

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