SCHEME OF COURSES FOR B.TECH. CIVIL ENGINEERING FOR 2011 BATCH AND ONWARDS

B. TECH. Ist   SEMESTER

Course No.	Course title	L	T	P	C
CIV-102	Engineering Drawing	2	0	4	4

B. TECH. 2nd   SEMESTER

Course No.	Course title	L	T	P	C
CIV-201	Engineering Mechanics	3	1	0	4

B.TECH. 3RD SEMESTER   (CIVIL)

Course No.	Course title	L	T	P	C
CIV-301	Structural Analysis- I	2	2	0	4
CIV-301(P)	Structural Engineering Lab- I	0	0	2	1
CIV-302	Fluid Mechanics-I	2	1	0	3
CIV-302(P)	Fluid Mechanics Lab-I	0	0	2	1
CIV-303	Surveying-I	2	1	0	3
CIV- 303(P)	Surveying Lab-I	0	0	3	2
MTH-303	Mathematics-I	2	1	0	3
ELE-304	Basic Electrical Engineering	2	1	0	3
ELE-304(P)	Basic Electrical Engineering Lab.	0	0	2	1
HSS-301	Humanities & Social Science-I	2	1	0	3
CIV-300	Professional Development Activities	0	0	2	1
Total Contact Hours and Credits		30			25
COURSES OFFERED TO OTHERS DEPARTMENTS (METALLURGY)					
CIV- 304	Geology & Mineralogy	2	2	0	4
CE-304(P)	Geology & Mineralogy Lab.	0	0	2	1

B.TECH. 4th SEMESTER (CIVIL)

Course No.	Course title	L	T	P	C	Remarks
CIV-401	Structucal Analysis- II	2	1	0	3	*Two weeks survey camp immediately after exam. of 4th semester (July)
CIV-402	Fluid Mechanics-II	2	1	0	3	
CIV-402(P)	Fluid Mechanics Lab-II	0	0	2	1	
CIV-403	Surveying-II	2	1	0	3	
CIV-403(P)	Surveying Lab	0	0	2	1	
CIV-403(SC)	Surveying Camp*	0	0	4	2	
CIV-404	Geotechnical Engineering-II	2	1	0	3	
CIV-404(P)	Geotechnical Laboratory	0	0	2	1	
CIV-405	Building Drawing and Construction	3	1	0	4	
MTH-406	Mathematics-II	2	1	0	3	
CIV-400	Professional Development Activities	0	0	2	1	
Total Contact Hours and Credits			31		25	

BTECH. 5th- SEMESTER (Civil)

Course No.	Course title	L	T	P	C
CIV-501	Design of Structures-I	2	2	0	4
CIV-501(P)	Concrete Laboratory	0	0	2	1
CIV-502	Traffic Engineering and Road Facilities	2	1	0	3
CIV-503	Geotechnical Engineering-II	2	2	0	4
CIV-503 (P)	Geotechnical Laboratory	0	0	2	1
CIV-504	Water Resources Engineering	2	2	0	4
CIV-505	Quantity Surveying and Cost Evaluation	2	1	0	3
CIV-500	Professional Development Activities	0	0	2	1
Elective Courses					
CIV-511: E1	Architecture and Town Planning	2	1	0	3
	Concrete Technology				
	Engineering Seismology				
Total Contact Hours and Credits			29		25
COURSES OFFERED TO OTHERS DEPARTMENTS (ELECTRICAL)					
CIV-506	Hydraulics and Hydraulic Machines	3	1	0	4

B.TECH. 6th SEMESTER (Civil)

Course No.	Course title	L	T	P	C
CIV-601	Design of Structures-II	2	2	0	4
CIV-601(P)	Structural Engineering Lab.	0	0	2	1
CIV-602	Highway Engineering and PMS	2	2	0	4
CIV-602(P)	Highway Lab.	0	0	2	1
CIV-603	Engineering Geology and Materials	3	1	0	4
CIV-603 (P)	Geology Lab.	0	0	2	1
CIV-604	Hydropower Engineering	2	1	0	3
CIV-600	Professional Development Activities	0	0	2	1
Elective Courses					
CIV-611:E1	Advanced Geotechnical Engineering	2	1	0	3
CIV-611:E1	Water Shed Management				
PHY-ELE,E1	Solar Architecture				
CIV-612E2	Structural Analysis-III	2	1	0	3
	Disaster Management(F)				
	Applied Hydrology				
Total Contact Hours and Credits			29		25

B.TECH. 7th SEMESTER (Civil)

Course No.	Course title	L	T	P	C
CIV-701	Water supply & Sanitary Engg.	2	1	0	3
CIV-701(P)	Water Quality lab	0	0	2	1
CIV-702	Structural Dynamics	2	1	0	3
CIV-703	Construction Technology & Management	2	1	0	3
CIV-704	Design of Structures-III	2	2	0	4
CIV-705	Seminar	0	2	0	2
CIV-706	Project Pre-Work	0	0	4	2
CIV-700	Professional Development Activities	0	0	2	1
Elective courses					
CIV-711:E1	Railway and Airport Engineering	2	1	0	3
	Fluvial Hydraulics				
MTH-711:E1	Operation Research				
CIV-712:E2	Soil Dynamics and m/c foundations	2	1	0	3
	Advanced Structural Analysis				
	Computer Aided Design*(F)	1	0	4	
Total Contact Hours and Credits			30		25

*For examination purpose it will be treated similar to a laboratory course.

B.TECH. 8th SEMESTER (Civil):

Course No.	Course title	L	T	P	C
CIV-801	Irrigation and Hydraulic Structures	2	2	0	4
CIV-802	Bridge Engineering	2	1	0	3
CIV-803	Project*	0	5	10	10
CIV-804	Practical Training & Viva-voce	0	0	0	2
ELECTIVE COURSES					
CIV-811:E1	Rock Mechanics and Tunneling Technology	2	1	0	3
	Transportation Planning and Economics				
MTH-811	Numerical Methods in Civil Engineering				
CIV-812:E2	Ground Improvement Techniques	2	1	0	3
	Earthquake Resistant Design				
	Environmental Engineering				
Total Contact Hours and Credits		28			25

*The evaluation will be done as per statutes.

ANNEXURE-I

REVISED SCHEME OF COURSES
FOR 4-YEAR B.TECH. PROGRAMME
IN CIVIL ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY
SRINAGAR

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR
NAME OF DEPARTMENT: **Department of Civil Engineering**

1. Subject Code: CIV- **102**   Course Title: **Engineering Drawing**
2. Contact Hours**:   L: 2   T: 0   P: 4**
3. Examination Duration (Hrs): **Minor 1:- 1   Minor 2:- 1   Major:- 3**
4. Relative Weightage: **Minor 1:- 20   Minor2:- 20   Assignments:- 10**
   Major:- 50
5. Credits: **4**
6. Semester: **1st (Autumn)**
7. Pre-requisite: **Nil**
8. Objective: To give Students basic knowledge of treatment of problems in design and
   drawing by geometrical methods and to develop the ability to visualize the pictorial
   view from the given orthographic view and vice-versa.
9. Details of Course:

S. No	Contents	Lecture Hours
1.	Types of projections, concept of solid as 3-dimensional object, lines and planes, first and third angle practices	12
2.	Projections of simple geometrical solids, placed in simple positions with single rotation of the face, edge or axis of solid with respect to one of the principal planes of projection	12
3.	Section of simple geometrical solids, types of sectional planes, true shape of sections	12
4.	Intersection of surfaces, simple case of intersection of two prisms, two cylinders, and cone and a cylinder	6
5	Development of surfaces of simple sectional solids and intersecting solids.	6
6.	Isometric projections of given orthographic projections	6
7.	Orthographic projections of simple blocks	6
	Total	60

10. Practical Drawing Plates to be Prepared:-

1. Layout; Printing of title blocks and projection of lines.
2. Projection of planes, inclined to one plane
3. Projection of solids, single rotation of solids
4. Section of solids
5. Intersection of surfaces, Development of surfaces
6. Isometric projections. Projection of Blocks

11. Suggested books

S. No	Name of Books/ Authors/ Publishers	Year of Publication
1.	Gill, P.S. "Engineering Graphics and Drafting"1st Ed.S.K.Kataria & Sons	2001
2.	Mohan, K.R." Engineering Graphics" Dhanpat Rai Publishing Company	2010
3.	Bhatt, N.D. "Engineering Drawing"	
4.	Venugopal, K. " Engineering Drawing and Graphics" , New Age International (P) Ltd	2006
5.	Luzadder W.J. " Fundamentals of Engineering Drawing" 5th Ed. Prentice Hall India	1967

National Institute of Technology Srinagar

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-201   Course Title: **Engineering Mechanics**
3. Contact Hours: L: 3   T: 1   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;   Minor-II: 1;   Major: 3**
5. Relative Weightage: **Minor-I:20;   Minor-II:20;   Major:50;   Class Performance:10**
6. Credits: 4
7. Semester: 2nd (Spring)
8. Pre-requisite: Nil

Course Details

S. No.	Contents	Lecture Hours
1	**Moment of area of plane sections:** First moment of an element of an area. First moment of finite area. Centroid and centroidal axes of a finite area. Second moment of finite area. Moment of inertia of a plane section about different axes. Parallel and perpendicular axes theorems of moment of inertia. Composite areas. Polar moment of inertia.	6
2	**Analysis of stresses and strains:** Forces and stresses. Conditions of equilibrium, compatibility and stress strain relations. Stress-strain diagrams, Hooke's law, Modulus of elasticity (E), Ultimate & allowable stresses, factor of safety, Lateral strains, Poisson's ratio, Multi-axial stress system, Volumetric strain, Bulk modulus (K), Composite sections, Shear stress concept, Modulus of rigidity (G). Temperature stresses in composite sections. Relation between E, G and K.	12
3	**Members subjected to flexural loads:** Reaction forces for planar structures (beams). Support conditions, statical determinacy & stability of beams, determination of shear forces & bending moments in beams, shear & moment diagrams, Analysis of beams for different loading conditions, Relation between load, shear force & bending moment.	10
4	**Member forces in trusses:** Planar truss structures, truss joint identification, sign conventions, member force representation, statical determinacy & stability of trusses. Numerical methods of truss analysis (method of joints, method of sections & graphical method). Trusses subjected to lateral forces, cantilever trusses.	6
5	**Members subjected to torsional forces:** Preliminary concept of stress in shafts subjected to torsional forces, torsional stresses in circular shafts, solid and hollow shafts. Design of power transmission shafts, compound shafts.	6

REFRENCES:
1. Beer, P.F. and Johnston (Jr.) E.R. "Mechanics of Materials",S.I. version, Tata McGraw Hill , India, 2001.
2. Engineering Mechanics of Solids: Popov.
3. Strength of Materials : Ryder.
4. Fundamentals of Structural Analysis: West.
5. Strength of Materials by William A. Nash

National Institute of Technology Srinagar

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-301   Course Title: **STRUCTURAL ANALYSIS-1**
3. Contact Hours: L: 2   T: 2   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;   Minor-II: 1;   Major: 3**
5. Relative Weightage: **Minor-I:20;   Minor-II:20;   Major:50;**
   Class Performance:10
6. Credits: 4
7. Semester: 3rd (Autumn)
8. Pre-requisite: Nil
9. Objective: To develop the understanding of basic principles of Analysis of Determinate Structures.

Details of Course

S. No.	Contents	Lecture Hours
1	**INTRODUCTION TO STRUCTURAL ANALYSIS:** Structure; Structural Engineering ; History of Structural Engineering ; The Engineering Design Process ; Structural Analysis ; Structural Form ; Simplifications for Purpose of Analysis ; Types of Loads ; Evaluation of Gravity Loads On Various Components with Reference to IS : 875.	4
2	**BASIC CONCEPTS OF STRUCTURAL ANALYSIS:** Forces ; Specification of a Force ; Free Body Diagrams ; Equations of Equilibrium ; Condition Equations ; Displacements ; Compatibility ; Boundary Conditions ; Principle of Superposition ; Stiffness & Flexibility; Types of Structural Supports.	2
3	**BENDING AND SHEAR STRESS IN BEAMS:** Flexural formula, bending stress and shear stress diagrams for homogeneous beam sections of various shapes.	8
4	**COMPOUND STRESSES:** Principal stresses and strains, evaluation by analytical and graphical methods - Mohr's Circle.	8
5	**SLOPES AND DEFLECTIONS:** Slope and deflection of determinate beams by differential equation, moment area, conjugate beam and energy methods. Castigliano's first energy theorem and its applications to deflection of simple determinate trusses.	10
6	**COLUMNS:** Stresses in columns, short and long columns, buckling phenomenon. Euler's,Rankine's theory - Crippling loads evaluation. stresses in eccentrically loaded columns.	6
7	**INDETERMINATE STRUCTURES:** Introduction to Indeterminate structures; Degrees of Freedom, Kinematic & Static Indeterminacy of Structures.	2

REFRENCES :

1. Structural Analysis : Jack C. McCormac.

2. Nash, William A. "Theory and Problems of Strength of materials 4/e". Tata McGraw Hill, New Delhi,2004.
3. Fundamentals of Structural Analysis : West.
4. Introduction to Structural Engineering : John M. Biggs.
5. Indeterminate Structures : C.K.Wang .
6. Determinate Structures : R.L.Jindal.
7. Reddy, C.S. "Basic Structural Analysis" , Tata McGraw Hill, New Delhi,2003.

National Institute of Technology Srinagar

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-301(P)   Course Title: **STRUCTURAL ENGINEERING LAB-I**
3. Contact Hours: L: 0   T: 0   P: 2
4. Examination Duration (Hrs.):   **Viva-Voce at the end of semester**
5. Credits: 1
6. Semester: 3rd (Autumn)
7. Pre-requisite: Nil
8. Objective: To develop the understanding of basic principles of Analysis of Determinate Structures.
9. Details of the course

S.No.	Name of experiment	objective
1.	Tensile Test of Steel	To determine yield strength, ultimate tensile strength, percentage elongation and modulus of elasticity (Plot, stress strain curve).
2.	Tensile and Compressive strength of Timber	i. Parallel to grains ii. Perpendicular to grains.
3.	Shear test of steel/timber	To measure ultimate shear strength. Shear modulus. Plot shear stress strain Curve.
4.	Torsion test of steel	To measure angle of twist. Ultimate torsional strength stress strain Curve.
5.	Buckling load of columns various end conditions.	To determine crippling load of columns with different end conditions and compare theoretical values.
6.	Verification of Maxwell's Theorem.	To verify the Principle of Maxwell's theorem
7.	Testing of Bricks and Stones as per IS Specifications.	
8.	Verification of horizontal thrust in a three hinged arch	To evaluate experimentally horizontal thrust in a three hinged arch and draw influence line diagram for the horizontal thrust.

