

**Academic Scheme  
for  
B.Tech. Civil Engineering  
Four Years Programme**

# **Syllabus**

As per

**(Choice Based Credit System)**

**(I – VIII Semesters- for Batch 2016& onwards)**



**Department of Civil Engineering IUST,  
Awantipora, Pulwama -192122**

## OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-2016 & ONWARDS

### Semester-I

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit (L+P)</b>	<b>Subject Type</b>
PHY-111T	Physics-I	4– 0	4	C
CHM-111T	Chemistry-I	4 – 0	4	C
MTH-111T	Mathematics-I	4 – 0	4	C
ELE-101T	Basic Electrical Engineering	3 – 0	3	CF
BIO-101T	Environmental Science	4 – 0	4	CF
CIV-101T/P	Engineering Drawing	2 – 3	4	CF
MEC-101P	Engineering Workshop	0- 3	2	CF
PHY-112P	Physics-I Lab	0 – 2	1	C
CHM-112P	Chemistry –I Lab	0 – 2	1	C
	<b>Total Credits</b>	<b>21-10</b>	<b>27</b>	

### Semester-II

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit (L+P)</b>	<b>Subject Type</b>
PHY-211T	Physics-II	4 – 0	4	C
CHM-211T	Chemistry II	4 – 0	4	C
MTH-211T	Mathematics-II	4 – 0	4	C
CSE-201T	C Programming	4 – 0	4	CF
CIV-201T	Elements of Civil Engineering	3 - 0	3	CF
ECE-201T	Basic Electronics and communication Engineering	3– 0	3	CF
PHY-212P	Physics-II Lab	0 – 2	1	C
CHM-212P	Chemistry II Lab	0 – 2	1	C
CSE-202P	C Programming Lab	0– 2	1	CF
	<b>Total Credits</b>	<b>22-6</b>	<b>25</b>	

## OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-2016 & ONWARDS

### Semester-III

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit (L+P)</b>	<b>Subject Type</b>
CIV-311T	Structural Analysis I	4 – 0	4	C
CIV-312T	Surveying I	4 – 0	4	C
CIV-313T	Fluid Mechanics I	4 – 0	4	C
CIV-314T	Building materials & construction techniques	4 – 0	4	C
MTH-312T	Probability & Statistics	3 – 0	3	C
CIV-315P	SOM Lab	0– 2	1	C
CIV-316P	Surveying Lab-I	0 – 2	1	C
CIV-317P	Fluid Mechanics Lab I	0 – 2	1	C
XXX-xxxTP	Elective I (Generic*)	x – x'	X	GE
	<b>Total Credits</b>	<b>19+x – 6+x'</b>	<b>22+X</b>	

\*From other departments of university not from parent department, minimum credits=2 maximum credits =4

### Semester -IV

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit</b>	<b>Subject Type</b>
CIV-411T	Structural Analysis-II	4 – 0	4	C
CIV-412T	Surveying-II	4 – 0	4	C
CIV-413T	Fluid Mechanics-II	4 – 0	4	C
CIV-414T	Concrete Technology	3 – 0	3	C
CIV-415TP	Building Drawing & AutoCAD	2 – 2	3	C
CIV-419T	Engineering Geology & Seismology	3 – 0	3	C
CIV-416P	Fluid Mechanics Lab II	0– 2	1	C
CIV-417P	Structural Lab	0 – 2	1	C
CIV-418P	Surveying Lab II	0 – 2	1	C
CIV-418(SC)P	Surveying Camp	0 - 3	2	C
	<b>Total Credits</b>	<b>20 - 11</b>	<b>26</b>	

**OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-2016 & ONWARDS**

**Semester-V**

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit</b>	<b>Subject Type</b>
CIV-511T	Design Of Concrete Structures I	4 – 0	4	C
CIV-512T	Geotechnical Engineering-I	4 – 0	4	C
CIV-513T	Water supply Engineering	4 – 0	4	C
CIV-514T	Quantity Survey & Cost Estimation	4– 0	4	C
CIV-515T	Advanced Structural Analysis	4 – 0	4	C
XXX-xxxT	Elective II (Open)	x – x'	X	OE
CIV-516P	Geotechnical Lab I	0– 2	1	C
CIV-517P	Water Quality Lab	0 – 2	1	C
CIV-518P	Concrete Technology Lab	0 - 2	1	C
	<b>Total Credits</b>	<b>20 +x -6+x'</b>	<b>23 +X</b>	

