nem Chand & Bros.	2001

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-505

Course Title: **Env. Engineering - II**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF THE COURSE:

S. No.	Contents	Contact hours
1	Wastewater Collection: Plumbing, types of sewers, design considerations, construction & maintenance, stormwater sewers.	6
2	Wastewater Characterization: Constituents.	2
3	Wastewater Treatment: On site and centralized treatment systems.	2
4	Pre-and Primary Treatment: Screen, grit removal, oil and grease removal.	3
5	Secondary Treatment: Activated sludge process, conventional and extended aeration, waste stabilization ponds, UASB process, UASB post treatment.	9
6	Advanced Wastewater Treatment.	2
7	Wastewater and sludge Disposal: Reuse systems, wastewater disposal on land and water bodies, disposal of sludge.	4
8	Municipal Solid Waste: Collection, characterization, transport, treatment & disposal.	6
9	Types of Industrial Waste: Liquid, solid, atmospheric and hazardous wastes: Characterization and treatment.	8
	TOTAL	42

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Davis, M.L. and Cornwell, D.A., "Introduction to Environmental Engineering", McGraw Hill.	1998
2	Master, G.M., "Introduction to Environmental Engineering and Science", Prentice Hall of India.	1998
3	Peavy, H.S., Rowe, D.R. and Tchobanoglous, G., "Environmental Engineering", McGraw Hill.	1986
4	Arcievala, S.J., "Wastewater Treatment for Pollution Control", Tata McGraw Hill.	2000

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT. /CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-506

Course Title: **Soil Mechanics and Engineering Geology**

2. Contact Hours: **L: 3 T: 1 P:2**

DETAILS OF THE COURSE:

S. No.	Contents	Contact hours
1	Soil Formation: Soil types, Composition, Three phase relations.	2
2	Physical Properties: Specific gravity, Water content, Shape and size, grain size distribution curves, relation density, consistency of soils, Unified soil classification system, IS soil classification system, field identification tests.	5
3	Compaction: General principles, tests, factors affecting compaction, field compaction, compaction techniques.	2
4	Capillarity, Permeability: Darcy's law, determination of permeability, equivalent permeability in stratified soil, insitu permeability test, 1-D flow, Laplace's equation, flow nets, seepage, uplift pressure, confined and unconfined flows, piping, filter criteria.	10
5	Compressibility and Consolidation: Fundamentals, 1-D consolidation, normally and over-consolidation clays, void ratio-pressure relationships, compressibility characteristics, time rate of consolidation, coefficient of consolidation, curve fitting techniques, settlement, secondary consolidation, 3-D consolidation, vertical sand drains.	7
6	Shear Strength of Soil: Principle of effective stress, Mohr-Coulomb failure criterion, direct shear test, unconfined compression test, Triaxial shear test: consolidated drained, consolidated undrained, unconsolidated undrained, vane shear test, shear strength of clays and sands, critical void ratio, stress path, pore-pressure coefficient.	10
7	Geological Processes: Rock forming minerals, rock types and their engineering properties.	2
8	Structural Geology: Dip, strike, faults, folds, joints, their formation and importance in respect of civil engineering structures, rock mass movements, causes of landslides.	4
	TOTAL	42

SUGGESTED BOOKS:

S. No.	Name of Books / Author / Publisher	Year of publication
1	Holtz, R.D. Kovacs, W.D., “An Introduction to Geotechnical Engineering”, Prentice Hall.	1981
2	Couduto, D.P., “Geotechnical Engineering- Principles and Practices”, Prentice Hall of India.	2002
3	Ranjan, G. and Rao, A.S.R., “Basics and Applied Soil Mechanics”, New Age International Publishers.	2007
4	Murthy, V.N.S., “Text Book of Soil Mechanics and Foundation Engineering”, CBS Publishers.	2007
5	Lambe, T.W. and Whitman, R.V., “Soil Mechanics”, John Wiley and Sons.	2000
6	Das, B.M., “Principles of Geotechnical Engineering”, Thomson Asia.	2002

PCE 501 STRUCTURAL ANALYSIS LAB

LIST OF PRACTICALS/APPARATUS

1. Redundant Joint apparatus
2. Elasticity coupled beam apparatus
3. Deflection of truss apparatus
4. Three hinged arch apparatus
5. Beam model
6. Two hinged arch apparatus
7. Elastic properties of deflected beam apparatus
8. Coloum apparatus
9. Portal frame Apparatus
10. Curved Member Apparatus

PCE 502 SOIL MECHANICS LAB

LIST OF PRACTICALS/APPARATUS

1. Sieve Analysis
2. Hydrometer Analysis
3. Liquid & Plastic Limit | Test
4. Shrinkage Limit Test
5. Proctor Compaction Test
6. Relative Density
7. In Situ Density-Core Cutter & Sand Replacement
8. Permeability Test
9. Direct Shear Test
10. Specific gravity determination of coarse and fine grained soils
11. Static Cone Penetration Test
12. Standard/Dynamic cone penetration test

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-601

Course Title: **Design of Reinforced Concrete Structures**

2. Contact Hours: **L: 2 T:1 P:2/2**

DETAILS OF THE COURSE:

S. No.	Contents	Contact hours
1	Design of continuous RC beams, moment redistribution.	3
2	Design loads on buildings, wind and earthquake loads.	3
3	Analysis and design of RC framed buildings; Framing systems, member proportioning, loadings, static and dynamic analysis and component design, provisions of ductile detailing.	5
4	Design of T-beams bridge, standard specifications and general design considerations.	5
5	Design of overhead water tanks, general design consideration for circular & Intze tanks	6
6	Pre-stressed concrete: Materials, prestressing systems, stress analysis & losses of prestress, design of simple beams.	6
	TOTAL	28

SUGGESTED BOOKS:

S. No.	Name of Books / Author / Publisher	Year of publication
1	Jain A.K., "Reinforced Concrete", Limit State Design, 5 th Ed., Nem Chand & Bros.	2006
2	Krishna, J. and Jain O.P., "Plain and Reinforced Concrete", Vol.2, Nem Chand & Bros.	1983
3	Pillai, S.U. and Menon, D., "Reinforced Concrete Design", Tata McGraw-Hill.	2003
4	Sinha, S.N., "Reinforced Concrete Design", Tata McGraw-Hill.	