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

1. Subject Code: CIV -302   Course Title: Fluid Mechanics-I
2. Contact Hours: L: 2   T: 1   P: 0
3. Examination Duration (Hrs.): Minor –I = 1 Minor –II =1 Major = 3
4. Relative Weightage: Minor-I: 20 Minor-II: 20 Major: 50   C.I+ C.A: 10
5. Credits: 3
6. Semester: 3rd. (Autumn)
7. Pre-requisite:Nil
8. Objective: To develop the understanding of basic principles of mechanics of fluids at rest and in motion and their applications in solving the real engineering problems.
9. Details of course:

S.No	Contents	Lecture Hours
1.	INTRODUCTION: Physical properties of fluids viz, mass density, viscosity, compressibility, vapour pressure, surface tension, capillarity, etc. Ideal Fluids and Real Fluids; Newtonian and Non-Newtonian Fluids.	3
2.	FLUID STATICS: Pressure Intensity, Pascal's law; Pressure- density- height relationships, manometers; pressure on plane and curved surfaces, centre of pressure; Buoyancy, Stability of immersed and floating bodies.	5
3.	KINEMATICS OF FLUID FLOW: Steady and unsteady, uniform and non uniform, laminar and turbulent flows; one, two and three dimensional flows; Stream lines, Streak lines and path lines; Continuity equation; Rotation and Circulation; Elementary explanation of stream function and velocity potential; Graphical and Experimental methods of drawing flow nets.	6
4.	DYNAMICS OF FLUID FLOW: Euler's equation of motion along a streamline and its integration to yield Bernoulli's equation; Flow measurement, flow through orificemeter, Venturimeter, orifices, mouth pieces, pitot and prandtl tubes, sluice gates under free and submerged conditions, Various types of Notches and weirs under free and submerged flow conditions, Aeration of nape.	10
5.	MOMEMTUM EQUATION: Momentum equation and its application to stationary and moving vanes, pipe bends.	4
6.	DIMENSIONAL ANALYSIS AND HYDRAULIC SIMILITUDE: Dimensional analysis, Buckingham's theorem, Important dimensionless numbers and their significance, Geometric, Kinematic and dynamic similarity; Model analysis.	4
7.	BOUNDARY LAYER ANALYSIS:	6

	Boundary layer thicknesses, Boundary layer over a flat plate, Laminar boundary layer, Application of momentum equation, Turbulent boundary layer, Laminar sub-layer, smooth and rough boundaries, local and Average friction coefficients, separation.	
	Total	38

10. Suggested Books:

S.No	Name of Books/authors/Publishers	Year of Publication
1.	Kumar, D.S. "Fluid Mechanics and Fluid Power Engineering". Seventh Ed. S.K. Kataria& Sons Publishers, New Delhi,	2008-2009
2	Garde R.J " Engineering Fluid Mechanics"	1988
3.	Kumar, K.L. " Engg. Fluid Mechanics", Eurasia Publishing House (P) Ltd. New Delhi, 1984.	1998
4.	Streter, V.L., Wylie, E.B. and Bedford, K.W. "Fluid Mechanics" McGraw Hill , New York,	2001
5.	Asawa, GL, Fluid Flow in Pipes & Cannels 2008? CBS Puyblishers, new Delhi.	2000.
6.	Mohanty " Fluid Mechanics"Printice Hall of India second Ed.	2010

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

1. Subject Code: CIV-302(P) Course Title: Fluid Mechanics Laboratory-I
2. Contact Hours: L: 0 T: 0 P: 2
3. Examination Duration (Hrs.): Theory: 0 Practical's: 2
4. Relative Weightage: (%) Mid Term: 50 End Term: 50
5. Credits: 1
6. Semester: 3rd. (Autumn)
7. Pre-requisite:Nil
8. Objective: To develop skills in understanding the measurement of fluid characteristics.
9. Details of the course

List of Experiments:

1. To determines experimentally the metacentric height of a ship model.
2. To verify the Bernoulli's equation experimentally.
3. To determine the coefficient of discharge, coefficient of velocity and coefficient of contraction of an orifice or a mouthpiece of a given shape.
4. To calibrate an orifice meter and to study the variation of coefficient of discharge with Reynold's number.
5. To calibrate a venturimeter and to study the variation of coefficient of discharge with Reynold's Number.
6. To calibrate sharp crested rectangular and triangular weir.
7. To verify momentum equation experimentally.

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OD DEPTT/CENTRE: Department of Civil Engineering
1. Subject Code: CIV-303   Course Title: Surveying-I
2. Contact Hours: L = 2 T= 1   P = 3
3. Examination Duration (Hrs): Minor = 1   Major = 3   Practical = 3
4. Evaluation Weightage (%):   Minor-I=20 Minor-II=20   Major =50 C.P.=10
5. Credits: 3   6. Semester: Autumn   7. Subject Area: Civil Engg
8. Pre-requisite: Nil

9. Objective: To impart basic understanding of various aspects related to system of Geometrics and other physical measurements in the field of Civil Engg.

10. Details of Course

Unit No.	Course Contents	Lecture Hours
Unit -1	**a. Introduction**: Importance, Principles of Surveying. Types of Surveying.	4
	b. Chain Surveying: Field Equipment, Methods of chaining, Offsets, corrections in chaining, obstacles in chain-surveying; plotting; Degree of accuracy. Tape and chain corrections	7
Unit - 2	**a. Prismatic compass surveying**. Instruments; Principle, Procedure and precautions. Closed traverse; corrections; local attraction; plotting.	6
	b. **Plane Table Surveying**; Field equipments, Methods of plane tabling, Two point and Three point problem, Precautions, Accuracy	6
Unit - 3	**a. Levelling**; Instruments; Field book recording, Bench mark & its types, methods of reduction of levels, various types of field works; contouring; Plotting. Testing and permanent adjustments. Sensitivity of bubble tube.	9
	b. Areas and Volumes: Methods of determining areas and volumes viz., Borrow - pits.	4
Total		36

BOOKS RECOMMENDED
1. Surveying Vols. I & II   by   Dr. K.R.Arora
2. Surveying Vols. I & II, by Duggal, S.K.
3. Surveying & Levelling by Basak
4. Surveying & Levelling Vols. I & II by Kanetkar,T. P. and Kulkarni, S.V
5. Surveying & Levelling by P.B. Shahni
6. Surveying Vol. I & II, by Punmia, B. C
7. J.K. Ghosh

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OF DEPTT/CENTRE: Department of Civil Engineering

1. Subject Code: CIV-303 (P)   Course Title: Surveying Laboratory-I
2. Contact Hours: L = 0 T= 0   P = 3
3. Examination Duration (Hrs): Minor = 0   Major = 0   Practical = 3
4. Evaluation Weightage (%): Internal Teacher = 40   End Term = 60
5. Credits: 2   6. Semester: Autumn   7. Subject Area: Civil Engg
8. Pre-requisite: Nil

9. Objective: To impart basic understanding of various aspects related to system of Geometrics
                    and other physical measurements in the field of Civil Engg.

10. Details of Course

Sr. No.	Course Contents	Lecture Hours
1	**CHAIN SURVEYING:** 1. Ranging / chaining a line and recording the field book. 2. Setting-out Right Angles using Tape. 3. Taking offsets and setting-out Right Angles using:- (i) Cross Staff (ii) Indian Optical Square 4. Testing of Adjustment of Indian Optical Square 5. Testing and Adjustment of Chain.	9
2	**COMPASS SURVEYING:** 1. Study of Prismatic Compass 2. Field Work in Compass Surveying: Measurement of Angles between the lines meeting at a point, and Compass Traversing and Taking Observations	6

3	**PLANE TABLE SURVEYING:**
	 1. Study of Equipment
	 2. Setting-up the plane table- Temp. Adjustments.
	 3. Marking North Direction and Orientation by:
	    (i). Magnetic Needle/Trough Compass
	    (ii). Back- sighting.
	 4. Plotting a few points by Radiation Method.
	 5. Plotting a few points by Inter-Section Method.
	 6. Two point and three point problem.
		9

4	**LEVELLING:** 1. Study of Equipment and levelling staff. 2. Temporary adjustment of levelling Instruments. 3. Field work using levelling Instrument: (i) Taking Staff readings and (ii) Recording the field book. 4. Longitudinal Section of Road/Railway/Canal/Dam 5. Cross Section of a Road/Railway/Canal/Dam.	12

	6. Taking Staff readings on different stations / finding difference of level between them.	
	Total	36

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OF DEPT./CENTRE: **Department of Civil Engineering**
1. Subject Code: CIV-304   Course Title: Geology and Mineralogy

2. Contact Hours: **L: 2**   **T: 1**   **P: 2/2**
3. Examination Duration (Hrs.):   **Theory: 3   Practical: 2**
4. Relative Weightage: **M1: 20   M2:   20   CI: 10 Major: 50**
5. Credits: **3**   6. Semester: **Autumn** 7. Subject Area:
8. Pre-requisite: **Nil**
9. Objective: To impart the basic understanding of the formation of rocks and minerals and to expose the students to the basic erosional and depositional processes.
10. Details of Course:

S. No.	Contents	Lecture Hours
	Part A Physical Geology	
1.	Introduction to the science of geology.	3
2.	Crust of earth and its composition.	3
3.	Minerals and Rocks.	3
4.	Weathering of Rocks; Erosion, transportation and deposition by wind, Water and ice.	6
5.	Introduction to geological structures.	3
	Part B Mineralogy	
1.	Rock forming minerals and ore forming minerals. Processes of mineral formation. Physical properties of minerals.	4
2.	Introduction to ore minerals. Principle ore minerals of Aluminum, Copper, Lead, Zinc, Antimony, Nickel, Tin, Chromium, Magnesium and Iron, their important properties, mode of formation, mode of occurrence, uses and distribution in India.	10
3.	Study of Refractory minerals, coal and petroleum.	4
	Total	**36**

11. **Books recommended**

S.No.	Name of Books/ Authors/ Publishers	Year of Publication
1.	Bangar, K.M, Principles of Engineering Geology, Standard Publishers Distributors, New Delhi.	**1995**
2.	Parbin Singh Engineering Geology, Katson Publishers New Delhi.	**2009**
3.	Billings, M.P., Structural Geology, Prentice-Hall India, New Delhi.	**1974**
4.	Blyth, F.G.H and de Freitas, M.H. Geology for Engineers, ELBS, London.	**1974**
5.	Gokhale, KVG.K and Rao, D.M., Experiments in Engineering Geology, Tata- McGraw Hill, New Delhi.	**1981**

6.	Kesavulu, C. Textbook of Engineering Geology, Macmillan, India Ltd. New Delhi.	**1993**
7.	Geology for Civil Engineers by McLean and Gribble, Spon Press, Taylor &Francis Group, London.	**1999**

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

1. Subject Code: CIV-304(P) Course Title: Engineering Geology Laboratory
2. Contact Hours: **L: 0** **T: 0** **P: 2/2**
3. Examination Duration (Hrs.): **Theory:** **0** **Practical:** **2**
4. Relative Weightage: Mid Term = 40 End Term = 60
5. Credits: **1** 6. Semester: **Autumn** 7. Subject Area:

8. Pre-requisite: **Nil**
9. Objective: To impart the basic skills for determination of characteristics of rocks and minerals.
10. Details of Course:

S. No.	Contents	Lecture Hours
	List of Experiments	
1.	The study of Physical Properties of Minerals.	**6**
2.	Determination of Specific Gravity by: a) Jolly's Spring Balance b) Walkers Steel Yard Balance c) Beam Balance	**6**
3.	Study of Rocks and their Characteristics.	**4**
4.	Study and Sketching of various types of Geological Structures.	**6**
5.	Determination of Dip and Strike with a Clinometer Compass.	**6**

National Institute of Technology Srinagar

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-401   Course Title: **STRUCTURAL ANALYSIS-I**
3. Contact Hours: L: 2   T: 1   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;   Minor-II: 1;   Major: 3**
5. Relative Weightage: **Minor-I:20;   Minor-II:20;   Major:50;   Class Performance:10**
6. Credits: 3
7. Semester: 4th (Spring)
8. Pre-requisite: Nil
9. Objective: To develop the understanding of basic principles of Analysis of in-determinate Structures.

Details of Course

S. No.	Contents	Lecture Hours
1	**ANALYSIS OF BEAMS BY FORCE METHOD:** Method of consistent deformation for analysis of indeterminate beams. Analysis of fixed beams by integration and Moment area methods. Three moment theorem and its application to analysis of continuous beams.	10
2	**APPROXIMATE ANALYSIS OF 2D FRAMES:** Sub frame method for approximate analysis of frames for gravity loads. Portal and cantilever methods for analysis of frames under lateral loads.	4
3	**INTRODUCTION TO DISPLACEMENT METHOD OF ANALYSIS:** Analysis of Indeterminate Beams & Frames (with & without Sway) by Classical Displacement Methods viz; Slope Deflection Method & Moment Distribution Method, Kani's Method	8
4	**INFLUENCE LINES & TRAVELLING LOADS:** Principles of Influence Lines and their Application to Determinate Structures; Beams and Arches. Criteria for maximum moment & shear under series of moving concentrated loads in beams. Absolute maximum forces in beams under moving udl.	6
5	**Elements of Plastic Analysis of beams and frames:** Plastic section modulus, shape factor and moment of resistance. Mechanism method and statical method of analysis, combination of individual mechanisms for frames.	8

BOOKS RECOMMENDED
1. Indeterminate Structural Analysis   by C.K.Wang
2. Indeterminate Structural Analysis   by R.L.Jindal
3. Structural Mechanics   by Noris & Wilbur

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

1. Subject Code: CIV -402   Course Title: Fluid Mechanics-II
2. Contact Hours: L: 2   T: 1   P: 0
3. Examination Duration (Hrs.): Theory: 3   Practical's: 0
4. Relative Weightage: Minor-I: 20   Minor-II: 20   Major: 50   C.I+ C.A: 10
5. Credits: 3
6. Semester: 4 th. (Spring)
7. Pre-requisite: Basic course of Fluid Mechanics -I
8. Objective: To develop the understanding of basic principles of fluid flow through pressure and gravity type conduit systems to ensure adequate water distribution to consumers and management of surface water resources.