**Semester-VI**

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit</b>	<b>Subject Type</b>
CIV-611T	Design Of Steel Structures	4 – 0	4	C
CIV-612T	Geotechnical Engineering-II	4 – 0	4	C
CIV-613T	Transportation Engineering-I(Highway & Pavement Management System)	4 – 0	4	C
CIV-614T	Water Resources Engineering	4 – 0	4	C
CIV-618T	Computer Applications in Civil Engineering	2 – 2'	3	C
YYY-yyyT	Elective IV (Open)	y – y'	Y	OE
CIV-615P	Geotechnical Lab II	0– 2	1	C
CIV-616P	Transportation Lab	0– 2	1	C
CIV-617P	Geophysical Lab	0 – 2	1	C
	<b>Total Credits</b>	<b>18 +(y) - 8+(y')</b>	<b>22 +(Y)</b>	

## OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-2016 & ONWARDS

### Semester-VII

<b>Course Code</b>	<b>Course Title</b>	<b>L - P</b>	<b>Credit</b>	<b>Subject Type</b>
CIV-711T	Design Of Concrete Structure-II	4 - 0	4	C
CIV-712T	Irrigation & Flood Structures	4 - 0	4	C
CIV-713T	Structural Dynamics	4 - 0	4	C
CIV-714T	Environmental Engineering	3- 0	3	C
CIV-719T	Traffic Engineering & Transportation Facilities	3 - 0	3	C
YYY-yyyT	Elective VI (Open)	y - y'	Y	OE
CIV-715P	Pre Project Work	0 - 4	2	C
CIV-716P	Seminar	0 - 4	2	C
CIV-717P	Tour & Training	0-4	2	C
CIV-718P	Dynamics & earthquake Lab	0 - 2	1	C
	<b>Total Credits</b>	<b>18+(y) -14+(y')</b>	<b>25+(Y)</b>	

### SEMESTER-VIII

<b>Course Code</b>	<b>Course Title</b>	<b>L - P</b>	<b>Credit</b>	<b>Subject Type</b>
CIV-811T	Design of Bridge Structures	4 - 0	4	C
CIV-812T	Earthquake Resistant Design	4 - 0	4	C
CIV-813TP	Project	5 - 10	10	C
CIV-814P	Professional viva-voce	0-3	2	C
XXX-xxxT	Elective VII (Open)	x - x'	X	OE
YYY-yyyT	Elective VIII (Open)	y - y'	Y	OE
	<b>TOTAL CREDITS</b>	<b>13+(x+y) -13+(x'+y')</b>	<b>20+(x+Y)</b>	

## ELECTIVES

### LIST OF OPEN ELECTIVES

<b>Course Code</b>	<b>Subject</b>	<b>L - P</b>	<b>Credits</b>	<b>Preferred semester</b>	<b>Prerequisite</b>
CIV-E07T	Railway and Airport Engineering	3 - 0	3	V	Civil Engineering Background
CIV-E02T	Disaster Management	3 - 0	3	V	Engineering Science Background
ECE-E24T	Applied Electronic Instrumentation	3 - 0	3	V	Basic Electronics Engineering
<b>MTH-412T</b>	<b>Numerical Methods</b>	<b>4-0</b>	<b>4</b>	<b>VI</b>	<b>-</b>
CIV-E04T	Advanced Measurement Techniques (Remote Sensing / GPS)	3 - 0	3	VI	Computer Science/Physics/Math/Engineering discipline/Geology/Geo-informatics
CIV-E06T	Civil Engineering Management	3 - 0	3	VI	Civil Engineering Background
CIV-E08T	Green Architecture & Town Planning	3 - 0	3	VII	Engineering Background
CIV-E10T	Advanced Geo-Technical Engineering	3 - 0	3	VII	Geotechnical Engineering I & II
CIV-E11T	Advanced Pre-stressed Concrete	3 - 0	3	VII	Civil Engineering Background
CIV-E12T	Hydraulic Machines & Water Power Engineering	3 - 0	3	VIII	Water Resource Engineering
MTH-E01T	Operation Research & Optimization	3 - 0	3	VIII	Transportation Engg I/Advanced Structural Analysis/Geotechnical Engg I & II
CIV-E03T	Advanced Construction Technology	3 - 0	3	VIII	Structural Analysis I & II
CIV-E13T	Rock Mechanics & Tunneling Technology	3 - 0	3	VIII	Civil Engineering Background
CIV-E14T	Transportation Planning & Economics	3 - 0	3	VIII	Transportation Engineering I)