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-602

Course Title: **Design of Steel Elements**

2. Contact Hours: **L: 2 T:1 P:0**

DETAILS OF THE COURSE:

S. No.	Contents	Contact hours
1	Introduction, properties of structural steel, I.S. rolled sections , I.S. specifications.	2
2	Design approach, elastic method, limit state design.	2
3	Connections, simple and moment resistant riveted, bolted and welded connections.	3
4	Tension members, steel members subject to axial tension.	2
5	Compression members, struts and columns.	3
6	Roof trusses, roof & side coverings, design loads, purlins, members, end bearings.	2
7	Built-up columns, beams, stability of flange and web, built-up sections.	5
8	Plate-girders including stiffeners, splices and curtailment of flange plates.	4
9.	Beam column, stability consideration, Iteration formulae, column bases, slab base, gusseted base and grillage footings.	5
	TOTAL	28

SUGGESTED BOOKS:

S. No.	Name of Books / Author / Publisher	Year of publication
1	Arya, A.S. and Ajmani, J.L., “Design of Steel Structures”, Nem Chand & Bros.	2000
2	Duggal, S.K., “Design of Steel Structures”, Tata McGraw-Hill.	2006
3	Negi, L.S., “Design of Steel Structures”, Tata McGraw-Hill.	2006

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-603

Course Title: **Foundation Engineering**

2. Contact Hours: **L: 3 T: 1 P: 2/2**

DETAILS OF THE COURSE :

S. No.	Contents	Contact hours
1	Introduction : Role of civil engineer in the selection, design and construction of foundation of civil engineering structures, brief review of soil mechanics principles used in foundation engineering	3
2	Soil Exploration: Methods of soil exploration; boring, sampling, penetration tests, correlations between penetration resistance and soil design parameters.	4
3	Earth Pressure and Retaining Walls : Earth pressure at rest, active and passive earth pressure, Rankine and Coulomb's earth pressure theories, earth pressure due to surcharge, retaining walls, stability analysis of retaining walls, proportioning and design of retaining walls.	6
4	Foundations : Types of foundations, mechanism of load transfer in shallow and deep foundations, shallow foundations, Terzaghi's bearing capacity theory, computation of bearing capacity in soils, effect of various factors, use of field test data in design of shallow foundations, stresses below the foundations, settlement of footings and rafts, proportioning of footings and rafts, sheeting and bracing of foundation excavation.	11
5	Pile Foundation: Types and method of construction, estimation of pile capacity, capacity and settlement of group of piles, proportioning of piles.	5
6	Well Foundations: Methods of construction, tilt and shift, remedial measures, bearing capacity, settlement and lateral stability of well foundation.	4
7	Slopes: Mode of failure- mechanism, stability analysis of infinite slopes, methods of slices, Bishop's simplified method.	5
8	Machine Foundations: Types of machine foundations, mathematical models, response of foundation – soil system to machine excitation, cyclic plate load test, block resonance test, criteria for design.	4
	TOTAL	42

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Ranjan, G. and Rao, A.S.R., “ Basic and Applied Soil Mechanics”, New Age.	2000
2	Das, B.M., “Principles of Foundation Engineering”, PWS.	2004
3	Som, N.N. and Das, S.C., “Theory and Practice of Foundation Design”, Prentice-Hall.	2003
4	Couduto, Donald P., “Geotechnical Engineering – Principles and Practices”, Prentice-Hall.	1999
5	Peck, R.B., Hanson, W.E. and Thornburn, T.H., “Foundation Engineering”, John Wiley.	1974

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT. /CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE-604

Course Title: **Transportation Engineering - I**

2. Contact Hours: **L: 3 T: 1 P: 2/2**

DETAILS OF THE COURSE:

S. No.	Contents	Contact hours
1	Highway Development and Planning: Historical Development, road patterns, master plans, road development plans, PMGSY, engineering surveys, highway projects.	6
2	Highway Material and Testing: Subgrade Soil, Sub base and base course materials, bituminous materials, testing of soils, stone aggregates and bitumen.	6
3	Highway Geometric Design: Cross Section elements, sight distances, horizontal and vertical alignment.	6
4	Traffic Engineering: Traffic characteristics, road user & vehicular characteristics, traffic studies, accident studies, traffic operations, traffic control devices, intelligent transport systems, pollution due to traffic.	8
5	Design of Highway Pavements: Flexible Pavements and their design, review of old methods, CBR method, IRC:37-2001, equivalent single wheel load factor, rigid pavements, stress in rigid pavement, IRC design method (IRC:58-2002).	6
6	Highway Construction: Construction of various layers, earthwork, WBM, GSB, WMM, various types of bituminous layers, joints in rigid pavements.	6
7	Highway Maintenance: Various type of failures, evaluation and remedial measures.	4
	TOTAL	42

SUGGESTED BOOKS:

S. No.	Name of Books / Author / Publisher	Year of publication
1	Khanna, S.K. and Justo, C.E.G., “Highway Engineering”, Nem Chand & Bros.	2004
2	Khanna, S.K. and Justo, C.E.G., “Highway Material Testing Manual”, Nem Chand & Bros.	2004
3	Kadiyali, L.R., “Traffic Engineering and Transportation Planning”, Khanna Publishers.	2002
4	Sharma, S.K., “Principles and Design of Highway Engineering”, S.Chand & CO.	1995
5	Papacostas, C.S. and Prevedouros, P.D., “Transportation Engineering and Planning”, Prentice Hall.	2002
6	Jotin Khisty, C. and Kent Lall,B., “Transportation Engineering- An Introduction”, Prentice Hall	2002

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: TCE 605

Course Title: **Theory and Applications of GPS & GIS**

2. Contact Hours: **L: 3 T: 0 P: 2/2**

DETAILS OF THE COURSE :

S. No.	Contents	Contact hours
1	Fundamentals of GPS: Components of GPS, GPS receivers, reference coordinates systems – datums, geoid, ellipsoid, WGS 84 system, time, signal propagation through atmosphere-their modeling and estimation, satellite orbit.	5
2	GPS Signals: Navigational data.	2
3	GPS Data: Collection methods – static positioning, kinematic positioning – pseudo-kinematic and stop & go, observation planning and strategy.	4
4	Introduction, Geographical concepts and terminology, difference between image processing system and GIS.	3
5	Utility of GIS, various GIS packages and their salient features, essential components of a GIS.	3
6	Data acquisition through scanners and digitizers, methods of digitization.	3
7	Raster and vector data, data storage, verification and editing.	3
8	Rectification and registration, interpolation of data. Database Structure – Hierarchical data, network systems, relational database.	7
9	Data manipulation and analysis, spatial and mathematical operations on data, area analysis, query-based analysis.	7
10	Applications of GPS & GIS for various natural resources mapping & monitoring and for engineering applications.	5
	TOTAL	42

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Burrough, P.A. and McDonnell, R.A., “Principles of Geographic Information for Land Resources Assessment”, Oxford University Press.	1998
2	Demers, M.N., “Fundamentals of Geographic Information System”, 3 rd Ed., John Wiley.	2005
3	Legg, C.A., “Remote Sensing and Geographic Information System”, John Wiley.	1999
4	Chandra, A.M. and Ghosh, S.K., “Remote Sensing and Geographical Information Systems”, Alpha Science.	2005
5	Maguire, D.J., Batty, M. and Goodchild, M. (Eds.), “GIS, Spatial Analysis and Modelling”, ESRI Press.	2005

THU-608 PRINCIPLES OF MANAGEMENT

L-3 T-1 P-0

UNIT 1

INTRODUCTION TO MANAGEMENT: Theories of management: Traditional behavioral, contingency and systems approach. Organization as a system.

UNIT 2

MANAGEMENT INFORMATION: Interaction with external environment. Managerial decision making and MIS.

UNIT 3

PLANNING APPROACH TO ORGANIZATIONAL ANALYSIS: design of organization structure; job design and enrichment; job evaluation and merit rating.

UNIT 4

MOTIVATION AND PRODUCTIVITY: Theories of motivation, leadership styles and managerial grid. Co-ordination, monitoring and control in organizations. Techniques of control. Japanese management techniques.

- Minor Project: submission of 15 pages of Case studies on above.

SUGGESTED BOOKS

1. Peter Drucker, Harper and Row: The Practice of Management.
2. Koontz: Essentials of Management, PHI Learning.
3. Schemerhorn" introduction to Management" 10th edition, John Wiley (India).
4. Staner: Management, PHI Learning.
5. Daft: Principles of Management, Cengage Learning.
6. T. N. Chhabra: Principle and Practice of Management, Dhanpat Rai, New Delhi.

PCE 601 ENVIRONMENTAL LAB

LIST OF PRACTICALS/APPARATUS

1. Determination of turbidity, colour, and conductivity.
2. Determination of pH , alkalinity and acidity.
3. Determination of hardness and chlorides.
4. Determination of residual chlorine and chlorine demand.
5. Determination of dissolved oxygen.
6. Measurement of air pollutants with high volume sampler.
7. Measurement of sound level with sound level meter.

PCE-602 TRANSPORTATION ENGINEERING LAB.

List of experiments/Apparatus

A. Test of bitumen

1. Specific gravity test of bitumen
2. Ductility test of bitumen
3. Flush point and fire point test of bitumen
4. Float test of bitumen
5. Penetration test of bitumen
6. Softening test of bitumen
7. Viscosity test of bitumen
8. Water content test of bitumen

B. Test of Aggregate

1. Abrasion test of aggregate
2. Shape test (flakiness and elongation) of aggregate
3. Impact value test of aggregate
4. Specific gravity test of aggregate
5. Compressive strength test of aggregate

C. Test of Tar

1. Viscosity of tar

D. Test of bituminous mix

1. Marshal test for stability and flow value

UTTARAKHAND TECHNICAL UNIVERSITY

Program: B. Tech (Civil Engg.)