9. Details of course:

S.No	Contents	Lecture Hours
1.	FLOW IN OPEN CHANNELS : Uniform flow, Critical depth, Normal depth, Specific energy, Resistance formulae, Gradually varied flow equations, Classification of water surface profiles, Computation of water surface profiles, step by step method and graphical integration method. Hydraulic Jump, Momentum Principle for open channels, Evaluation of the jump elements. Venturi flumes.	14
2.	FLOW THROUGH PIPES: Nature of turbulent flow in pipes , Hydraulic and energy grade lines. Equation for velocity distribution over smooth and rough pipes, Resistance coefficient and its variation, Nikuradse experiments, Moody diagram, Flow in sudden expansion, Contraction, diffusers, Bends, Valves and Siphons;Concept of equivalent length,branchedpipes pipes in series and parallels, Simple networks, Transmission of power.	11
3.	FLUID FLOW PAST SUBMERGED BODIES: Drag and lift, Drag on a sphere, cylinder and disc: Lift, Magnus effect and Circulation.	3
4.	WATER HAMMER AND SURGE TANKS: Sequence of events after sudden value closure, pressure diagrams, Gradual closure or opening of the valve, Instantaneous closure of valve in a rigid pipe, Instantaneous closure of valve in an Elastic pipe and Compressible fluid, Methods of Analysis; Surge Tanks, Location of Surge Tanks, Types, Design of surge Tanks.	4

5.	HYDRAULIC MACHINES : Types of Turbines, Description and principles of Impulse and reaction Turbines, Unit quantities and specific speed, Runaway speed, Turbine characteristics , Selection of Turbines, Cavitation; Draft Tube, Draft Tube Dimensions, Types of draft tubes; Governing of Turbines; Centrifugal pumps, specific speed, power requirements, Reciprocating pumps.	6
	Total	36

10. Suggested Books:

S.No	Name of Books/authors/Publishers	Year of Publication
1.	Kumar, D.S. "Fluid Mechanics and Fluid Power Engineering". Seventh Ed. S.K. Kataria& Sons Publishers, New Delhi,	2008-2009
2.	K.Subramanaya "Open channel Flow"3rd.Tata McGraw Hill Pub.Co.New Delhi	1999
3.	RangaRaju, K.G., "Flow Through Open Channels", 2nd.Tata McGraw Hill Publishing Company Ltd., New Delhi,1986	1999
4.	Nigam "Handbook of Hydro electricEngg."	2001
5.	Garde R.J " Engg. Engineering Fluid Mechanics"	1988
6.	Deshmukh,M.M, " Water Power Engineering"DanpatRai&Sons,NaiSarak New Delhi	1978
7.	Asawa, GL " Fluid Flow in Pipes and Channels" CBS Publishing	

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

1. Subject Code: CIV-402(P)   Course Title: Fluid Mechanics Laboratory-II
2. Contact Hours: L: 0   T: 0   P: 2
3. Examination Duration (Hrs.): Theory: 0   Practical's: 2
4. Relative Weightage: (%)   Mid Term: 40 End Term: 60
5. Credits: 1
6. Semester: 4 th. (Spring)
7. Pre-requisite: Nil
8. Objective: To develop skills in understanding the measurement aspects of open channel and closed conduit flow.
9. details of the Course

 List of Experiments:
1. To study the variation of friction factor "f" for turbulent flow in different commercial pipes.
2. To determine the loss coefficient for various pipe fittings.
3. To determine Manning's coefficient of roughness "n" for the bed of a given flume.
4. To calibrate a broad crested weir.
5. To study the formation of hydraulic jump.
6. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile.
7. To study the velocity distribution in an open channel and to determine the energy and momentum correction factors.

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OD DEPTT/CENTRE: Department of Civil Engineering

1. Subject Code: CIV-403   Course Title: **Engineering Surveying-II**
2. Contact Hours: L = 2 T = 1   P = 0
3. Examination Duration (Hrs): Minor-I = 1   Minor-II= 1 Major = 3
4. Evaluation Weightage (Marks): C.P. =10   Minor-I=20 Minor-II=20   Major =50
5. Credits: 3   6. Semester: Spring   7. Subject Area: Civil Engg
8. Pre-requisite: Engineering Surveying-I

9. Objective: To impart basic understanding of various aspects related to system of Geometrics
            and other physical measurements in the field of Civil Engg.

10. Details of Course

Unit No.	Course Contents	Lecture Hours
Unit -1	**a. Theodolite**: Construction, Temporary and Permanent adjustment of transit Theodolite; angle measurements and errors, Theodolite traversing-Traverse calculations; Traverse adjustments.	6
	b. Tacheometry: Stadia and its principal, analytic lens, Heights and distances from stadia intercepts; subtense method, tangential method; Accuracy, tacheometric alidade	6
Unit - 2	**a. Trigonometrical levelling**: Curvature and refraction, Axis-signal correction, method of trigonometrical levelling.	4
	b. **Curves**: Elements of simple curve; design and setting out of a simple curve, compound curve, transition curve, Vertical Curves	8
Unit - 3	**a.** **Setting out works**: Setting out Buildings, Culverts and bridges, Tunnels. Transfer of alignment. Fixing of horizontal and vertical controls.	6
	b. **Geodetic surveying**: Triangulation- principles: choice of stations, Base line measurements- electronic methods of distance measurements, Triangulation adjustments-Heights-figure adjustments; Spherical excess, Computations of sides of spherical triangles.	6
Total		36

BOOKS RECOMMENDED
1. Surveying Vols. I & II   by   Dr. K.R.Arora
2. Surveying Vols. I & II, by Duggal, S.K.
3. Surveying & Levelling by Basak
4. Surveying & Levelling Vols. I & II by Kanetkar,T. P. and Kulkarni, S.V
5. Surveying & Levelling by   P.B. Shahni
6. Surveying Vol. I & II, by Punmia, B. C

NAME OD DEPTT/CENTRE: Department of Civil Engineering

1. Subject Code: CIV-403 P   Course Title: **Surveying Laboratory-II**
2. Contact Hours: L = 0 T = 0   P = 3
3. Examination Duration (Hrs): Minor = 1   Major = 3   Practical = 3
4. Evaluation Weightage (%): Mid Term= 40   End Term = 60
5. Credits: 1   6. Semester: Spring   7. Subject Area: Civil Engg
8. Pre-requisite: Surveying Lab-I

9. Objective: To impart basic understanding of various aspects related to system of Geometrics and other physical measurements in the field of Civil Engg.

10. Details of Course

Sr. No.	Course Contents	Lecture Hours
1	**THEODOLITE SURVEYING:** 1. Study of Equipment: (i). Ordinary Theodolites, (ii). E D M Theodolites and (iii) G T S Theodolites. 2. Temporary Adjustments of a Theodolite. 3. Field work using a Theodolite: (i). Measurement of Horizontal and Vertical Angles by ordinary and electronic Theodolites, and (ii) Measurement of linear and angular measurements using EDM/GTS Instruments (Basic Introduction)	15
2	**TACHEOMETRIC SURVEYING:** 1. Study of equipment and graduated staff. 2. Temporary adjustments 3. Field work: (i). Determination of Constants " K & C " (ii). Stadia Traversing & recording stadia field book (iii). Location of Details by Tacheometric Methods 4. Subtense Bar Method: Theory and Field work	15
	Total	30

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NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OD DEPTT/CENTRE: Department of Civil Engineering

1. Subject Code: CIV-403 (SC)   Course Title: **Surveying Camp**
2. Contact Hours: L = 0 T = 0   P = 3
3. Examination Duration (Hrs): Minor = 1   Major = 3   Practical = 3
4. Evaluation Weightage (%): Mid Term= 40   End Term = 60
5. Credits: 1   6. Semester: Spring   7. Subject Area: Civil Engg
8. Pre-requisite: Surveying Lab-I & II
9. Objective: To impart knowledge to o actual field problems.

10. Details of Course

3	**TWO WEEK DURATION**
	
	1. Triangulation:
	  (i). Ordinary Methods
	  (ii). On the basis of Global positioning system (GPS)
	2. Shifting of Horizontal and Vertical Controls
	3. Setting out of works
	4. Setting out of Curves
	5. Contouring:
	  (i). Contouring of a Dam Reservoir/Railway line
	  (ii). Preparing a contour plan by various methods
	  (iii). Setting out of Contour lines of an appropriate site.
		Two weeks survey camp immediately after exam of 4TH semester

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

1. Subject Code: CIV -404   Course Title: Geotechnical Engineering -I
2. Contact Hours: L: 2   T: 1
3. Examination Duration: (Hrs)   Minor-1 =1 Minor –II=1: Major=3
4. Relative Weight-age: (%) Minor-I: 20   Minor-II: 20   Major: 50   C.I.+ C.A: 5.
Credits = 4
6. Semester: 4th. (Spring)
7. Pre-requisite:Nil
8. Subject Area Civil Engineering
9. Detail of the course

S. No.	Topic	Lecture Hours
1	**INTRODUCTION:**	
	Soil and its formation , various processes and agencies for formation. Types of soils. Three phase soil model, Index properties and classification of soils.	10
2	**SOIL HYDRAULICS.**	
	Flow through soils, Darcy's Law. Permeability , factors and determination in the lab/Field. Steady state flow , seepage force, laplace equation for steady state flow,flow nets. for homogeneous embankments with and without toe filters.	10
3	**SOIL COMPRESSIBILITY.**	
	One dimensional consolidation, Terzaghi's equation , Consolidation test e log p curves. Consolidation settlement, Time required for settlement.	6
	Compaction,laboratory compaction tests, proctor compaction , compaction curve and control on field compaction.	4
4	**EFFECTIVE STRESS.**	
	Total and effective stresses ,pore water pressure	2
5	**STRESS DISTRIBUTION.**	
	Stress distribution under concentrated load . Westergard's and Boussineq's method.	4
6	**SOIL INVESTIGATION.**	
	Laboratory and Field Investigation . Sub soil exploration , penetration methods,Geo physical methods electromagnetic method, electric resistivity method and Seismic method .	4
7	**CLAY MINERALOGY.**	

	Minerals present in clay, dependence of behaviour of clay on type of mineral.	2

BOOKS RECOMMENDED

1. Soil Mechanics   by   Alam Singh
2. Principles of soil Mechanics   by   D.W.Taylor
3. Theoretical Soil Mechanics   by   Terzaghi
4. Soil Mechanics   by   Terzaghi & Peck
5. Soil Mechanics   by   Withman & Lamb
6. Soil Mechanics   by   S.B.Saighal
7. Soil Mechanics   by   Jumikis
8. Geotechnical Engineering   by   Purushothama Raj
9. Geotechnical Engineering   by   C. Venkatramaiah

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

1. Subject Code: CIV-404(P)   Course Title: Geotechnical Engineering Lab-I
2. Contact Hours: L: **0**   T: **0**   **P=3**
3. Examination Duration (Hrs.): Practical = 3
4. Relative Weight-age: (%) Mid-term = 40 Final Term = 60
5. Credits: 1
6. Semester: 4th. (Spring)
7. Pre-requisite:Nil
8. Objective : To impart necessary training for measurement of basic properties of soils.
9. Details of the course

Name of the Experiments	Lecture Hours
1. Determination of water content; bulk density and specific gravity	3
2. Soil gradation by sieve analysis and hydrometer analysis.	3
3. Consistency limits; Determination of plastic; liquid and shrinkage limits.	9
4. Determination of permeability by falling head and constant head method.	6
6. Conduct of 1-dimensional consolidation 7.	6
6. Conduct of standard proctor compaction test. 7.	6
8. Rapid control Compaction test as per USBR.	3

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

1. Subject Code: CIV-404(P)   Course Title: Building Drawing & Construction
2. Contact Hours: L: **2**   T: **3**   **P=0**
3. Examination Duration (Hrs.): M1: 1 Hour   M2: 1 Hour M3: 3 Hour
4. Relative Weight-age: (%) M1: 20   M2: 20   Major: 50
5. Credits: 04
6. Semester: 4th. Semester
7. Subject Area Arch
8. Pre-requisite: Nil
9. Objective: To impart understanding & knowledge of various aspects of Building Drawing and Construction
9. Details of the course

S. No.	Topic	Lecture Hours
01	Standard Conventions in Drawing: Basic principles of planning and design in buildings.	02
02.	Foundations: Principles of foundations, types and suitability of foundations including strip, pad, raft, pile and pier foundation, timbering for excavation of foundation	02
03.	Damp proofing: Causes, effects, parts of building likely to be affected of methods of damp-proofing , materials of damp proofing.	02
04.	Masonry: Principles and significance of brick masonry; terms used and types of brick bonds; principles and significance of stone masonry; types of stone masonry walls; building uses of common types of stones.	03
05.	Drawing of plans, elevations and sections giving construction details of important building components including foundation, plinth, DPC, lintels , slabs and roofs; full specifications for each component.	12
06.	Simple drawing exercises on layouts of building services such s electrical, water supply and plumbing, sanitation etc.	04
07.	Doors, Windows, Ventilators and Lintels; Location, size and different types including steel and aluminum: types f lintels and their construction details. Drawing of typical doors, windows and ventilators.	05
08.	Drawing of R.C.C. slabs & beams (including cantilevers), columns and footings.	05
09.	Stairs and Staircases: Various types and materials; proportioning of staircase, brief introduction of ramps, lifts and escalators,. Drawing of R.C.C. stair case.	04
10.	Floors; Consideration of choice in ground and upper floors; various types f floors and their suitability; flooring materials and their construction details.	04
11.	Roofs & Roof Coverings: Classification of roofs with special reference to pitched roofs; different roof coverings and details of rain proofing at top wall. Drawings of various timber roof trusses	05

	with joint details.	
	Total:	**48**

Books Recommended:

01. Building Drawing   M.G Shah
02. Civil Engineering Drawing   Chakorobarty
03. Civil Engineering Drawing   J.B. Mc. Kay
04. Building Construction   Sharma and Koul
05. Properties of Concrete   A. M . Nevile

National Institute of Technology Srinagar

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-501   Course Title: **Design of Structures-I**
3. Contact Hours: L: 2   T: 1   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;   Minor-II: 1;   Major: 3**
5. Relative Weightage: **Minor-I:20;   Minor-II:20;   Major:50;   Class Performance:10**
6. Credits: 4
7. Semester: 5th (Autumn)
8. Pre-requisite: Nil
9. Objective: To impart understanding of various aspects of design of Reinforced Concrete.