### **LIST OF GENERIC ELECTIVES**

<b>Course Code</b>	<b>Subject</b>	<b>L - P</b>	<b>Credits</b>	<b>Preferred semester</b>	<b>Prerequisite</b>
<b>CIV-G01T</b>	<b>Civil Engineering and Materials and Construction Techniques</b>	<b>3 - 0</b>	<b>3</b>	<b>III</b>	Engineering Science Background (Excluding CE)

### **LIST OF OPEN ELECTIVES/GENERIC ELECTIVES OFFERED TO SISTER BRANCHES**

<b>Course Code</b>	<b>Subject</b>	<b>L - P</b>	<b>Credits</b>	<b>Preferred semester</b>	<b>Prerequisite</b>
<b>CIV-G01T</b>	<b>Civil Engineering and Materials and Construction Techniques</b>	<b>3 - 0</b>	<b>3</b>	<b>III</b>	Engineering Science Background (Excluding CE)
<b>CIV-E02T</b>	<b>Disaster Management</b>	<b>3 - 0</b>	<b>3</b>	<b>V</b>	Engineering Science Background
<b>CIV-E04T</b>	<b>Advanced Measurement Techniques (Remote Sensing / GPS)</b>	<b>3 - 0</b>	<b>3</b>	<b>VI</b>	Computer Science/ Physics/ Maths/ Engg. discipline/ Geology/ Geoinformatics
<b>CIV-E08T</b>	<b>Green Architecture &amp; Town Planning</b>	<b>3 - 0</b>	<b>3</b>	<b>VII</b>	Engineering Background

**OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING**

**Semester-I**

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit (L+P)</b>	<b>Subject Type</b>
<b>PHY-111T</b>	<b>Physics-I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CHM-111T</b>	<b>Chemistry-I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>MTH-111T</b>	<b>Mathematics-I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>ELE-101T</b>	<b>Basic Electrical Engineering</b>	<b>3 – 0</b>	<b>3</b>	<b>CF</b>
<b>BIO-101T</b>	<b>Environmental Science</b>	<b>4 – 0</b>	<b>4</b>	<b>CF</b>
<b>CIV-101T/P</b>	<b>Engineering Drawing</b>	<b>2 – 3</b>	<b>4</b>	<b>CF</b>
<b>MEC-101P</b>	<b>Engineering Workshop</b>	<b>0- 3</b>	<b>2</b>	<b>CF</b>
<b>PHY-112P</b>	<b>Physics-I Lab</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>CHM-112P</b>	<b>Chemistry –I Lab</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
	<b>Total Credits</b>	<b>21-10</b>	<b>27</b>	



# PHY-111T - Physics-I

L – P

Credit: 4

4 – 0

## UNIT I

Vector Analysis: Rotation of coordinate axis and transformation of vectors, Gradient of scalar field, Divergence and curl of vector field in Cartesian, Spherical Polar and Cylindrical coordinate systems, Gauss's divergence theorem, Stokes theorem, Dirac Delta Function with Properties, Greens function.

## UNIT II

Electromagnetic Theory: Concept of Field, Coulomb's Law and Gauss's theorem, Calculation of electric field, Biot-Savart Law, Ampere's Law, Modification of Ampere's Law, Concept of Displacement Current, Faraday's law, Scalar and Vector Potentials, divergence and curl of magnetic and electric fields.

Maxwell's equations: (Free Space and Media) Integral and Differential Form, Boundary Conditions for E and B fields, Physical Significance of Maxwell's Equations.