Year: Fourth

Semester:-VII

Session: 2012-2013

Scheme & Evaluation Pattern

S. No.	Course No.	Subject	Periods			Evaluation				Total Marks
			L	T	P	Sessional		External Exam		
						CT	TA		Total	
Semester: VII										
Theory										
1	TCE-701	Bridge Engineering	3	1	0	30	20	50	100	150
2	TCE-702	Transportation Engg. II	3	1	0	30	20	50	100	150
3	TCE-703	Seismology and Earthquake Engg.	3	1	0	30	20	50	100	150
4		Elective –I	3	1	0	30	20	50	100	150
5		Elective II	3	1	0	30	20	50	100	150
6										
Practical/Design										
1		Project	0	0	4	0	0	50	50	100
2		CAD Lab- I	0	0	3	10	15	25	25	50
3		Industrial Interaction	0	0	2	0	0	25	25	50
4		Seminar	0	0	2	0	0	50	-	50
TOTAL = 1000										
S. No.	Course No.	Subject	Periods			Evaluation				Total Marks
			L	T	P	Sessional		External Exam		
						CT	TA		Total	
Semester: VIII										
Theory										
1		Elective – III	3	1	0	30	20	50	100	150
2		Elective – IV	3	1	0	30	20	50	100	150
3		Elective – V	3	1	0	30	20	50	100	150
4		Elective - VI	3	1	0	30	20	50	100	150
5										
6										
Practical/Design										
1		Project	0	0	6	0	0	100	200	300
2		Discipline	0	0	2	0	0	50	-	50
3		CAD Lab. II	0	0	3	10	15	25	25	50
4										

TOTAL = 1000

L- Lecture, **T-** Tutorial, **P-** Practical, **CT-** Class Test comprising of two tests in a semester each of 15 marks, **TA-** Teacher Assessment comprising of Attendance and Home Assignments & Tutorials tests in a semester each of 10 marks.

UTTARAKHAND TECHNICAL UNIVERSITY

B.TECH (CIVIL ENGINEERING)

SESSION 2012-13

ELECTIVES

VII Semester

List of Elective Subjects (I & II)

1. TCE 704 Ground Water Engineering
2. TCE 705 Hydraulic Structure
3. TCE 706 Digital Image Processing
4. TCE 707 Air & Water Pollution

VIII Semester

List of Elective Subjects (III, IV, V & VI)

Elective-III

TCE 801 Hydro Power Engineering
OR

TCE 802 River Engineering

Elective-IV

TCE 803 Advantage Structural Design
OR

TCE 804 Construction Planning & Management

Elective-V

TCE 805 Traffic Engineering and Management
OR

TCE 806 Advance Highway Engineering

Elective-VI

TCE 807 Environmental Impact & Risk Management
OR

TCE 808 Environmental Management & Sustainable Development

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Bridge Engineering**

2. Contact Hours: **L: 3 T: 1 P:**

DETAILS OF THE COURSE :

S. No.	Contents	Contact hours
1	Site investigations, selection of suitable type of bridge, hydraulic calculations, design loads for multi-lane bridges, analysis of deck slabs.	6
2	Load distribution in multi-beam deck.	6
3	Prestressed concrete bridge, prestress losses, temperature and shrinkage stresses, grillage analysis. Box girder bridge.	8
4	Design of arch bridges, bow string girder bridge.	4
5	Design of lattice girder steel bridge, introduction to cable bridges, various types of bearings and their design.	8
6	Various types of bearings and their design.	4
7	Introduction to bridge sub structure, analysis & design of pier, piles & well foundation.	6
	TOTAL	42

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Mondorf, P.E., "Concrete Bridges", Taylor & Francis.	2006
2	Ryall, M.J., Parke, G.A.R and Harding. J.E., "The Manual of Bridge Engineering", Thomas Telford.	2002
3	Ponnuswamy, S., Bridge Engineering", Tata McGraw-Hill	2005
4	Rajgopalan, N., "Bridge Super Structures", Narosa Publishing.	2006

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Transportation Engineering-II**

2. Contact Hours: **L: 3 T: 1 P:**

DETAILS OF THE COURSE :

S. No.	Contents	Contact hours
1	Introduction, Permanent Way and Components: History and administrative setup of Indian Railways; rail gauges, permanent way – functions, requirements, sections in embankment and cutting (single/double track), electrified tracks, locomotives, wheel and axle arrangement, coning of wheels, components – rails, sleepers, ballast and formation.'	8
2	Resistances and Stresses in Tracks, Hauling Capacity: Types of resistances to traction, stresses in different components of track, hauling capacity of a locomotive, tractive effort.	3
3	Joints and Fastenings: Types of joints, short welded rails, long welded rails and continuous welded rails, rail to rail and rail to sleeper fastenings, elastic fastenings.	4
4	Track Geometrics, Turnouts and Crossings: Railway alignment, vertical alignment – gradients and grade effects, horizontal alignment – horizontal curves, super-elevation, concepts of cant excess and deficiency, safe permissible speed, transition curves, widening of gauges and track clearances, points and crossings – terminologies, types of turnouts, design of turnouts, types of crossings, design of crossings.	7
5	Track Safety, High speed tracks, Urban railways: Signals classification and their functions, train operation control systems – absolute, automatic block systems, centralized train control system, ATS, interlocking of tracks – principle of interlocking, types of interlocking, high speed tracks – track requirements, speed limitations, high speed technologies, urban railway - railway systems in urban areas.	6
6	Introduction, Aircraft Characteristics and Airport selection: Air transport development in India, national and international organizations in air transport, aircraft characteristics and their impact on planning of an airport, selection of site for an airport, airport obstruction, imaginary surfaces, runway orientation clam period and wind coverage.	6

7	Geometric Designs: Runway and taxiway geometric designs, exit taxiway, its design and fillet curves, runway configuration, separation clearance, design of apron and their layouts.	7
8	Airport Traffic control Aids: Visual aids, marking and lighting of runway and apron area, wind and landing direction indicator.	2
	TOTAL	42