10. Details of Course:

S. No	Contents	Lecture Hours
1	Properties Of Concrete & Reinforcing Steel, Characteristic Strength, Stress Strain Curves, Shrinkage & Creep Phenomenon.	03
2	General design Philosophies: Working Stress, Ultimate Load & Limit State Method Of Design. Analysis & Design Of Structures In Flexure/Torsion By Limit State Method.	03
3	Design of singly and doubly reinforced sections: rectangular sections & T sections; codal provisions. Behavior of beam in shear & bond, design for shear, anchorage & slipping of reinforcement. Detailing of reinforcement as per codal provisions with reference to IS 456-2000. Serviceability limit state of deflection and cracking. Calculation of deflection, codal requirements.	18
4	Design of columns: short and long column, eccentrically loaded columns.	05
5	Design of one-way and two-way slabs with and without corners held down. Introduction to design by moment coefficients. Introduction to Masonry retaining walls	07

     Suggested Books:

S. No	Name of Book/ / Publishers	Authors
1	Reinforced concrete Limit State Design	A.K.Jain
2	Design of R.C.C. Structures	Sinha
3	Design of R.C.C. Structures	Karve & Shah
4	Design of reinforced concrete & Pre-stressed concrete Structures	Kong & Evans

National Institute of Technology Srinagar

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-501(P)   Course Title: **CONCRETE LABORATORY**
3. Contact Hours: L: 0   T: 0   P: 2
4. Examination Duration (Hrs.):   **Viva-Voce at the end of semester**
5. Credits: 1
6. Semester: 5th (Autumn)
7. Pre-requisite: Nil
8. Objective: To develop the understanding of basics of concrete and its constituents.
9. Details of the course

List of Experiments / Objective

A) CEMENT: Standard Consistency and setting times
To determine: i) Standard consistency ii) Initial setting time iii) Final setting time in conformity with IS code 4031.

Tensile and Compressive strength

i)   To determine the tensile strength and compressive strength of Cement in accordance with IS code - 4031.

B) AGGREGATES:
Particle size distribution and fineness modulus

   i)   To determine the particle size   distribution and fineness modulus of coarse and fine aggregates (IS -460). All the relevant tests for aggregates as   per I.S. codes.

C) CONCRETE:
Workability test
 i)   To determine the consistency of fresh concrete by slump test.
 ii)   To determine the workability of freshly mixed concrete by the compaction factor test
Compressive strength of Cement Concrete (Nominal mix)
i)   To determine the cube strength of concrete for different mixes and different W/C ratios.
Flexural Strength of Concrete
 i)   To determine the flexural strength (Modulus   of   Rupture) of concrete (Nominal Mix)
Ultimate strength of Beams
To determine the flexural ultimate strength of
   i) an under reinforced beam
   ii) an over reinforced beam
Bond strength
 To determine the bond strength between
 i)   Mild steel plain bars & concrete
                          Tor Steel/cold twisted bars and concrete

National Institute of Technology Srinagar

10.	Name of the Department:	Department of Civil Engineering

1. Subject Code: CIV-502	Course Title: Traffic Engineering and Road Facilities

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

3. Examination Duration (Hrs):	**Theory:**	2	**Practical:**	0

4. Relative Weitage:	**CAA**	10	**Minor I**	20	I	20	50

5. Credits:	4	6. Semester: 5th **Autumn**	7. Subject Status: **Core**

8. Pre-requisite: **Nil**

9. Objective: To impart understanding and knowledge of various aspects of Traffic Engineering and Road Facilities.

10. Details of Course:

S. No.	Contents	Lecture Hours
1	Components of traffic system- vehicle characteristics; human characteristics, road characteristics & traffic-control devices,	6
2	Intersections- unsignalized intersections, channelization and roundabouts, interchanges- requirement & design.	10
3	Traffic signs- role and types, signalized intersections, signal timing design; signal coordination, Parking facilities- parking demand, on-street parking, off-street parking,	14
4	Traffic flow theory-flow parameters; fundamental relation of traffic flow, road capacity and level of service concept.	10
Total		**40**

11. Suggested Books:

S. No.	Name of Books/Authors/Publishers	Year of Publication
1	Transport Planning and Traffic Engineering by CA O'Flaherty, John Wiley & Sons, Inc., New York; Toronto.	2002
2	Traffic Engineering by McShane & Roess, Prentice-Hall of India Private Ltd, New Delhi-110001.	1990
3	Principles and Practices of Highway Engineering by Kadiyali & Lal, Khanna Publishers, Delhi-6	1996
4	Principles of Transportation Engineering by Chakarborty & Das, Prentice-Hall of India Private Ltd, New Delhi-110001	
5	Traffic Engineering and Transport Planning by L. R. Kadiyali, Khanna Publishers, 2-B , Nai Sarak, Delhi-110006	1999

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

1. Subject Code: CIV -503   Course Title: Geotechnical Engineering -II
2. Contact Hours: L: 2   T: **1**
3. Examination Duration : (Hrs) Minor-1= 1 Minor –II = II 60 Major=3
4. Relative Weight-age: (%) Minor-I: 20   Minor-II: 20   Major: 50   C.I.+ C.A: 10
5. Credits: 3
6. Semester: 5th (Autumn)
7. Pre-requisite:Nil
8. Objective: To impart knowledge of fundamentals of strength and stability problems in
          Geotechnical Engineering and their analysis.

S.No.	Topic with contents	Lecture hours
1	**SHEAR STRENGTH:** shear strength concept. Mohr's Coulumb equation. Laboratory determination. Triaxial compression test under different Drainage conditions , viz undrained , drained and consolidated , direct shear test . Unconfined compression test. Strength envelope.	**8**
2	**BEARING CAPACITY AND FOUNDATIONS:** Basic definitions and methods of determination, Prandtl's solution . Terzaghi's solution for ultimate bearing capacity. Size effects . Effects of rigidity of footings. Plate load test.Design principles for footing and rafts. Foundations on clays and sands Foundations - types and applications , Pile foundation types , classifications and determination of load carrying capacity , dynamic and static methods. Pile load test, pile groups efficiency of pile groups.	12
4	**EARTH PRESSURE:** Lateral earth pressure. Rankine's theory Active and Passive States. Lateral earth pressure under various conditions , like surcharge , sloping backfill and high water table behind the wall. Earth pressure diagrams . total thrust. Tension Cracks.	
5	**STABILISATION**: methods of stabilization . Brief introduction to each of the methods of stabilization such as shot-creting, geo-reinforcement	
6	**STABILITY OF SLOPES:** Infinite slopes, conjugate stresses, stability number Swedish and Friction circle methods . Submergence case, complete draw down case, Steady seepage case.	

BOOKS RECOMMENDED

1. Soil Mechanics   by   Alam Singh
2. Principles of Soil Mechanics   by   D.W.Taylor
3. Theoretical Soil Mechanics by   Terzaghi
4. Soil Mechanics   by   Terzaghi & Peek
5. Soil Mechanics   by   Witman & Lamb
6. Soil Mechanics   by   S.B.Saighal
7. Soil Mechanics   by   Jumikis

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR, J&K

NAME OF THE DEPARTMENT/CENTRE : **Department of Civil Engineering**
Subject Code: CIV -504   Course Title: **Water Resources Engineering**
2. Contact Hours: L: 2   T: **2**   P -0
3. Examination Duration: (Hrs)   Minor-1= 1 Minor –II = II 60 Major=3
4. Relative Weight-age: (%) Minor-I: 20   Minor-II: 20   Major: 50   C.I.+ C.A: 10
5. Credits: 04
6. Semester: 5th (Autumn)
7. Pre-requisite:Nil
8.Pre-requisite :   **Nil**
Objective: To impart the knowledge for understanding elementary aspects of hydrology
and Fluvial Hydraulics for use in the planning, design, and management of water resources
projects. Also to impart understanding of introductory aspects of integrated water resources
development and management.

Details of Course:

S. No.	Contents	Lecture Hours
1	Definition and scope of hydrology, hydrological cycle, water balance equation	2
2	Precipitation, its mechanism, forms, weather systems, Indian scenario, measurement, average precipitation, gauge network adequacy, missing data determination, and consistency	3
3	Evaporation: factors affecting, measurement, empirical equations, analytical methods, reservoir evaporation; Evapotranspiration, its measurement, ET equations, potential evapotranspiration	3
4	Interception and depression storage	1
5	Infiltration, infiltration capacity, measurement, indirect determination, infiltration indices	3
6	Streamflow measurement: Direct and indirect methods, depth measurement, velocity measurement, stage-discharge relationship	3
7	Runoff: Factors affecting, runoff characteristics of streams, rainfall-runoff relationships	2
8	Hydrographs: Definition, components, base flow separation, effective rainfall, unit hydrograph, its derivation , applications, and limitations.	3
9	Floods: Rational method, empirical methods, U.H. method, Design flood definition	2

10	Flood routing: Reservoir and channel routing	3
11	Reservoir Design Studies: Types of reservoirs, storage capacity, fixation of capacity, safe yield, reservoir sedimentation: trap efficiency, capacity-inflow ratio, life of reservoirs	3
12	Groundwater: Introduction, types of aquifers, aquifer properties, Darcy's law, Dupuit assumptions, steady one-dimensional aquifer flow, Well Hydraulics : Steady flow to wells in confined and unconfined aquifers	3
13	Fluvial Hydraulics: Introduction, properties of sediment particles, brief description of incipient motion, bed load, and suspended load	3
14	Water Resources Planning and Development: National water policy, Single and multi-purpose development, Integrated water resources development and management, inter-state and international aspects of river basin development.	2
Total		36

1. Suggested Books:

S.No.	Name of Books/Authors/Publishers	Year of Publication
1.	Subramanaya, K."Engineering Hydrology" Tata McGraw Hill, New Delhi.	2001.
2	Linsely,K.,Kohler, A. and Paulhus L.H. "Hydrology for Engineers" McGraw Hill Book Company Inc. New York.	1975
3	Ragunath, H.M. "Hydrology Principles Analysis and Design" New Age International (P) Ltd Publishers., New Delhi.	2005
4	Garde, R.J. and RangaRaju K.G. "Mechanics of sediment transportation and alluvial stream problems". New Age International (P) Ltd. Publishers, New Delhi.	1994
5	Arora, K.R. "Irrigation Water power and water Resources Engineering". Standard Publishers Distributors, Delhi.	2002
6	Wilson, E.M. "Engineering Hydrology" ELBS, English Language book Society/ Macmillam Education Ltd., London,	1999.
7	Asawa, G.L. Irrigation and Water Resources Engineering , New age International Publishers	2005

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OD DEPTT/CENTRE: **Department of Civil Engineering**

1. Subject Code: CIV-505   Course Title: **Quantity Surveying & Cost**
                                                        Evaluation (QSCE)
2. Contact Hours: L = 2 T = 1   P = 0
3. Examination Duration (Hrs): Minor = 1   Major = 3
4. Evaluation Weightage (%age): C.P. =10   Minor-I=20   Minor-II=20   Major =50
5. Credits: 3   6. Semester: 5th Autumn   7. Subject Area: Civil Engg
8. Pre-requisite: Nil
9. Objective: To impart understanding of various aspects related to Material/labour analysis and
                    other physical measurements in the field of Civil Engg.

10. Details of Course

Unit No.	Course Contents	Lecture Hours
Unit -1	**a. Estimate:** Importance, Items of a work and their units. Types of estimates, viz. preliminary; approximate; Abstract estimate; Plinth area estimate; detailed estimate; revised estimate; supplementary estimate, bill of quantities and abstract of cost.	4
	b. Analysis of Rates: Preparing analysis of rates, Labour schedule, material schedule & rate schedule. Analysis of rates- of lime concrete in foundation; Brickwork in foundation in super structure; stone masonary; R.C.C. work; R.B.work; Plastering; pointing; white washing; colour washing; painting; wood work, earth work in foundation; earth work in road; D.P.C. ; Steel work for reinforcement; steel work in trusses; wood work in frames, shutters etc.	8
Unit - 2	**a. Specifications:** General specifications and detailed specifications, Book of specifications, specifications for earth work in foundation; L.C. in foundation; R.C.C. work; Brick work; R. B. work; Wood work in doors, windows etc. D.P.C. centering and shuttering; earthwork in canal and road.	4
	b. Works Estimate: Estimates of building; Estimates of walls; methods of building estimate; Longwall-shortwall and centreline methods; Estimate of masonary platform, estimate of a masonary tank, estimate of roof trusses (wooden/steel) Estimate of a single roomed building; estimate of a two roomed building with C.G.I roof over wooden trusses and over steel truss. estimate of a shop; estimate of a R.C.C. beam, R.C.C. Slab	10
	a. Estimate of Road: Methods of estimating; materials for different items of work and labour; methods of estimating earth work; estimate of a metalled road.	4

Unit - 3	**b. Valuation & Rent Fixation:** Valuation of building-various methods; Rent fixation, plinth area requirement.	4
	c. Introduction to Building Codes: Sanitary fitting; Electrification; in-built furniture, Hazard safety measures in high rise buildings.	2
Total		36

BOOKS RECOMMENDED
 1. Estimating and Costing   by B. N. Datta
 2. Hand Book of Civil Engineering   by P. N. Khanna
                                    3. Estimating and Costi

NAME OF THE DEPTT. /CENTRE: **Department of Civil Engineering**
1. Subject Code: CIV -506   Course Title: Hydraulics and Hydraulic Machines
2. Contact Hours: L: 2   T: 1   P: 0
3. Examination Duration (Hrs.): Theory: 3   Practical's: 0
4. Relative Weightage: Minor-I: 20   Minor-II: 20   Major: 50   C.I+ C.A: 10
5. Credits: 3
6. Semester: 5th. (Autumn)
7. Pre-requisite:Nil
8. Objective: To develop the understanding of basic principles of mechanics of fluids at rest and in motion andtheir applications in solving the real engineering problems.
9. Details of course:

S.No	Contents	Lecture Hours
1.	INTRODUCTION: Physical Properties of Fluids.	3
2.	FLUID STATICS: Pressure Intensity, Pascal's law, pressure- density - height relationships, Manometers, Pressure on plain and curved surfaces, Centre of pressure.	5
3.	KINEMATICS OF FLUID FLOW : Types of flows, stream lines, streak lines and path lines, continuity equation.	4
4.	DYNAMICS OF FLUID FLOW: Euler's equation of motion along a stream line and its integration to yield Bernoulli's equation; flow measurement, pitot tube, prandtl tube, Venturimeter, Orifice meter, Orifices, Weirs and Notches.	10
5.	FLOW THROUGH PIPES: Hydraulic grade line, Darcey-weisbachh formula, Design of pipes, Equivalent diameter of pipes, Transmission of power through pipes.	4
6.	FLOW IN OPEN CHANNELS: Chezy's formula, Manning's formula, Design of Channels, Economic Section.	5
7.	HYDRAULIC MACHINES: Types of turbines ,description and principles of impulse and reaction turbines , unit quantities and specific speed, runaway speed ,turbine characteristics , slection of turbines , governing of turbines.Centrifugal pumps , specific speed , power requirement, reciprocating pumps.	5
8.	LAYOUT OF POWER HOUSE: General layout and arrangement of Hydropower units.	2
	Total	38

10.Suggested Books:

S.No	Name of Books/authors/Publishers	Year of Publication
1.	Kumar, D.S. "Fluid Mechanics and Fluid Power Engineering". Seventh Ed. S.K. Kataria& Sons Publishers, New Delhi,	2008-2009
2	Garde R.J " Engg. Engineering Fluid Mechanics"	1988
3.	Streter, V.L., Wylie, E.B. and Bedford, K.W. "Fluid Mechanics" McGraw Hill , New York,	2001
4.	Bansal,R.K. "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., New,Delhi,	2000.