## UNIT III

**Diffraction:** Fraunhofer diffraction due to Single-Slit and Double-Slit.

**Interference:** Division of wave front and amplitude, Newton's rings and Fresnel Biprism

**Polarization:** Linear, Circular, Elliptical.

## UNIT IV

Mechanics of System of Particles: Conservation of linear momentum, angular momentum and energy, Rigid body motion: Angular momentum of a rotating rigid body.

Collision of Particles: Laboratory and COM systems, kinematics of elastic scattering in laboratory system.

Non-inertial system and fictitious force: Physics in a rotating system, Coriolis force and centrifugal force, Central force motion as one body problem.

## UNIT V

Waves and Vibrations: Differential equation of simple harmonic motion, energy of simple harmonic oscillator, Superposition of two linear SHMs, Lissajous Figures, damped harmonic motion, energy dissipation, forced oscillations, amplitude and velocity resonance, Q-value of an oscillator, sharpness of resonance, energy consideration in forced oscillations, Concept of Gravitational Wave, Shock Wave and Seismic Wave.

### References:

1. Introduction to Vector Analysis, Schaum Series: M.R.Spiegel.
2. Introduction to Electrodynamics: D.J.Griffiths.
3. Introduction to Engineering Electromagnetics: YeonHo Lee.
4. Engineering Electromagnetics: W.H.Hayt and J.A.Buck.
5. Introduction to Optics: A. Ghatak
6. Introduction to Mechanics: D.S. Mathur
7. Introduction to Mechanics: Daniel Kleppner, Robert Kolenkow.
8. Introduction to Classical Mechanics: R.G.Takwale and P.S.Puranik.
9. Vibrations and Waves: A.P.French

## **CHM-111T-Chemistry-I**

**L P**

**4 0**

**Credit: 4**

### **Unit-I CHEMICAL THERMODYNAMICS**

Introduction and Importance, First Law of Thermodynamics, Work done in Isothermal and Adiabatic Conditions. Heat capacities, Relation between  $C_p$  and  $C_v$  relations, Second Law of Thermodynamics, Concept of Entropy, Carnot engine, Gibbs free energy. Free Energy Changes as Criteria of Reversible and Irreversible process, Gibbs-Helmholtz's equation, Clausius- Clapeyron equation.

### **Unit-II ELECTRO-CHEMISTRY**

Introduction, Conductivity of Electrolytes, Kohlrausch's Law of Independent Migration of Ions and its Application, Debye Huckel Theory of Strong Electrolytes. Electrochemical cells, Electrode-Potential, Standard Electrode Potential, Types of Electrodes (Metal-Metal Ion electrode, Gas Electrodes, Metal Insoluble Metal Salt Electrode), Fuel Cells, pH: Measurement and Control.

### **Unit-III ENVIRONMENTAL CHEMISTRY**

Introduction to Environmental Chemistry, Concept and Scope of Environmental Chemistry, Chemistry of the Atmosphere, Global Warming, Greenhouse effect, Acid Rain: Mechanism of Formation and Effects and Depletion of Ozone Layer, Chemistry of Water and Waste Water, Measurement of acidity, Alkalinity, Hardness, BOD, COD, and Treatment of Water for Domestic and Industrial Purpose. Toxic Chemicals in the Environment, Biochemical Effects of Arsenic, Lead, Mercury and, Pesticides.

### **Unit-IV ALLOYS**

Introduction to Alloys, Advantages of Alloys over other Metallic Materials, Manufacturing of Alloys (Fusion Method, Powder Metallurgy, Electrodeposition and Reduction method), Classification of Alloys (Ferrous and non-Ferrous metal Alloys), Carbon steels (Carbon Steels Classification, Composition and Uses), Alloy Steels (Low, Medium and High alloys steels), Effect of Different Alloying Elements on Properties of Alloy steels, Engineering Application of Copper, Nickel and Aluminum Alloys.

### **Unit V INSTRUMENTAL TECHNIQUES I**

Introduction, Advantages and Disadvantages of Instrumental and Non-Instrumental Methods, Electromagnetic Radiation, Electromagnetic Spectrum, Light Absorption (Beers-Lambert Law) UV-Vis spectroscopy (Types of Transition, Chromophors, Auxo-chromes and Applications) Infrared Spectroscopy (Modes of vibration, IR bands corresponding to different functional groups and Applications).