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Chandra, S. and Agarwal, M. M., “Railway Engineering”, Oxford.	2007
2	Arora, S. P. and Saxena, S. C., “A Text Book of Railway Engineering”, Dhanpat Rai Publications.	2004
3	Mundrey, J. S., “Railway Track Engineering”, Tata Mcgraw Hill.	2000
4	Khanna, S. K., Arora, M. G. and Jain, S. S., “Airport Planning & Design”, Nem Chand and Bros.	2000
5	Horonjeff, Robert and McKelvey, Francis X., “Planning & Design of airports”, 4th Ed., McGraw Hill.	1993
6	Saxena, S.C., “Airport Engineering – Planning and Design”, CBS Publishers.	2008

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Seismology and Earthquake Engineering**

2. Contact Hours: **L: 3 T: 1 P:**

DETAILS OF THE COURSE :

S. No.	Contents	Contact hours
1	Introduction to Earthquake Parameters : Earthquake occurrences – Global Seismic Belts.	2
2	Indian Seismic Zoning map, their engineering implications : Damage survey, seismic intensity, isoseismal maps, More commonly used earthquake parameters like epicenter, epicentral distance, origin time, focus, magnitude, frequency. Elementary information on seismic wave propagation. Demonstration of seismographs to explain earthquake recording	2
3	Single Degree of Vibration Freedom System : Introduction to vibration problems , Undamped and Damped free vibration with viscous damping, Forced vibrations, Steady state, Vibration Isolation, Vibration Measuring Instruments, (Demonstration for determination of damping, frequency etc.), Response of undamped systems to time dependent force functions (Pulse/impulses), Duhamel's Integral, Response to ground motion, Response spectra.	18
4	Two Degree of Freedom System : Determination of natural frequency and mode shapes, Steady state forced vibrations, Undamped vibration absorbers.	2
5	Multi Degree of Freedom System : Rayleigh's Method - Determination of fundamental frequency of simple systems, Free vibrations of undamped systems – Determination of frequency and mode shapes by Holzer method, Stodola Method, Evaluation of earthquake forces in multi-storeyed buildings using response spectra.	12
6	Earthquake Effects : Ground failures, Local site effects, Effects on ground and structure.	3
7	Introduction to IS Code: 1893, Codal Provisions for evaluation of earthquake forces on buildings.	3
	TOTAL	42

SUGGESTED BOOKS :

S. No.	Name of Books / Author / Publisher	Year of publication
1	Krishna, Jai, chandrasekran, A.R. and Chandra, B. ‘Elements of Earthquake Engineerng”, 2 nd Edition, South Asia Publisher, New Delhi	1994
2	Okamoto, S. “Introduction to Earthquake Engineering.” University of Tokyo Press. Tokyo.	1973
3	Clough, R.W. and Penzien, J. “Dynamics of Structure”, Mc Graw Hill Book Co., New York.	1993
4	Chopra, Anil K. “Dynamic of structures”, 2 nd Edition. Pearson Education.	2001
5	IS : 1893 Indian Standard – “Criteria for Earthquake Resistant Design of Structures General Provisions and Buildings”, Bureau of Indian Standard, Manak Bhawan, New Delhi.	2002
6	IEEE Std. 344-190 x, Recommended Practices for seismic Qualification of classes IE Equipment for Nuclear Power Generating station, “ Institute of Electrical and Electronics Engineers.	1989

ELECTIVES

1. Ground water Engineering
2. Hydro Power Engineering
3. Hydraulic Structures
4. River Engineering
5. Advance Structural Design
6. Construction Planning & Management
7. Traffic Engineering and Management
8. Advance Highway Engineering
9. Digital Image Processing
10. Air & Water pollution
11. Environmental Impact & Risk Management
12. Environmental Management & Sustainable Development

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Ground Water Engineering**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Groundwater occurrence and its role in hydrologic cycle, groundwater bearing formations, attributes of an aquifer, aquifer classification, flow and storage characteristics of various types of aquifers, recharge processes, storage release mechanisms.	7
2.	Differential equations governing groundwater flow in Cartesian coordinates, Dupuit-forchheimer assumptions, analytical solutions, numerical solutions, regional groundwater planning, stream-aquifer interflows.	8
3.	Differential equations governing ground water flow in polar coordinates, well hydraulics, analytical solutions for confined, leaky confined and unconfined aquifers, image well theory, time-variant pumping rates, well interference, analysis of pumping test data.	8
4.	Construction of wells, various drilling techniques.	4
5.	Estimation of recharge, lumped water balance, flow in unsaturated zone, experimental methods, GEC-97 norms.	6
6.	Artificial recharge, induced recharge, roof water harvesting.	4
7.	Contamination of groundwater, quality parameters and standards, river bank infiltration.	3
8.	Ground water modeling packages.	2
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Todd, D.K., “Groundwater Hydrology”, Wiley.	1980
2.	Walton, W.C., “Ground Resource Evaluation”, McGraw-Hill	1970
3.	Jacob Bear, “Hydraulics of Groundwater”, McGraw-Hill.	1979
4.	Bouwer, H., “Groundwater Hydrology”, McGraw-Hill.	1978
5.	Kruseman, G.P. and Ridder, N.A., “Analysis and Evaluation of Pumping Test Data”, IILRI.	1990
6.	Rushton, K.R., “Groundwater Hydrology”, John Wiley.	2003
7.	Freeze, R.A. and cherry, J.A. “ Groundwater”, Prentice Hall.	1979