National Institute of Technology Srinagar

Name of Deptt./Center   Department of Civil Engineering

1. Subject Code   CIV-511 : E1   Course Title: **Concrete Technology**
2. Contact Hours: L: 2   T: 1   P: 0
3. Examination Duration (Hrs): Theory 5
4. Relative Weightages: M1   20   M2   20   Major 50   Assignment & Attendance   10
5. Credits: 3
6. Semester: 5th Autumn
7. Subject Area: Concrete & Concrete making materials
8. Pre-requisite: Nil
9. Objective: To impart understanding of various aspects related to ingredients and properties of concrete and concrete mix design.

Details of Course:

S. No	Contents	Lecture Hours
1	Cement: Its Basic Chemistry, Types of Portland cement	5
2	Normal aggregates and their properties	5
3	Fresh Concrete and its properties. Strength of Concrete: Water/Cement ratio-Gel/Space Ratio, Influence of Temperature on Strength of Concrete and Bond between concrete and Reinforcement, Mixing, handling, placing, and Concrete. Elasticity, Shrinkage and Creep of Concrete	18
4	Mix Design: IS method	5
5	Special Concretes	3

Suggested Books:

S. No	Name of Book/ Authors / Publishers	Year of Publication
1	Naville, A.M. " Properties of Concrete. Pearson Publishers, N Delhi	2004
2	Shetty, M.S."Concrete Technology" S.Chand & Company N Delhi	2002
3	Gambhir,M.L."Concrete Technology"TaTa McGraw Hill N Delhi	1995
4	Naville, A.M. and Brookes, J.J." Concrete Technology", Pearson Publishers, N Delhi	1994

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OF DEPT./CENTRE: **Department of Civil Engineering**
1. Subject Code: CIV-511:E1   Course Title: Engineering Seismology
                                                                  (Earthquake Engineering)
2. Contact Hours: **L: 2**   **T: 1**   **P: 0**
3. Examination Duration (Hrs.):   **Theory: 3   Practical: Nil**
4. Relative Weightage: **M1: 20   M2: 20   CI: 10 Major: 50**
5. Credits: **3**   6. Semester: 5th **Autumn**   7. Subject Area:
8. Pre-requisite: **Must have studied Engineering Geology & Materials**
9. Objective: To impart the basic understanding of earthquakes, physics of the   earth's interior from a practical side, to foresee the potential consequences of strong earthquakes on urban areas and civil infrastructure and how to do more efficient hazard management and mitigation. This module will communicate how science can enhance community resilience and has relevance far beyond any site for earth sciences, earthquake engineering, preparedness, mitigation, emergency response, decision-making, and public policy.
10. Details of Course:

S. No.	Contents	Lecture Hours
	Engineering Seismology (Earthquake Engineering)	
1.	Engineering Seismology, Seismology and Seismic Exploration (Definitions). Introduction to Seismic Hazard and Earthquake Phenomenon. Global seismicity - Analysis of earthquake focal mechanisms.	6
2.	Seismotectonics and Seismic Zoning of India. Microzonation. Mechanism of Faulting. Earthquake Prediction.	7
3.	Site Response to Earthquakes: Local geology and soil conditions. Site investigations and soil tests. Dynamic design criteria for a given site.	8
4.	Earthquake Monitoring and Seismic Instrumentation. The Seismograph – Principles of Seismometer. Location of the epicenter of an earthquake. Earthquake size and intensity. Energy released in an earthquake.	8
5.	Earthquake: Risk and Preparedness. Earthquake: Social Consequences; Codes and Public Policy.	7
	Total	**36**

11. **Books recommended**

S.No.	Name of Books/ Authors/ Publishers	Year of Publication
1.	Earthquake by Bolt, B.A., W.H. Freeman, New York	**1993**

2.	An Introduction to Geophysical by Exploration by Kearey P and Brooks, M. Blackwell Publishers Oxford	1991
3.	Basic Exploration Geophysics by Robinson, E.S and Coruch, C. John Wiley & Sons	1998
4.	Earthquake by Walker, B.S., Time-Life Books Inc., Alexandria, Virgina.	1982
5.	The Interior of the Earth by Bott, M.H.P., Edward Arnold. London.	1982
6.	The Solid Earth: An Introduction to Global Geophysics by Flower, C.M.R., Cambridge University Press.	1990
7.	Modern Global Seismology by Lay, T. and Wallace, T.C., Academic Press, San Diego	1995

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-601   Course Title: **DESIGN OF STRUCTURES-II**
3. Contact Hours: L: 2   T: 2   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;   Minor-II: 1;   Major: 3**
5. Relative Weightage: **Minor-I:20;   Minor-II:20;   Major:50;   Class Performance:10**
6. Credits: 4
7. Semester: 6th (Spring)
8. Pre-requisite: Nil
9. Objective: To impart basic concepts of Steel Design. Introduction of new code IS:800-2007 is
            dealt in detail.

Course Details

S. No.	Contents	Lecture Hours
1	**Design of Steel Structures:** Introduction to structural steel and their properties, rolled sections. Design philosophies.	4
2	Design of bolted connections; concentric and eccentric.	3
3	Design of welded connections; concentric and eccentric.	3
4	Design of tension members; Rolled and Built-up sections.	4
5	Design of compression members; Rolled and Built-up sec. design of column bases.	5
6	Design of flexural member, laterally supported, laterally unsupported and built-up beams.	6
7	Design of Plate Girders.	4
8	**Design of Timber structures:** Introduction, Structural timbers and their properties. Design of members in tension, compression and flexure. Bolted and nailed joints.	8

Reference:

1. Design of steel structures   By   Subramanium
2. Design of Steel Structures   By   Duggal
3. Design of Steel Structures   By   Arya and Ajmani.
4. Design of Steel Structures   By   Vizrani and Ratwani

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

01.Name of the Department: Department of Civil Engineering

02. Subject Code: CIV-601(P)   Course Title: **STRUCTURE Engineering Lab.-II**

01.   Contact Hours: L: 0   T: 0   P: 0

02.   Examination Duration (Hrs.):

03.   Relative Weightage:

04.   Credits: 1

05.   Semester: 6th (Spring)

06.   Pre-requisite: Nil

07. Objective: To I develop the understanding of behavior f in- determinate structures.

Name of the experiment:
   (1) Deflection of curved beams
   (2) Behaviour of a portal frame under different load combinations
   (3) Deflection of Truss
   (4) Behaviour a cantilever beam under symmetrical and un-symmetrical loading
   (5) Analysis of an elastically coupled beam
   (6) Analysis of a redundant joint
   (7) Analysis of two hinged arch

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

01. Name of the Department: Department of Civil Engineering
02. Subject Code: CIV-602   Course Title: **Highway Engineering and**
                                                    PMS

03. Contact Hours: L: 2   T: 1   P: 0
04. Examination Duration (Hrs.):   **Minor-I: 1;**   **Minor-II: 1;**   **Major: 3**
05. Relative Weightage: **Minor-I:20;**   **Minor-II:20;**   **Major:50;**   **CA -:10**
06. Credits: 3
07. Semester: 6th (Spring)
08.Pre-requisite: Nil
09. Objective: To impart understanding and knowledge of various aspects of Highway

Engineering and Pavement Management System.

10. Details of Course:

S. No.	Contents	Lecture Hours
1	Scope, History, classification of roads. Comparison with other modes of transportation.	4
2	Alignment design: route survey and highway Location	3
3	Geometric design: cross-section elements; sight distances, horizontal and vertical alignment.	10
4	Pavement design: factors affecting pavement design, types of pavements, Empirical methods of flexible pavement design (e.g. C.B.R, group index and Burmister's layer theory), stresses due to load and temperature in rigid pavements, introduction to design methods of rigid pavements.	7
5	Highway materials and construction: Properties and tests for road aggregates and bituminous materials, design of bituminous concrete mix, methods of preparing subgrade, base course and construction of various types of surface covers, joints in cement concrete roads.	6
6	Pavement management system: basic concept, data requirements & collection methods, maintenance and rehab treatments, priority programming, implementation of PMS.	6
Total		**36**

11. Suggested Books:

S. No.	Name of Books/Authors/Publishers	Year of Publication
1	Khanna, S.K. and Justo, C.E.G. 2002. "Highway Engineering". Nem Chand Brothers, Roorkee.	2002
2	Bhanot, K.L.1990. " Highway Engineering", S. Chand and Company (P) Ltd., New Delhi.	1990
3	Rao, G.V. 1996. "Principles of Transportation and Highway Engineering", Tata McGraw Hill, New Delhi.	1996

4	Pavement Design and Management Guide by Transportation Association of Canada, Ottawa, Ontario, Edn. Dr. Ralph Haas, University of Waterloo.	1997

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

1. Subject Code: **CIV-602(P)**   Course Title: **Highway Laboratory**

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

3. Examination Duration (Hrs):   **Theory:** $\boxed{0}$ **Practical:** $\boxed{1}$

4. Relative Weightage: **CANB** $\boxed{20}$ I $\boxed{0}$ Ma $\boxed{0}$ $\boxed{80}$

5. Credits: $\boxed{1}$ 6. Semester: **Spring**   7. Subject Status: **Core**

8. Pre-requisite: **Nil**

9. Objective: To impart understanding and knowledge of various Highway Material Properties and Testing.

10. Details of Course:

S. No.	Contents	Lecture Hours
1	Tests on aggregate, aggregate grading, specific gravity, crushing, abrasion, impact, soundness, flakiness, elongation, fineness modulus, silica content, organic content, silt content, Alkalinity, deleterious material.	12
2	Tests on bitumen and bituminous mixes: viscosity; penetration, softening point, flash & fire point, ductility, specific gravity, elastic recovery, marshall stability	10
3	Tests on subgrade: sub-grade modulous, CBR.	02
Total		**24**

11. Suggested Books/Manuals:

S. No.	Name of Books/Authors/Publishers	Year of Publication
1	Khanna, S.K. and Justo, C.E.G. 2002. "Highway Engineering". Nem Chand Brothers, Roorkee.	2002
2	Highway Materials and Pavement Testing by Khanna, Justo & Veeraragavan, Nem Chand Brothers, Roorkee	2009
3	Material Testing Laboratory Manual by Kukreja, Kishore & Chawla, Standard Publishers, Nai Sarak, Delhi	1996

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

8. Subject Code: **CIV-603** Course Title: **Engineering Geology & Materials**

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

10. Examination Duration (Hrs.): **Theory: 3** **Practical: 2**

11. Relative Weightage: **M1: 20** **M2: 20** **CI: 10** **Major: 50**

12. Credits: **4** 6. Semester: **Spring** 7. Subject Area:

8. Pre-requisite: **Nil**

9. Objective: To impart the basic understanding of how rocks behave at different scales, under various loading conditions at ground surface and in the subsurface (a few km below ground). The link between rock mechanics, geology and hydrogeology (i.e. the conditions under which the rock formed) will be clearly established. The student shall understand the various engineering properties of earth's materials.

10. Details of Course:

S. No.	Contents	Lecture Hours
	Part A: Engineering Geology	
1.	Physical Geology; geology and its relevance to civil engineering, geological work of wind, rivers, glaciers and seas.	**6**
2.	Petrology; formation of rocks, types/field classification, weathering of rocks, origin of soils.	**6**
3.	Structural Geology; folds, faults, joints, unconformities.	**4**
4.	Engineering Geology; geological considerations in tunnels, dams, bridges, building sites; landslides	**6**
5.	Earthquakes; basic definitions, types and causes, distribution in the world, seismic zones.	**6**
	Part B: Materials	
1.	Stones; their engineering properties; bricks, classification and strength requirements; tiles and their uses.	**2**
2.	Timber; properties, defects, seasoning, decay and prevention.	**2**
3.	Lime; types, properties and tests.	**2**
4.	Other materials	**2**
	Total	**36**

Recommended field work I: Field trip to geologically significant places to learn in-situ character of rocks in quarries/outcrops, road cuttings, dams, tunnels and underground excavations - measuring strike and dip of a formation - tracing of outcrops.