### **Text Books**

1. J.C. Kuriacose and J. Rejaraman: Chemistry in Engineering and Technology Volumes I & II (Tata McGraw Hill publishing company Limited, New Delhi)
2. P.C. Jain. Engineering Chemistry, (DhanpatRai& Sons, NaiSarak; New Delhi).
3. Physical Chemistry – Puri Sharma and Patharua.
4. Inorganic Chemistry (J.D. Lee).
5. Physical Chemistry by Peter Atkins, Juliodepaula
6. Electrochemistry and Corrosion Science by N.Perez
7. A Textbook of Organic Chemistry, V. K. Ahluwalia and MadhuriGoyal
8. Organic Chemistry: Stereochemistry, I. L. Finar, Pearson Education
9. Environmental chemistry by A. K. De, New Age International

### **Reference Books:**

1. C.V. Agarwal - Chemistry of Engineering Materials (Tata publishing Works, Varanasi)
2. L.A.Munro – Chemistry in Engineering (Prentice Hall, New York)
3. Chemistry of Engineering Materials, C.P. Murthy, C.V. Agarwal and A. Naidu BS
4. O.P.Vermani and A.K. Narula – Applied Chemistry Theory and Practice, (Wiley Eastern Limited, New Delhi).
5. R. M. E. Diamand: Applied Chemistry for Engineers, (Pitman)
6. Laboratory Manual on Engineering Chemistry by S.K. Bhasin and Sudha Rani, DhanpatRai Publishing Company, New Delhi (2004).

## **MTH-111T -Mathematics-I**

**L – P**

**Credit: 4**

**4 – 0**

### **Unit-I**

Introduction to differential calculus, Leibnitz's Theorem for  $n^{\text{th}}$  derivative, Taylor's theorem, Tangent and Normal, Partial Differentiation, Euler's theorem, Double points, asymptotes, curvature and tracing of curves.

### **Unit-II**

Limit, continuity and differentiability of functions of several variables, Chain rule, Jacobian theorem. Taylor's theorem of one and two variables, extrema of functions, two or more variables using method of Lagrange's multipliers.

### **Unit-III**

Ordinary differential equations: Exact ordinary differential Equations and Ordinary differential equations reducible to exact differential equations. Linear differential equations and equations reducible to linear form. Linear Differential equations of second and higher order with constant and variable coefficients. Applications of Ordinary Differential Equations

### **Unit-IV**

Series solutions of Ordinary Differential Equations

### **Unit-V**

Algebraic Equation, Elements of the theory of polynomial equations. Fundamental theorem of Algebra, Relation between the roots and the coefficients of an equation, Solution of cubic & bi-quadratic equations

### **BOOKS RECOMMENDED**

1. Differential calculus, Shanti Narayan, S.Chand
2. A text Book on Engineering Mathematics by Bali, N.P, Luxmi Publications
3. Ordinary and Partial Differential equation, M.D.Raisinghania, S.Chand and Co

### **Reference Books**

1. Advanced Engineering Mathematics by Jain, R.K. and Iyengar SRK, Narosa, 2001
2. Advanced Engineering Mathematics, Kreyszig, J.Wiley
3. Linear Algebra, Hoffmann & Kunze, Prentice-Hall
4. Differential equations and its applications, H.T.Piaggio, Prentice-Hall
5. Engineering mathematics Vol I-II, Sastry, Prentice Hall of India

## **ELE-101T – Basic Electrical Engineering**

**L – P**

**Credit:3**

**3 – 0**

### **UNIT I**

Introduction to DC circuits, Active and passive two terminal elements, Types of Voltage and Current Sources, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, Kirchhoff's laws, Mesh analysis, Nodal analysis, current division, voltage division. Conventions for describing networks: Reference directions for currents and voltages.

### **UNIT II**

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Application of network theorems in solving various circuits, Star-Delta Transformation.

### **UNIT III**

Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phasor representation, J operator, Analysis of R-L, R-C, R-L-C circuits, Introduction to three phase systems - types of connections, relationship between line and phase values.

### **UNIT IV**

Working principle, construction and applications of DC machines and AC machines (1- phase transformers, single-phase induction motors, introduction to alternator: Principle of operation and working.