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Hydropower Engineering**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Introduction: Prospects of hydropower, sources of energy, hydropower potential, distribution and development, basin-wise development of hydropower, constraints in hydro power development.	3
2.	Stream Flow Data and Hydropower Potential: Flow and load duration curves, estimation of flow duration curve at ungauged site, primary and secondary power, storage and pondage, load factor, capacity factor, utilization factor, diversity factor.	4
3.	Types of Hydro Power Plants: Base and peak load Hydro-power plants, run-of-river plants, valley dam plants, diversion canal plants, high head diversion plants, pumped-storage power plants.	3
4.	Intake Structures: Functions of intake structures, its location types, trash rack-dimensions, design, spacing of bars, methods of cleaning; design of transition.	5
5.	Conveyance System: Power canal-location, site, surges in canals, penstocks-types, design and layout, economical diameter of penstock, hydraulic losses, branches, air vent, forebay.	8
6.	Hydraulic Transients: Basic equations of Unsteady flow through conduits, method of characteristics, boundary conditions, single-pipeline applications for various valve opening conditions, functions of surge tank and its location, types and design of surge tank, introduction to transient softwares like HAMMER and HYTRAN etc.	8
7.	Hydraulic Turbines: Types of turbines, characteristics and efficiency of turbines, selection of turbines, selection of turbines, cavitations, casing, draft tubes, tail trace and their hydraulic design.	8
8.	Small Hydropower Development: Benefits and potential of small hydropower plants, components of small hydropower plants, trench weir, desilting tank, and turbines.	3
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Barrow, H.K., “Water Poer Engineering”, Tat McGraw-Hill	1943
2.	Varshney, R.S., “Hydro Power Structures”, Nem Chand & Bros.	2001
3.	Choudhary, M.H., “Applied Hydraulic Transients, Van Nastrand Reinhold.	1987
4.	Warnick, C.C., “Hydropower Engineering”, Prentice-Hall.	1984
5.	“Hydropower Development”, Vol.3,4,5,&6, Norwegian Institute of Technology, Division of Hydraulic Engineering.	1992

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Hydraulic Structures**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Introduction: Hydraulic structures for water resources projects.	2
2.	Embankment Dams: Types, design considerations, seepage analysis and control, stability analysis, construction techniques.	8
3.	Gravity Dams: Forces acting on failure of a gravity dam, stress analysis, elementary profile, design of gravity dam, other functional features of a gravity dam.	8
4.	Spillways: Types and their design, spillway gates, cavitations, aerators and energy dissipation (terminal structures).	8
5.	Channel Transitions: Design principles for subcritical and supercritical flows.	6
6.	Hydropower Plant: Terms relating to hydropower, basic design aspects of different unit of hydropower plant.	10
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Singh, B., “Fundamentals of Irrigation Engineering”, 9 th Ed. Nem Chand & Bros.	1997
2.	Asawa G.L.,” Irrigation Engineering”, 2 nd Ed., New Age International.	1996
3.	Ranga Raju, K.G., “Flow through Open Channels”, Tata McGraw-Hill.	2003
4.	Subramanya, K., “Flow in open Channels”, 2 nd Ed. Tata McGraw-Hill.	2000
5.	Chow V.T., “Open Channel Hydraulics”, McGraw-Hill.	1959

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **River Engineering**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Elements of River Geomorphology: Origin and properties of sediments, river problems control of vegetation an river morphology.	4
2.	Soil Erosion and Sediments Yield: Types of erosion, mechanism of soil erosion, sediment delivery ratio, process based modeling of soil erosion.	6
3.	Hydraulics of Alluvial Streams: Incipient motion, modes of sediment transport, bed-forms., resistance to flow in alluvial rivers, bed load transport, suspended load transport.	8
4.	River Geometry and Plan Forms: Stable channels and their geometry, flow around river bends, braided river, meandering river.	6
5.	Gravel Bed Rivers: Hydraulic geometry of gravel bed rivers, armouring, bed forms and resistance to flow in gravel bed rivers.	6
6.	Bed Level Variations in Steams: Degradation, local scour, aggradations, reservoir sedimentation, mathematical modeling for river bed variations.	6
7.	Rivers and Environment: Environmental effects of hydraulic structures, river pollution, river action plans, stream restoration.	6
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Garde, R.J., "River Morphology", New Age International.	2006
2.	Julin, P.Y., "Erosion and Sedimentation", Cambridge University Press.	1998
3.	Jansen, P.P.H., "Principles of River Engineering", VSSD Publications.	1994
4.	Rosgen, D., "Applied River Morphology", Wildland Hydrology books, Pagosa Springs.	1996
5.	Graf, W.H. and Altinakar, M.S., "Fluvial Hydraulics: Flow and Transport Processes in Channels of Simple Geometry", John Wiley.	1999

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Advanced Structural Design**

2. Contact Hours: **L: 3 T: 1 P/D: 2/2**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Inelastic analysis of R.C. beams and frames.	4
2.	Analysis & design of flat slabs; equivalent frame method, direct design method, deflection calculations.	6
3.	Design of shear walls	4
4.	Analysis & design of deep beams	4
5.	Design of grid floors, folded plates, cylindrical shells.	8
6.	Design of industrial buildings, bracing, gantry girders and stepped columns.	8
7.	Microwave tower & transmission line towers	4
8.	Plastic Design.	4
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Jain, A.K., "Reinforced Concrete- Limit State Design", 6 th Ed., Nem Chand & Bros.	2006
2.	Varghese, P.C., "Advanced Reinforced Concrete Design", Prentice Hall.	2001
3.	Pillai, S.D. and Menon, D., "Reinforced Concrete Design", Tata McGraw-Hill.	2003
4.	Agarwal P. and Shrinkhande, M., "Earthquake Resistance Design of Structures", Prentice-Hall of India.	2006
5.	Krishna Raju, N., "Advanced Reinforced Concrete Design", CBS Publishers.	1986

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Construction Planning & Management**