11. **Books recommended**

S.No.	Name of Books/ Authors/ Publishers	Year of Publication
1.	Bangar, K.M, Principles of Engineering Geology,	**1995**

		Standard Publishers Distributors, New Delhi.	
2.		Parbin Singh Engineering Geology, Katson Publishers New Delhi.	**2009**
3.		Billings, M.P., Structural Geology, Prentice-Hall India, New Delhi.	**1974**
4.		Blyth, F.G.H and de Freitas, M.H. Geology for Engineers, ELBS, London.	**1974**
5.		Gokhale, KVG.K and Rao, D.M., Experiments in Engineering Geology, Tata- McGraw Hill, New Delhi.	**1981**
6.		Kesavulu, C. Textbook of Engineering Geology, Macmillan, India Ltd. New Delhi.	**1993**
7.		Geology for Civil Engineers by McLean and Gribble, Spon Press, Taylor &Francis Group, London.	**1999**
8.		Building Materials by Parbin Singh, Katson Publishers New Delhi.	**2009**
9.		Civil Engineering Material by Gurbachan Singh, Standard Publishers New Delhi.	**2000**
10.		Building Material by Dutta.	
11.		Building Materials by Duggal S. K., New Age International (P) Ltd. Publishers, New Delhi.	**2006**

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

13. Subject Code: **CIV-603(P)**   Course Title: **Engineering Geology Laboratory**

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

15. Examination Duration (Hrs.):   **Theory: 0   Practical: 2**

16. Relative Weightage: **Internal Assessment: 40   External Assessment: 60**

17. Credits: **1**   6. Semester: **Spring**   7. Subject Area:

8. Pre-requisite: **Nil**

9. Objective: To impart the basic understanding of how rocks behave at different scales, under various loading conditions at ground surface and in the subsurface. The link between rock mechanics, geology and hydrogeology (i.e. the conditions under which the rock formed) will be clearly established. The student shall understand the various engineering properties of earth's materials.

10. Details of Course:

S. No.	Contents	Lecture Hours
	List of Experiments	
1.	The study of Physical Properties of Minerals.	**6**
2.	Determination of Specific Gravity by: d) Jolly's Spring Balance e) Walkers Steel Yard Balance f) Beam Balance	**6**
3.	Study of Rocks and their Characteristics.	**4**
4.	Study and Sketching of various types of Geological Structures.	**6**
5.	Determination of Dip and Strike with a Clinometer Compass.	**6**

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR, J&K

NAME OF THE DEPARTMENT/CENTRE   :   **Department of Civil Engineering**

2. Subject Code: CIV-604   Course Title: Hydropower Engineering

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

4. Examination Duration (Hrs.) :   **Theory**   P | 3 | | 0 |

5. Relative Weightage :   **M1** | 20 | **M2** | 20 | | 50 | | 10 |

6. Credits : | 4 |

7. Semester : **Spring**

8. Pre-requisite :   **Nil**

9. Objective: To impart the knowledge for understanding of various aspects of hydropower development. To familiarize the students with the various types of Civil Engineering structures used in hydropower development and design aspects of some of them.

10. Details of Course:

S.No.	Contents	Lecture Hours
1	Introduction: Hydropower development, power equation, assessment of potential, comparison of hydro thermal and nuclear power plants	2
2	Classification - High, Medium and Low Head schemes - Run off river plants - Storage power station - Tidal power plant -Recent experiences in wave power development - Underground power plants - Pumped storage schemes - Small and mini Hydropower systems - Power demand - Role of Hydropower in a grid.	4
3	WATER CONVEYANCE SYSTEM: Power Canals, Alignment, Design of Power canals,Flumes, Covered conduits and Tunnels.Penstocks- Alignment, types of penstocks, Economic Diameter of penstocks, Anchor blocks.	7
4	DAMS: Selection of site, Preliminary Investigations,Final Investigations, Types of Dams- Rigid Dams :- Gravity dams, Arch and buttress dams, Basic principles	10

		of design and details of construction.	
5		EMBANKMENT DAMS: Earthen dams, rockfill dams, Design considerations.	6
6		SPILLWAYS : Types, Spillway gates, Design of stilling basins.	6
7		POWER HOUSE DETAILS: Forebay, Intakes, General layout of power house and arrangement of hydropower units; underground Power stations.	3
8		TRANSMISSION SYSTEMS: General introduction	2
9		Economic and Financial feasibility of Hydro Power plants.	2
Total			42

11. Suggested Books:

S.No.	Name of Books/Authors/Publishers	Year of Publication
1.	Barrows, H.K."Water Power Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi.	1999
2	Nigam, P.S. " Handbook of Hydroelectric Engineering"Nem Chand & Brothers, India.	1985
3	Dandekar, M.M. " Water Power Engineering" , Vikas Publishing House, Gaziabad, U.P. India.	1985
4	Deshmukh, M.M. "Water Power Engineering", DanpatRai& Sons, NaiSarak, Delhi.	2002
5	Varshney, R.S. "Hydropower Structures", Nem Chand Brothers, Roorkee,.	2001
6	Arora, K.R. " Irrigation water power and Water Resources Engineering", Standard Publishers Distributors, Delhi.	2002
7	Das, M.M Saikia, M.S Irrigation and water Power Engineering. PHI Learning. Pvt. Ltd.	2009
8	Brown, G,, Hydroelectric Engineering Practice, CPS,.	1984
9	Creager and Justin, Hydro electric Hand Book, John Wiley.	1950

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

1. Subject Code: CIV - 611E1
2Course Title: Advanced Geotechnical Engineering
3. Contact Hours: L: 2   T: **1**
4. Examination Duration :   Minors: 60 minutes each   Major=3hrs
5. Relative Weight-age: Minor-I: 20   Minor-II: 20   Major: 50   C.I.+ C.A: 10

6. Credits:

7. Semester: 6th. (Spring)

 8. Pre-requisite: Nil

9. Details :-

S.No.	Topic/contents	Lecture Hours
1	**Earth Retaining Structures**: Analysis for earth pressures by other methods for sloping backfill, proportioning and stability checks.	**10**
2	Analysis and design pile foundations,ms detailed , Raft foundations; analysis and design.	12
3	**Environmental Geotechniques: Introduction , importance and scope.** Landfills-Basics and design and development.	**10**
4	Slope stability Analysis- advanced methods.	04
5	Soil Dynamics-Brief Introduction.	02

Books:
1. Earth Retaining Structures by Shamsher Prakash.
2. Design aids in geotechnical Engineering by Kani Raj.
3. Foundation Engineering by Bowels
4. Foundation Engineering by Teng.

NAME OF THE DEPARTMENT/CENTRE   :**Department of Civil Engineering**

1. Subject Code: **CIV-611 E1**   Course Title: **Watershed Management**

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

3. Examination Duration (Hrs.) :   **Theory**   P **3**   **0**

4. Relative Weightage :   **M1** **20** **M2** **20**   **50**   **10**

5. Credits :   **3**

6. Semester : **Spring**

7. Pre-requisite :   **Nil**

8. Objective: To familiarize the students with different aspects of watershed management.

9. Details of Course:

S.No.	Contents	Lecture Hours
1	Introduction: Importance of Water Shed Development for improvement in Environment.Status of Watershed Development in India, Watershed Concepts.	4
2	Land: Survey(layout), Soil and Soil Moisture Conservation, Rainwater Management, Reclamation of saline soils.	6
3	Water: Data and Analysis, Integrated Water Resources Management, Conjunctive Use.	6
4	Greenery: Agriculture, Crop Husbandry, Sustainable Agriculture,Biomass, Management, Dryland Agriculture, Irrigation, Pastures and Silvipastures, Horticulture, Social Forestry, Afforestation.	6
5	Energy: Renewable Resources, Biomass, small hydropower, Ocean Tides and Waves.	4
6	Socioeconomics: Peoples'part, State and Integrated Approach, Sustainable Society, Economics.	4
7	Appropriate Technology: Farm Equipment, Contour Methods, Check Dams, Water Catchment and	6

	Harvesting, Low Cost Technology, Rural Technological Delivery Systems.	
Total		36

10. Suggested Books:

S. No.	Name of Books/Authors/Publishers	Year of Publication
1.	Murthy, J.V.S. Watershed Management, New Age International Publishers (P) Ltd. India.	2004
2	Das, Ganshyam.Hydrology and Soil Conservation Engineering, Prentice Hall of India.	2004
3	Suresh, R. Watershed Hydrology, Standard Book House, India.	2010

National Institute of Technology Srinagar

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-612-E2   Course Title: **STRUCTURAL ANALYSIS-III**
3. Contact Hours: L: 2   T: 1   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;**   **Minor-II: 1;**   **Major: 3**
5. Relative Weightage: **Minor-I:20;**   **Minor-II:20;**   **Major:50;**   **Class Performance:10**
6. Credits: 3
7. Semester: 6th (Spring)
8. Pre-requisite: Nil
9. Objective:

Details of Course

S. No.	Contents	Lecture Hours
	CABLES AND SUSPENSION BRIDGES: Statics of a suspension cable. Analysis of cable & suspension bridges with & without stiffening girders. Analysis for static loads.	8
	INTRODUCTION TO ENERGY METHOD OF ANALYSIS: Strain energy concept; strain energy due to flexural and shear loading; Analysis of Indeterminate Beams, trusses & Frames by Energy Methods.	12
	ANALYSIS OF ARCHES BY FORCE METHOD: Two hinged and fixed arch analysis for static loads.	8
	INFLUENCE LINES DIAGRAMS FOR INDETERMINATE STRUCTURES: Principles of Influence Lines for in-determinate Structures; Beams, Arches. Muller-Bresslau Principle, Criteria for maximum moment & shear under series of moving concentrated loads in beams.	8

BOOKS RECOMMENDED
1. Indeterminate Structural Analysis   by C.K.Wang
2. Indeterminate Structural Analysis   by R.L.Jindal
3. Structural Mechanics   by Noris & Wilbur

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR, J&K

NAME OF THE DEPARTMENT/CENTRE   :   **Department of Civil Engineering**

1. Subject Code: **CIV-612 E2**   Course Title: **Applied Hydrology**

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

3. Examination Duration (Hrs.) :   **Theory**   P | 3 | | 0 |

4. Relative Weightage :   **M1** | 20 | **M2** | 20 | | 50 | | 10 |

5. Credits : | 3 |

6. Semester : **Spring**

7. Pre-requisite :   **Nil**

8. Objective: To impart the knowledge for understanding of some of the engineering and advanced applications hydrological analysis and design.

9. Details of Course:

S.No.	Contents	Lecture Hours
1	INTRODUCTION: Historical development, concepts of hydrometeorology.	3
2	PRECIPITATION: Selection of precipitation networks, Storm analysis, Storm selection, DAD Analysis, Depth-area frequency curve,Concept of probable maximum precipitation and effective rainfall.	6
3	EVAPORATION AND EVAPO-TRANSPIRATION: Measurement, factors affecting evaporation and evapo- transpiration, evaporation reduction, E.T. equations	5
4	INFILTRATION: Factors affecting measurement, infiltration capacity by hydrograph analysis, infiltration indices, empirical and analytical equations.	5
5	RUNOFF: Determination of available flow, derivation of unitgraph from complex storm hydrograph, S-curve hydrograph, IUH and its determination, elementary idea of conceptual models, Synthetic unitgraphs.	8

6	EXTREME FLOWS: Estimation of design flood, flood frequency analysis, factors affecting droughts, analysis of droughts.	8
7	REGRESSION AND CORRELATION: Elementary treatment with two variables and application to hydrologic problems.	4
Total		**39**

10. Suggested Books:

S.No.	Name of Books/Authors/Publishers	Year of Publication
1.	Chow, VenTe, Maidment, David, R.,Mays Lary W. "Applied Hydrology", McGraw Hill Publications.	1988
2	Viessmann, Warren Jr., Lewis Gary L." Introduction to Hydrology" Prentice Hall of India, New Delhi.	2009
3	Wilson, E.M. "Engineering Hydrology" ELBS, English Language book Society/ Macmillam Education Ltd., London.	1999
4	Linsely,K.,Kohler, A. and Paulhus L.H. "Hydrology for Engineers" McGraw Hill Book Company Inc. New York.	1975
5	Linsely,K.,Kohler, A. and Paulhus L.H. "Applied Hydrology" McGraw Hill Book Company Inc. New York.	1949
6	Chow VenTe," Handbook of Applied Hydrology", McGraw Hill Book Company, New York.	1964
7	Singh, V.P."Elementary Hydrology", Prentice Hall of India, Pvt. Ltd., New Delhi.	1994

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

1. Subject Code :-**CIV- 701**   Course Title :- **Water Supply and Sanitary Engineering**

2. Contact Hours :- **L: 2   T: 1**

3 Examination Duration (Hrs):-   **3 Hrs**

4. Relative Weightage :   Minor-1 = **20**,   Minor-2 =**20**,   CP = **10**,   Major=**50**

5. Credits = **3**   6. Semester = **Autumn** 7. Subject Area :-

8. Pre-Requisite:- **Nil**

9.Objectives :- To impart training to the student of various aspects related to water quality, Quantity, Storage and Distribution in addition to sanitation of buildings.