### **UNIT V**

Safety measures in electrical system- types of wiring- wiring accessories staircase, fluorescent lamps & corridor wiring- Basic principles of earthing – Types of earthing.

### **Text Books**

1. "Engineering Circuit Analysis", by William H Hayt, J E Kemmerly and Steven M Durbin, Seventh Edition, McGraw Hill, 2007
2. Electrical Engineering fundamentals by Deltoro, Prentice Hall India (PHI)
3. Kothari.D.P and Nagrath.I.J, "Basic Electrical Engineering", Second edition, Tata McGraw - Hill, 2009.
4. "Basic Electrical and Electronics Engineering", by S.K. Bhattacharya, First edition, Pearson Education, 2011.
5. Circuit Theory (Analysis & Synthesis) by A. Chakrabarti, Dhanpat Rai & Co.

## **BIO – 101 T –Environmental Science**

**L - P**

**4 - 0**

**Credit:4**

### **Unit 1: Multidisciplinary nature of environmental studies**

Definition, scope and importance, Need for public awareness.

### **Unit 2: Natural Resources:**

#### **Renewable and non-renewable resources:**

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

### **Unit 3: Ecosystems**

Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession.

Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: -a) Forest ecosystem b) Grassland ecosystem. c) Desert ecosystem. d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

### **Unit 4: Biodiversity and its conservation**

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

### **Unit 5: Environmental Pollution**

Definition, Cause, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards.

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

### **Unit 6: Social Issues and the Environment**

From Unsustainable to Sustainable development. Urban problems related to energy. Water conservation, rain water harvesting, watershed management. Resettlement and rehabilitation of people; its problems and concerns. Case Studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

### **Unit 7: Human Population and the Environment**

Population growth, variation among nations. Population explosion – Family Welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health. Case Studies.

### **Unit 8: Field work**

(Field work equal to 5 lecture hours)

Visit to a local area to document environmental assets river/ forest/grassland/hill/mountain. Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds. Study of simple ecosystems-pond, river, hill slopes, etc.

## **REFERENCE BOOKS**

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email:mapin@icenet.net (R)
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p
6. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
7. Down to Earth, Centre for Science and Environment (R)
8. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
9. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
10. Heywood, V.H & Weston, R.T. 1995. Global Biodiversity Assessment. Cambridge Univ. Press 1140p.

11. Jadhav, H &Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284 p.
  12. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.
  13. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
  14. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
  15. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
  16. Rao M N. &Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ. Co. Pvt. Ltd. 345p.
  17. Sharma B.K., 2001. Environmental Chemistry.Geol Publ. House, Meerut
  18. Survey of the Environment, The Hindu (M)
  19. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)
  20. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards,Vol I and II, Enviro Media (R)
  21. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
  22. Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p
- (M) Magazine  
 (R) Reference  
 (TB) Textbook



## **CIV-101T/P- Engineering Drawing**

**L – P**

**Credit: 4**

**2- 3**

### **UNIT- I:**

Basic Concepts of drawing quadrants, drawing instruments, types of lines etc.

Dimensioning: General rules of dimensioning. Types: Aligned, unidirectional, chain, parallel, combined, title, block & margins.

Orthographic projections: Concept of horizontal and vertical planes, first and third angle projections, orthographic projections of simple blocks, missing lines and missing views.

Projection of points, lines and planes: Projection of points in different quadrants, projection of lines and planes positioned in different orientations with respect to the principle planes.

### **UNIT II:**

Projection of solids: Projection of simple geometrical solids placed in simple positions and with single rotations of the face, edge or axis of the solid with respect to one of the principal planes of projection.

### **UNIT III:**

Section of solids: Principal of sectioning, Section of simple geometrical solids, types of the section planes and their trace representation and location, true shape sections, sectioning by auxiliary planes.

### **UNIT IV:**

Development of surfaces: Development of surfaces of simple sectional solids and intersecting solids, transition pieces, cones & cylinders.

### **UNIT V:**

Isometric projections: Classification of pictorial projections, Isometric projection of plane figures, prisms, pyramids, cylinders and for the given orthographic projections. Introduction to Auto CADD. Basic commands of CADD.