2. Contact Hours: **L: 3 T: 1 P/D: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Network Techniques: Introduction to network techniques; use of computer aided CPM and PERT for planning, scheduling and control of construction works; bar charts: Error in networks; Types of nodes and node numbering systems.	12
2.	Construction Planning: Planning for construction and site facilities using networks; preparation of construction schedules for jobs, materials, equipment, labour and budgets using CPM.	9
3.	Construction Equipments and Methods: Equipment for earthworks; Concrete construction; Aggregate production; Concrete production, handling and placement; Mixers, vibrations and temperature control.	12
4.	Control on Construction: Construction quality control and inspection; Significance of variability and estimation of risk; Construction cost control; crashing of networks	9
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Srivastava, U.K., Construction, Planning Management, Galgotia	1999
2.	Peurifoy, R.L., Construction Planning, Equipments and Methods, McGraw Hill.	1996
3.	Ahuja, H.N., Construction Performance Control by Networks, Wiley Interscience.	1976
4.	Moder and Philipese, Project Management with CPM and PERT, Van NO Strand.	1970

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Traffic Engineering & Management**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Fundamentals of Traffic Flow: Traffic flow elements, time-space diagram, flow-density relationship, gap and gap acceptance.	3
2.	Capacity Analysis: HCM 2000 and IRC guidelines, two-lane highway, multilane highway, basic freeway sections.	8
3.	Design of Intersections, Parking Areas and Terminals: Design of at-grade intersection, roundabout, grade-separated intersection, on-street parking, off-street parking, parking for disable, truck terminal, container terminal	6
4.	Road Safety Engineering: Statistical analysis of accidents, accident modeling, remedial measures, road safety audit, transportation system management (TSM) techniques, achievable speed reductions, estimate of accident reductions and benefits.	10
5.	Traffic Forecasting: Forecast based on past trends and extrapolation, forecast and mathematical models, period for forecasting, time series approach.	3
6.	Survey Execution: Defining data requirements, secondary sources, choice of survey instrument, design of sampling strategy, the survey plan, cross-sectional and time series surveys, training and administration, participatory transport surveys.	2
7.	Forecasting Travel Demand: Demand forecasting approaches, trip generation, trip distribution, mode choice, traffic assignment, other methods for forecasting demand.	4
8.	Planning for Public Transport: Selection of public transport technology, MRTS, LRTS, BRTS, ITS Modules, driver information and guidance, public transport travel information and ticketing, freight and fleet management, system integration.	6
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Flaherty C.A., “Transport Planning and Traffic Engineering”, Butterworth-Heineman.	2006
2.	Slin, M., guest, P. and Matthews, P., “traffic Engineering Design: Principles and Practice”, 2 nd Ed., Butterworth-Heinemann.	2006
3.	Garder, N.J. and Hoel, L.A., “traffic Engineering”, 3 rd Ed., Brooks/Cole, Pacific Grove.	2001
4.	Kadiyali, L.R., “traffic Engineering and Transport Planning”, 6 th Ed., Khanna Publishers.	2004
5.	McShane, William R. and Roses, Roger, P., “traffic Engineering”, Prentice Hall.	1990
6.	Virhic, Vikan, R., “Urban Transit Operations, Planning and Economics”, John Wiley.	2004

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Advanced Highway Engineering**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Introduction: National road development programmes, Bombay plan, Lucknow plan, IRC Vision-2021 and Rural Road Vision-225, comparison and significance, financial analysis of highway projects, vehicle operating cost.	6
2.	New Road Materials: Alternate forms of aggregates, theory and specifications of fillers, additives, emulsions, cutbacks and modifies binder, Mix designs-Marshall, Hubbard Field and Hveem Method, requirement of a mix.	7
3.	Pavement Structure-Soil Interaction: Tests on soil (Plate Load, CBR and Triaxial), strength of pavement materials, importance and functions of each layer of pavement and subgrade.	3
4.	Design of Flexible Pavements: Design factors, empirical, semiempirical and analytical design methods, California bearing ratio, triaxial, Mcleod and Burmister method, advantages and limitations, IRC method of design, design considerations for expressways.	6
5.	Design of Rigid Pavements: Design factors, load and temperature stresses, load transfer devices, design of Dowel and Tie bars, joint requirement and working, IRC methods of design of SFRC pavements, construction techniques and specifications, quality control tests, reinforced concrete pavements, continuously reinforced and prestressed.	8
6.	Stabilized Roads: Aggregate mixtures, proportioning, types of stabilizations, advantages and limitation, special problems related to drainage, control of seepage and capillary rise.	4
7.	Pavement Evaluation Techniques for Functional and Structural Evaluation: Benkalman beam deflection method, flexible and rigid overlays.	2
8.	Maintenance of Pavements: Routine and periodic maintenance, special repairs, maintenance management system, case study of failure of flexible and rigid pavements cracking, settlement, frost heaving and mud pumping in pavements.	6
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Kerbs, R.D. and Walker, R.D., “Highway Materials”, MCGraw-Hill.	1971
2.	Khanna, S.K. and Justo, C.E.G. “ highway Engineering”, NEm Chand and Bros.	2001
3.	Huang, Y.H. “Pavement Analysis and Design” Prentice Hall	1993
4.	Wright, P.H. and Dixon, K.K., “Highway Engineering”, John Wiley.	2004
5.	Kadiyali, L.R. and Lal, N.B., “Principles and Practices of Highway Engineering”, Khanna Publishers.	2006

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Digital Image Processing**

2. Contact Hours: **L: 3 T: 0 P: 2**

DETAILS OF COURSE :