10. Details of course :-

S No	Contents	Lecture Hours
1	Introduction and scope, Various sources of water, Water Quality Parameters, significance and codal recommendations of limits for various uses	6
2.	Water demand for various purposes, Population forecast , storage capacities of reservoirs, Variation in demand	6
3.	Water treatment :- Conventional treatments like screening, sedimentation, Coagulation, Filteration, Disinfection. Advanced treatments like Micro Filteration, Reverse osmosis, Activated carbon, etc	10
4.	Systems of distribution, Location of reservoirs , distribution patterns,	2
5.	Pipe designs, network analysis by various methods, pipe materials and joints, leakage prevention, types of pumps , Pump Design	6
6	Water supply in buildings, Plumbing and fixtures	3
7.	Sanitation of buildings.	3
	Total	36

11. Suggested books :-

S.No	Name of books/Authors/Publishers	Year
1.	"Water Works Engineering", /S.R Q , Motley E.M, Guang Zha/Prentice Hall	2009
2	"Env. Engg .Vol-1/ Modi P.N./ Standard Book House	2008
3	"Water and Waste Water Tech."/ Hammer M.J, / Prentice Hall	2001
4	"Water Supply and Sewerage," /McGhee T.J / McGraw Hill, Inc	1991

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OF DEPARTMENT: **Department of Civil Engineering**
1. Subject Code: CIV- 701**(P)**   Course Title: **Water Quality Laboratory**
2. Contact Hours**:   L: 0   T: 0   P: 2**
3. Relative Weightage: **Internal:- 40   External:- 60**
4. Credits: **1**
5.   Semester: 7th (**Autumn)**
6. Pre-requisite: **Nil**
7. Details of Course:

S.No	List of Experiments	Lecture Hours
1.	To determine the total solids, suspended solids and dissolved solids for a given sample of water	2
2.	To determine the alkalinity of a given sample of water	2
3.	To determine the total hardness and carbonate hardness for a given sample of water.	2
4.	To determine the turbidity of water.	2
5	To find the colour and odour of a given sample of water	2
6.	To determine the percentage of Sodium and potassium in a given sample of Water	2
7.	To determine the percentage of sulphates, chlorides, iodide, Floride.	2
8.	To determine the concentration of dissolved oxygen in a given sample of water and to find out the oxygen consumed.	2
9.	To determine the percentage of Ammonia and Nitrogen present in a given sample of water.	2
10.	To determine the percentage of Magnesium, Calcium, Iron, Silica and Aluminium in a given sample of water.	2
	Total	20

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OF THE DEPTT. /CENTRE: **Department of Civil Engineering**
1. Subject Code: CIV -702   Course Title: Structural Dynamics
2. Contact Hours: L: 2   T: 1   P: 0
3. Examination Duration (Hrs.): Theory: 3   Practical's: 0
4. Relative Weightage: Minor-I: 15   Minor-II: 15   Major: 40
C.I+ C.A: 155. Credits: 4
6. Semester: 7th (Autumn)
7. Pre-requisite:Nil
8. Objective: To impart understanding of various aspects of structural Dynamics / Plastic Analysis & Design of steel structures to deign safe Earthquake Resistant structures/safe steel structures.
9. Details of course:

S. No.	Contents	Lecture Hours
01.	Nature of dynamic loading: Harmonic, earthquake and blast loading, Single degree of freedom systems, free vibrations and forced vibrations: Harmonic force, Periodic force, Impulse, and General type of loading.	
02.	Multi-degree of freedom systems, numerical techniques for finding natural frequencies and mode shapes, orthogonality relationships of principal modes, Rayleighs Principal and its application for determination of fundamental frequency. Evaluation of dynamic response by mode superposition method.	
03	Discussion on Indian standards, codal provisions for earthquake resistant design. Design of buildings (Plane frames only) based on Codal provisions	
	Nature of dynamic loading: Harmonic, earthquake and blast loading, Single degree of freedom systems, free vibrations and forced vibrations: Harmonic force, Periodic force, Impulse, and General type of loading.	

Refrences:
    Dynamics of Structures By   Anil K. Chopra   Dynamics of Structures   By   Clough and Penzien   Structural Dynamics   By   Mario Paz

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OF DEPARTMENT: **Department of Civil Engineering**

01. Subject Code: CIV- 703 Course Title: **CONSTRUCTION TECHNOLOGY & MANAGEMENT**
02. Contact Hours**:   L: 2   T: 1**
03. Examination Duration: Minors 60 minutes each Major = 3 hrs
04. Relative Weightage: Minor-1: 20 Minor-II : 20   Major: 50   C.I. +C.A: 10
05. Credits: **1**
06. Semester: 7th (**Spring)**
07. Pre-requisite: **Nil**
08. Details of Course:

S. No.	Topic/ contents	**Lecture Hours**
01.	Construction Management, its necessity; objectives & Functions	03
02.	Construction methods and plant important equipments only	06
03.	Project scheduling: Various techniques namely Bar chart; CPM and PERT.	07
04.	Engineering economics of projects; Depreciation; Sinking Fund; compound interest factors, Selection of most economical alternative by variable cost method/Cost benefit ratio. Owning and Operating cost.	10
05.	Organization of Leadership: Function of protect organization. Principles and advantages of good organization. Leadership and motivation	04
06.	Works accounting. Cashbook, Imprest cash, contractors bills, store accounts. Materials at site account. Indent, invoice, Debit & Credit note, suspense head stock, Engineering Statements, Form of agreement.	06

Books Recommended:
1.Cosntruction Management by Mahesh Verma
2. Construction of Plant and Equipment by Peurifay

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

Name of the Department: Department of Civil Engineering
Subject Code: CIV-704   Course Title: **DESIGN OF STRUCTURES-III**
Examination Duration (Hrs.):   **Minor-I: 1;**   **Minor-II: 1;**   **Major: 3**
Relative Weightage: **Minor-I:20;Minor-II:20;**   **Major:50;**   **Class Performance:10**
Details of Course

S. No.	Contents	Lecture Hours
1	**Design of Foundations:** Various types of RCC footings, Design of Isolated footings and various types of combined footings. Introduction to Raft foundations and design procedure. Design of masonry foundations	11
2	**Design of Retaining walls:** Stability analysis of retaining walls, design of cantilever and counter-fort type RCC retaining walls. Design of masonry retaining walls.	8
3	**Design of Water retaining Structures:** Design underground, circular and rectangular water tanks with reference to IS:3370.	6
4	**Design of Pre-stressed Concrete:** General principles, methods of pre-stressing, pre-tensioning and post-tensioning, losses in pre-stress. Design of rectangular, T and I section beams.	7
5	**Design of Shell structures:** Membrane analysis of spherical and conical domes by statical methods. Design of domes and ring beams.	4

Reference:
1. Design of Footings   By   Kurien
2. Design of Reinforced and Pre-stressed Concrete Structures
                                By   Kong and Evans
3. Design of R.C.C. Structures   By   Jain and Jai Krishan.
4. Pre-stressed Concrete Structures   By   Krishna Raju.
5. Design of masonry, timber Structures   By   Arya.

1. Subject Code: **CIV-711:E1**   Course Title: **Railway and Airport Engineering**

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

3. Examination Duration (Hrs): **Theory:** | 2 | **Practical:** | 0 |

4. Relative Weightage: **CAA** | 10 | **Minor I** | 20 | **Minor II** | 20 | or | 50 |

5. Credits: | 3 | 6. Semester: **Spring**   7. Subject Status: **Elective**

8. Pre-requisite: **Nil**

9. Objective: To impart understanding and knowledge of various aspects of Railway and Airport

Engineering.

10. Details of Course:

S. No.	Contents	Lecture Hours
1	Importance of transportation systems, history of railways and it's development, development of Indian railways.	3
2	Permanent way and it's component parts, formation, ballast, sleepers, rails. creep and tilt in rails.	6
3	Track resistance and tractive effort, gauge problem, super- elevation near branching of curves, gradients.	5
4	Track fittings and fastenings, points and crossings, station Platforms, yards and sidings.	6
5	Classification of airports; planning, surveys and site selection of airports.	4
6	Airport geometrics: runway length and patterns & orientation, wind rose diagram, width and grades of runway, taxiways and aprons.	6
7	Airport pavement design: difference between highway and airport pavements, introduction to various design methods, airport drainage.	6
Total		**36**

11. Suggested Books:

S. No.	Name of Books/Authors/Publishers	Year of Publication
1	Rangawala, S.C. 2002. "Railway Engineering", Charotar Publishers, Anand	2002
2	Arora, S.P. and Saxena. 2001. " Railway Engineering" , Dhanpat Rai Publishers, New Delhi.	2001
3	Khanna, Arora and Jain. 2002. "Airport Planning and Design", Nem Chand and Brothers, Roorkee.	2002
4	Horren Jeff. "Airport Planning and Design"	1996

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR, J&K

NAME OF THE DEPARTMENT/CENTRE : **Department of Civil Engineering**

1. Subject Code: **CIV-711 E1** Course Title: **Fluvial Hydraulics**

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

3. Examination Duration (Hrs.) : **Theory** P **3** **0**

4. Relative Weightage : **M1** **20** **M2** **20** **50** **10**

5. Credits : **3**

6. Semester : **Spring**

7. Pre-requisite : **Nil**

8. Objective: To impart understanding of various aspects related to Floods and Droughts and measures to combat them.

9. Details of Course:

S.No.	Contents	Lecture Hours
1	**Introduction:** Sediment and fluvial hydraulics, nature of sediment problems.	
2	**Properties of sediment:** Particle size, shape, density, fall velocity. Bulk properties viz particle size distribution, specific weight, and porosity.	
3	Threshold of particle Transport: Introduction , Incipient motion criteria: compotent velocigy, lift concept, critical tractive force (Shields and White'	
4	**Bed Forms:** Terminology, Theoretical analysis of bed forms, empirical and graphical analysis, factors affecting bed forms.	
5	Channel roughness and resistance to flow: Resistance to flow with rigid boundary: Velocity distribution approach, Darey-Weibach formula, Chezys formula, Manning's formula, sediment siza and Manning's coefficient**.**	

	Resistance to flow with movable boundary: Grain roughness and form roughness, surface drag and form drag, different approaches viz. Einstein;s, Einstein-Barbarosa, Engelund and Hansen etc.	
	Bed Load tRansport: Introduction, Shear stress approaches viz, Duboys; Sheilds, Kalinskes, etc. Energy Slope approaches viz Meyer-peter, meyer-Peter and Mueller, Discharge approach, velocity and Bed form approaches, Probabilistic approach viz ?Einstein's approach.	
	Suspended Load Transport: Introduction, general considerations, Exchange theory under equilibrium conditions-The Rouse equation, effect of suspended sediment on Z,K and velocity distribution, Suspended load formulas viz Lane and Kalinske, Eubsteub etc,	
	Total Load Transpsort: Introduction; General approaches; Total Load Transport functions based on –Einsteins bed load function, power concept, etc.	
	Stable Channel Design: The empirical stable channel design, Tractive force method of stable channel design: Drag distribution and resistance to motion, design values for boundary shear, the stable cross section, Design by tractive force method.	

10. References:

1. Graf, W.H. Hy7draulcis of Sediment Transport, McGraw Hill international
2. Garde, R.J. and Rangaraju, K.G. Mechanics of sediment transportation and alluvial stream problems
3. Yang, Chih Ted (1966) Sedient Transport Theory and Pra;c;tice, McGraw Hill Companies Inc. New York.
4. Raudkivi, A.J. Loose Boundary Hydraulics, Pergamon Press.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR, J&K

NAME OF THE DEPARTMENT/CENTRE   :   **Department of Civil Engineering**

01. Subject Code: **CIV-801** Course Title: **Irrigation and Hydraulic Structures**

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

03. Examination Duration (Hrs.) :   **Theory**   P | 3 | | 0 |

04. Relative Weightage :   **M1** | 20 | **M2** | 20 | | 50 | | 10 |

05. Credits: | 4 |

06. Semester : **Spring**

07. Pre-requisite :   **Nil**

08. Objective: To impart the knowledge for understanding of various aspects of application of irrigation water to agricultural fields and design aspects of some irrigation structures.

09. Details of Course:

S. No.	Contents	Lecture Hours
1	INTRODUCTION: Present status of irrigation in India, Advantages of irrigation, brief description of Gravity,Lift and sprinkler irrigation.	4
2	SOIL -WATER-PLANT RELATIONSHIP CROP.WATER REQUIREMENTS: Soil moisture and crop water relationships, Duty, Delta,Consumptive use,Irrigation requirements,Principal Indian crops,Multiple cropping,etc.	4
3	CANAL IRRIGATION: Types of canals,parts of canal irrigation system,channel alignment,assessment of water requirements,estimation of channel losses,Design of Channels,Regime and semitheoritical approaches;Canal lining, factors affecting choice of various types of canal linings.	8
4	DIVERSION HEADWORKS: Selection of site and layout,Parts of diversion head-works,types of Weirs and Barrages,Design of weirs on permeable foundations,Control of silt entry into canal,Silt excluders and different types of silt ejectors.	10
5	CROSS DRAINAGE WORKS:	10

		Necessity of cross drainage works,their types and selection;Design of various types of cross drainage works-Aqueduct, syphon aqueduct,Super passage, Syphon, Level crossing.	
6		WATER LOGGING : causes,preventive and curative measures, Drainage of irrigated lands saline and alkaline lands.	4
	Total		**40**

10. Suggested Books:

S. No.	Name of Books/Authors/Publishers	Year of Publication
1.	Singh Bharat." Fundamentals of Irrigation Engineering", Nem Chand & Brothers, Roorkee.	1975
2	Varshney, Gupta and Gupta," Irrigation Engineering And Hydraulic Structures".Nem Chand & Brothers, Roorkee.	1982
3	Arora, K.R. " Irrigation water power and Water Resources Engineering", Standard Publishers Distributors, Delhi.	2002
4	Asawa, G.L."Elementary Irrigation Engineering" New Age International (P) Ltd. Publishers, New Delhi.	1999

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-802   Course Title: **BRIDGE ENGINEERING**
3. Contact Hours: L: 2   T: 1   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;**   **Minor-II: 1;**   **Major: 3**
5. Relative Weightage: **Minor-I:20;**   **Minor-II:20;**   **Major:50;**   **Class Performance:10**
6. Credits: 3
7. Semester: 8th (Spring)
8. Pre-requisite: Nil
9. Objective: The objective is to impart design concepts of bridges which can be utilized in real practice for design of various types of bridges.

Details of Course

S. No.	Contents	Lecture Hours
1	Introduction to Bridges: types of Bridges, standard loads on Bridges. Scour depth, Afflux.	3
2	Influence Line diagrams for Bridge Trusses. Criteria for maximum forces under series of moving loads (Standard I.R.C Loading).	8
3	Design of Foot bridges and Culverts.	3
4	Design of Trussed Bridges subjected to Standard IRC loading (Class-B, Class-A, Class-AA and Class-70R).	6
5	Design of steel bridges: Plate Girder Bridge and Composite Bridges (Steel Plate Girder and R.C.C Slab Type) subjected to Standard IRC loading (Class-B, Class-A, Class-AA and Class-70R).	8
6	Design of Bridge Slabs subjected to IRC loading.	8

Reference:
1. Victor, D.J. "Essentials of Bridge Engineering", Oxford and IBH Publishers, New Delhi.
2. Ponnuswamy, S." Bridge Engineering", Tata McGraw Hill, New
3. Design of Steel Structures   By   Vizrani and Ratwani
4. Design of Bridges   By   Krishna Raju
5. Design of Bridges   By   Rakshit.

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

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

1. Subject Code: **CIV-811:E1**   Course Title: **Rock Mechanics and Tunnelling Technology**
2. Contact Hours: **L: 2**   **T: 1**   **P: 0**
3. Examination Duration (Hrs.):   **Theory:**   **3**   **Practical:**   **Nil**
4. Relative Weightage: **M1: 20**   **M2: 20**   **CI: 10** **Major:**   **50**
5. Credits: **3**   6. Semester: **Spring**   7. Subject Area:
8. Pre-requisite: **Must have studied Engineering Geology & Materials and Geotechnical Engineering – I.**
9. Objective: To impart the basic understanding of the mechanical behavior of the rock and to understand the mechanics concerned with the response of the rock to the force field of its physical environments. At the conclusion of this module, it is expected that students will be able to perform simple rock mechanics and rock engineering analysis, understand the fundamentals of rock engineering design, and confidently apply the material to which they have been exposed.
10. Details of Course:

S. No.	Part A Rock Mechanics	Lecture Hours
	Part A Rock Mechanics	
1.	Introduction to rock mechanics and rock engineering. Terminology, Rock Classification Systems.	**6**
2.	Physical and Mechanical Properties of Rocks. Laboratory Testing.	**3**
3.	Rock masses: strength, deformability, failure criteria.	**3**
4.	Foundations and slope stability: foundations on discontinuous rock, slope instability basic mechanisms.	**3**
5.	Rock reinforcement and rock support: underlying principles, similarities and differences. Rock Bolting.	**3**
	Part B Tunnelling Technology	
1.	Introduction to tunnelling: Fundamental definitions, tunnelling art and engineering, historical development, Classification of tunnels.	**5**
2.	Geological aspects of tunnelling: Geological investigation, evaluation and appreciation, importance of geological knowledge, aim of geological investigation, principal elements of exploration programme, Influence of geological conditions on design and construction of tunnels.	**8**
3.	Methods of Tunnelling in soft and hard rock. Lining of tunnels. Tunnel supports.	**5**
	Total	**36**

Recommended field work II: Field trip to geologically significant places to learn in-situ character of rocks in outcrops, road cuttings, dams, tunnels and underground excavations.

1. **Books recommended**

S.No.	Name of Books/ Authors/ Publishers	Year of Publication
1.	Brown, E.T.; Analytical and Computational Methods in Engineering Rock Mechanics, CBS Publishers and Distributors, New Delhi.	**1989**
2.	Goodman, P.E.; Introduction to Rock Mechanics, John Wiley & Sons.	**1989**
3.	Design and Construction of Tunnels: Analysis of Controlled Deformations in Rock and Soils (ADECO-RS) by Pietro Lunardi	**2008**
4.	Tunnelling and Tunnel Mechanics: A Rational Approach to Tunnelling by D. Kolymbas.	**2010**
5.	Introduction to Tunnel Construction (Applied Geotechnics) by David Chapman, Nicole Metje and Alfred Stärk.	**2010**
6.	Tunneling to the Center of the Earth: Stories (P.S.) by Kevin Wilson.	**2009**
7.	Quantum Theory of Tunneling by Mohsen Razavy.	**2003**

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OD DEPTT/CENTRE: **Department of Civil Engineering**

1. Subject Code: CIV-812:E2   Course Title: **Ground Improvement Techniques**
2. Contact Hours: L = 2 T = 1   P = 0
3. Examination Duration (Hrs): Minor = 1   Major = 3
4. Evaluation Weightage (Marks): C.P. =10   Minor-I=20   Minor-II=20   Major =50
5. Credits: 3   6. Semester: Spring   7. Subject Area: Civil Engg
8. Pre-requisite: Geotechnical Engineering

9. Objective: To impart understanding of various aspects related to Ground Improvement Techniques in the field of Civil Engg.

10. Details of Course

Unit No.	Course Contents	Lecture Hours
Unit -1	**PART-I: INTRODUCTION** • Soil Types, Soil Investigation & Classification • Ground Modification/Stabilization • Need for Engineered Ground Improvement • Classification of Ground Improvement Techniques • Suitability, Feasibility and Desirability of Ground Improvement Techniques • Current & Future Developments	5
	. PART –II : Ground Improvement Techniques • **Mechanical Modification:** Introduction to Mechanical Modification, Principles of Soil Densification, Properties of Compacted Soil, Compaction Control, Specification of Compaction Requirements, Types of Compaction Equipment	6
Unit - 2	• **Hydraulic Modification:** Objectives & Techniques, Dewatering Systems, Soil-Water Relationships, Single & Multiple-Well Formulas, Drainage of Slopes, Filtration & Seepage Control, Pre-loading & Vertical Drains, Electrokinetic Dewatering & Stabilization. • **Chemical Modification/Stabilization:** Effect of various admixtures on Engineering Properties of	5

	Soils such as: Cement, Lime, Fly ash, Bitumen, Cement-Lime-Fly ash. Other chemical additives such as- $NaCL$, $CaCL_2$, $CaSO_4$, $Ca(OH)_2$, $NaOH$ etc., Grouting- Applications to Embankments, Foundations & Sensitive Soils, Admixtures in Pavement Design.		8
Unit - 3	• **Thermal Modification:** Thermal Properties of Soils, Heat Treatment of Soils, Ground Freezing, Strength & Behaviour of Frozen Ground.		4
	• **Modification By Inclusions & Confinement:** Evolution of Soil Reinforcement, Applications of Geosynthetics Material in Civil Engineering, Soil Nailing, Soil Anchors, Soil Confinement by Formwork.		4
	• **Modification by Exclusion Techniques:** Sheet Piles, Contiguous Bored Piles, Slurry Trenches, Diaphragm Walls, Compressed Air.		4
		Total	**36**

Recommended Books:

- Methods of Treatment of Unstable Ground : Belt – Butterworths, 1975
- Engineering Principles of Ground Modification: Manfired, R. H.
- Engineering Treatment of Soils   : Bell, F. G
- Geosynthetics for Soil Improvement   : ASCE, GST No. 18,
                                                                      New York
- Grouting Theory & Practice   : Nonveiller, E
- Soil Stabilization   : Ingles, O. G. &
                                                                      Metcalf, J. B.

NATIONAL INSTITUTE OF TECHNOLOGY, SRINAGAR, J&K

1. Subject Code: **CIV-811:E1**   Course Title: **Transportation Planning and Economics**

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

3. Examination Duration (Hrs): **Theory:** | 2 | **Practical:** | 0 |

4. Relative Weitage: **CAA** | 10 | **Minor I** | 20 | II | 20 | | 50 |

5. Credits: | 3 | 6. Semester: **Spring**   7. Subject Status: **Elective**

8. Pre-requisite: **Nil**

9. Objective: To impart understanding and knowledge of various aspects of Transportation Planning and Economics.

10. Details of Course:

S. No.	Contents	Lecture Hours
1	Introduction and scope of transportation planning and transportation economics, transportation planning issues.	3
2	Public Transportation: public transport modes, desirable characteristics of public transport systems, transit system operations, route development, stopping policy, stop location, scheduling, capacity of transit systems, socially optimal pricing	8
3	Transport analysis and forecasting: transport planning process, transportation and land use, transport planning strategies, transport planning models, travel demand analysis, operational transportation and land use models.	14
4	Transport economics and finance: pavement economics-construction cost; maintenance cost and vehicle operation cost, economic evaluation of highway projects- basic principles; time value of money; costs and benefits; net present value (NPV) method; benefit-cost (B/C) ratio method; internal rate of return (IRR) method; comparison of evaluation techniques, freight transport-trends and economic growth.	11
Total		**36**

11. Suggested Books:

S. No.	Name of Books/Authors/Publishers	Year of Publication
1	Transport Planning and Traffic Engineering by CA O'Flaherty, John Wiley & Sons, Inc., New York; Toronto.	2002
2	Transportation Engineering and Planning by Papacostas & Prevedouros, Prentice-Hall of India Private Ltd, New Delhi-110001	2002

3	Principles of Transportation Engineering by Chakarborty & Das, Prentice-Hall of India Private Ltd, New Delhi-110001	2003
4.	Urban Transportation Planning by Meyer & Miller, McGraw Hill, New Delhi	2001

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OF DEPARTMENT: Department of Civil Engineering

Subject Code: CIV- 812 E2   Course Title: Environmental Engineering
1. Contact Hours**: L: 2   T: 1   P: 0**
2. Examination Duration (Hrs): **Minor 1:- 1   Minor 2:- 1   Major: - 3**
3. Relative Weightage: **Minor 1**:- 20 **Minor2:- 20   Assignments:- 10   Major: -50**
4. Credits: **3**   6. Semester: (**Spring) 7**Pre-requisite: **Nil**
8.Objective: To impart understanding of various aspects related to clean environment, proper treatment and disposal of liquid, solid and gaseous waste produced by communities.
9.Details of Course:

S.No	Contents	Lecture Hours
1.	Importance of clean Environment, co existence, habitat and eco systems. Sources of pollution to Land, Water and Air. General effects of pollution.	*3*
2.	Pollution by sewage. Nature and types of sewages (domestic, Industrial etc)	3
3.	Methods of sewage disposal, effects of disposal on land and in water bodies, Self purification of streams, BOD calculations, Design of sewers, Types of sewers	8
4.	Unit operations in Sewage treatment, screening , grit removal, sedimentation, filtration, Activated sludge process . Septic and Imhoff tanks, soakages for isolated systems.	9
5	Solid waste management, Constituents of solid waste, Sanitary land filling, Composting, Incineration	4
6.	Air pollution, Air quality standards, measurement of air pollution, factors responsible for pollution, engineering measures to check air pollution.	5
	Total	32

7. Suggested books

S.No	Name of Books/ Authors/ Publishers	Year of Publication
1.	Modi P. N.," Waste water Treatment"	2005
2.	McGhee, T.J., "Water Supply and Sewerage", McGraw Hill	1991
3.	Hammer, M.J. and Hammer M.J., " Water and Waste Water Technology" Prentice Hall of India	2000
4.	Nathanson J.A. " Basic Environmental Technology" 5th Ed.	2009
5.	Viessman W. and Hammer M.J. " Water Supply and Pollution Control" 6th Ed. Addison Wesley Longman	1999

NATIONAL INSTITUTE OF TECHNOLOGY SRINAGAR

NAME OD DEPTT/CENTRE:　　　**Department of Civil Engineering**

1. Subject Code: CIV-812:E2　　　　　Course Title: **Ground Improvement Techniques**
2. Contact Hours: L = 2 T = 1　　　　P = 0
3. Examination Duration (Hrs): Minor = 1　　　Major = 3
4. Evaluation Weightage (Marks): C.P. =10　　　Minor-I=20 Minor-II=20　　　Major =50
5. Credits: 3　　　　6. Semester: Spring　　　　　7. Subject Area: Civil Engg
8. Pre-requisite: Geotechnical Engineering

9. Objective: To impart understanding of various aspects related to Ground Improvement Techniques in the field of Civil Engg.

10. Details of Course

Unit No.	Course Contents	Lecture Hours
Unit -1	PART-I: INTRODUCTION • Soil Types, Soil Investigation & Classification • Ground Modification/Stabilization • Need for Engineered Ground Improvement • Classification of Ground Improvement Techniques • Suitability, Feasibility and Desirability of Ground Improvement Techniques • Current & Future Developments	5
	. PART –II　　: Ground Improvement Techniques • Mechanical Modification: Introduction to Mechanical Modification, Principles of Soil Densification, Properties of Compacted Soil, Compaction Control, Specification of Compaction Requirements, Types of Compaction Equipment	6
Unit - 2	• Hydraulic Modification: Objectives & Techniques, Dewatering Systems, Soil-Water Relationships, Single & Multiple-Well Formulas, Drainage of Slopes, Filtration & Seepage Control, Pre-loading & Vertical Drains, Electrokinetic Dewatering & Stabilization. • Chemical Modification/Stabilization: Effect of various admixtures on Engineering Properties of Soils such as: Cement, Lime, Fly ash, Bitumen,	5

	Cement-Lime-Fly ash. Other chemical additives such as- NaCL, CaCL$_2$, CaSO$_4$, Ca (OH)$_2$, NaOH etc., Grouting- Applications to Embankments, Foundations & Sensitive Soils, Admixtures in Pavement Design.		8
Unit - 3	• Thermal Modification: Thermal Properties of Soils, Heat Treatment of Soils, Ground Freezing, Strength & Behaviour of Frozen Ground.		4
	• Modification By Inclusions & Confinement: Evolution of Soil Reinforcement, Applications of Geosynthetics Material in Civil Engineering, Soil Nailing, Soil Anchors, Soil Confinement by Formwork.		4
	• Modification by Exclusion Techniques: Sheet Piles, Contiguous Bored Piles, Slurry Trenches, Diaphragm Walls, Compressed Air.		4
	Total		36

Recommended Books:

- Methods of Treatment of Unstable Ground : Belt – Butterworths, 1975
- Engineering Principles of Ground Modification: Manfired, R. H.
- Engineering Treatment of Soils : Bell, F. G
- Geosynthetics for Soil Improvement : ASCE, GST No. 18, New York
- Grouting Theory & Practice : Nonveiller, E
- Soil Stabilization : Ingles, O. G. & Metcalf, J. B.

1. Name of the Department: Department of Civil Engineering
2. Subject Code: CIV-812; E2   Course Title: **EARTHQUAKE RESISTANT DESIGN (E-II)**
3. Contact Hours: L: 2   T: 1   P: 0
4. Examination Duration (Hrs.):   **Minor-I: 1;   Minor-II: 1;   Major: 3**
5. Relative Weightage: **Minor-I: 20;   Minor-II: 20;   Major: 50;   Class Perf.: 10**
6. Credits: 3
7. Semester: 8th (Spring)
8. Pre-requisite: Nil
9. Objective: The objective is to impart concepts of earthquake resistant design of buildings.

Details of Course

S. No.	Contents	Lecture Hours
1	Introduction to Earthquakes, Acceleration time history, Response Spectrum, Design Spectra.	6
2	Response of buildings subjected to ground motion based on modal analysis.	6
3	Seismic design of R.C.C Structures (upto 2-Storey Buildings) based on Codal provisions IS:1893.	10
4	Seismic design of brick masonry structures based on Codal provisions.	6
5	Detailing of R.C.C. Elements as per IS:13920.	4
6	Repair and seismic strengthening of buildings IS:13935.	4

Books:
1. Dynamics of Structures   By   Anil K. Chopra
2. Dynamics of Structures   By   Clough and Penzien
3. Seismic Design of Bridges   By
4. Seismic design of R.C.C & Masonry Structures   Pauley, T. and Priestley
5. Seismic design of Structures By   Pankaj Aggarwal, Shrikhande