SN	Contents	Contact Hours
1.	Introduction to remote sensing data analysis, spectral, spatial and radiometric resolutions, visual data interpretation, image formats, digital image and its characteristics, image processing systems.	6
2.	Initial data statistics, Histogram and Scatterplot.	2
3.	Image Preprocessing, atmospheric, radiometric and geometric corrections, image enhancement and restoration, contrast stretching-linear and non-linear.	6
4.	Noise removal, low, medium and high pass filters, other filters, multi-spectral enhancement.	5
5.	Image transformation - mathematical operators, KLT, PCA, FFT, image analysis - feature extraction, pattern recognition.	9
6.	Classification - Supervised and unsupervised techniques.	5
7.	Accuracy assessment procedures, post classification techniques.	2
8.	Data fusion, fuzzy logic, advance image processing techniques and concepts, application of digital image processing to various engineering problems.	7
Total		42

SUGGESTED BOOKS :

SN	Name of Books / Authors/ Publishers	Year of Publication
1.	Agarwal, C.S. and Garg, P.K., "Remote Sensing in Natural Resources Monitoring and Management", A.H. Wheeler & Co.	2000
2.	Chandra, A.M. and Ghosh, S.K., "Remote Sensing and Geographical Information Systems", Alpha Science.	2005
3.	Gonzalez, R.C. and Wintz, P., "Digital Image Processing", Addison Wesley.	2000
4.	Jia, X. and Richards, J.A., "Remote Sensing Digital Image Analysis", 3rd Ed., Springer Verlag.	1999
5.	Mather, P.M., "Computer Processing of Remotely sensed Data", John Wiley.	1999

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Air and Water Pollution**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Introduction and scope, air and water resources.	4
2.	Dispersion and interaction of pollutants, Air quality: Mass Balance approaches, box model approaches, air quality dispersion-modeling approaches, Water quality: Mass balance approaches, aquatic ecosystem modeling approaches, air and water chemistry.	8
3.	Monitoring and modeling of indoor and ambient air quality, Emission inventory, key meteorological data.	4
4.	Pollution of surface and ground water resources & control mechanisms. Baseline monitoring of surface waters, ground water quality and quantity, mitigation measures.	5
5.	Impact of air and water pollution on ecosystems, mitigation measures.	3
6.	Carrying capacity of air and water sheds.	3
7.	Air and water pollution versus health risk and global climate change, air and water quality standards, regulations and legislations, national versus international.	8
8.	Air Quality management and reclamation of water bodies, technology and policy options for controlling air and water pollution. Decision methods for evaluation of alternatives.	7
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Kenneth, W., Warner, F.C. And Davis Wayne, T., “Air Pollution, Its Origin and Control”, 3 rd Ed., Prentice Hall.	1997
2.	Mishra, P.C., “Fundamentals of Air and Water pollution”, South Asia Books.	1990
3.	Davis, M.L. and Cornwell, D.A., “Introduction to Environmental Engineering”, McGraw Hill.	2002
4.	David A. Chin, “Water Quality Engineering in Natural Systems”, John Wiley.	2006

UTTARAKHAND TECHNICAL UNIVERSITY

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Environmental Impact and Risk Assessment**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Introduction and scope utility of the EIA process, expended and narrowed scope of EIA, impacts of development activities, planning and management of impact studies.	6
2.	Environmental attributes environmental indices and indicators, environmental assessment, methods and techniques, matrices, network and checklist methods, prediction techniques for quality of environmental attributes.	10
3.	Impact evaluation, assessment of impact on air, water, soil and ground water, noise, biological environment. Assessment of impact on socio-economic environment, evaluation methods, mitigation measures.	10
4.	Health risk assessment, hazard identification, toxicology and dose response characterization, exposure characterization, risk characterization, uncertainty in estimates.	10
5.	Risk evaluation, risk acceptance, basic principles of health risk management.	6
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Kenneth, W., Warner, F.C. and Davis Wayne, T., "Air Pollution, Its Origin and Control", 3 rd Ed., Prentice Hall.	1997
2.	Mishra, P.C., "Fundamentals of Air and Water Pollution", South Asia Books.	1990
3.	Masters, G., "Introduction to Environmental Engineering and Science", Prentice Hall of India.	2004
4.	Jain, R.K., "Environmental Impact Assessment", John Wiley.	1978
5.	Paustenbach, D.A., "Risk Assessment", A Text Book of Case Studies, John Wiley.	1992

NAME OF DEPTT./CENTRE: **Department of Civil Engineering**

1. Subject Code: Course Title: **Environmental Management &
Sustainable Development**

2. Contact Hours: **L: 3 T: 1 P: 0**

DETAILS OF COURSE :

S. No.	Contents	Contact Hours
1.	Introduction and scope, inter-linkages of energy-environment and economy from engineering infrastructure perspective.	5
2.	Concepts of ecology, systems approach and sustainability engineering.	5
3.	Interaction between energy and environmental resources, environmental quality standards and indices (Indian and International).	7
4.	Environmental monitoring, analysis, statistics and data interpretation.	6
5.	Environmental management system, ISO 14000 Series.	4
6.	Impact assessment, life cycle assessment and risk analysis of scientific and technological developments.	6
7.	Environmental legislations, ethics and social responsibility.	4
8.	Sustainable development within the context of global economy, technology and climate change.	5
Total		42

SUGGESTED BOOKS :

S. No.	Name of books/ Authors/ Publishers	Year of Publication
1.	Baker, S., "Sustainable Development", Taylor & France's.	2006
2.	Krishnamoorthy, B., "Environmental Management", Prentice Hall of India.	2005
3.	Friedman, F.B., "Practical Guide to Environmental Management", Environmental Law Institute.	2003
4.	Environmental Management Plans Demystified: A Guide to ISO 14001-Spam Press.	2001
5.	Calow, P., "Handbook of Environmental Risk Assessment and Management", Blackwell Publishing.	1998