### **Books Recommended:**

1. Gill, P.S Engineering Drawing, S.K. Kataria and sons,
2. Bhatt, N.D Engineering Drawing, Charotar Book Stall, TulsiSadan, Anand
3. James, D Bethune Engineering Graphics with Auto CADD, 2006.
4. Narayana, Kannaiya Engineering Drawing, Scitech Publications, Chennai

### **Reference Books:**

1. Sham Tickoo, Auto CADD 2006
2. B.C.RanaM.B.Shah Engineering Drawing, Pearson Education

## **MEC-101P- Engineering Workshop**

**L P`**

**Credit: 2**

**0 3**

### **UNIT-I MACHINE SHOP**

Operation and function of various machine tools like Lathe, for turning, facing, chamfering, grooving, knurling, boring & thread cutting. Shaper machine, for preparation of horizontal surfaces, slots and V-grooves. Milling machine, for side, end and face milling & making of spur gear. Drilling machines, for drilling and reaming operations. Grinding machines, for various grinding operations and CNC machine, for simple, step and taper turning operations.

### **UNIT-II FITTING SHOP**

Exercise on marking, cutting, chipping, filing, drilling, tapping, reaming, pipe threading and making nut & bolt and single ended spanner. Exercise on V, L, dove-tail & radius fittings.

### **UNIT-III SHEET METAL SHOP**

Exercise on development of sheet metal surfaces like cylinder, funnel, rectangular duct and 90° bend. Soldering & brazing of various joints, making single/double riveted lap-joint & single cover plate riveted but-joint.

### **UNIT-IV WELDING SHOP**

Operation and function of various welding machines like Electric arc welding machine, for various joints like lap, butt & T and preparation of small cot-frame from conduit pipe. Gas welding machine, for cutting & joining operations and square pyramid from conduit pipe. TIG & MIG welding machines, for basic operations and Spot & Seam welding machines, for simple joints.

### **UNIT-V CARPENTRY AND PATTERN MAKING SHOP**

Various types of timber, defects in timber, exercise on various operations and making joints like half lap (T, dove-tail, cross), mitre & lengthening and mortise & tenon. Simple exercise on wooden Lathe including pattern making and railing.

### **UNIT-VI FOUNDRY SHOP**

Exercise to prepare the green moulding sand, to prepare core and mould (single/double piece pattern). Casting of ferrous & non-ferrous metals after mould preparation for simple castings.

### **UNIT-VII SMITHY SHOP**

Smith's tools & their use, exercise for forging operations for making L-hook, chisel, square & hexagonal head bolts.

### **BOOKS RECOMMENDED**

1. Raghuvanshi, B.S, A course in workshop technology, Vol. I - II. Dhanpat Rai and Sons.
2. Hajira Chowdry, Vol. I - II. Workshop Practice.

## **PHY-112P - Physics-I Lab**

**L – P**

**Credit:1**

**0 – 2**

### **Experiment No: 1**

- To determine the value of  $e/m$  of an Electron by Thompson Method

### **Experiment No: 2**

- To determine the value of Acceleration due to gravity( $g$ ) by using Bar Pendulum

### **Experiment No: 3**

- To determine the value of Acceleration due to gravity( $g$ ) by using Kater's Reversible Pendulum

### **Experiment No: 4**

- To determine the Young's Modulus of rigidity rectangular Steel Bar by Bending of Beam Method

### **Experiment No: 5**

- To determine the Wavelength of Sodium Light by Newton's Rings.

### **Experiment No: 6**

- To determine wavelength of Laser Source by Fresnel Biprism.

### **Experiment No: 7**

- To determine the frequency of A.C. by Melde's Method.

### **Experiment No: 8**

- To measure the magnetic field of circular current loops (BiotSavart Law)

### **Experiment No: 9**

- To determine Resolving Power of Telescope.

### **Experiment No: 10**

- To study the moment of inertia of a fly wheel.

## **CHM-112P-Chemistry Lab-I**

**L P**

**Credit:1**

**0 2**

### **List of Experiments**

**Note: Basic Introduction on Solution Preparation, Concentration terms, Handling of Glass wares Chemicals and Instruments, Precautions**

1. Determination of strength of NaOH solution by standardization of sodium hydroxide using Oxalic acid
2. To determine the acid value of a given mineral oil or vegetable oil.
3. To determine the moisture content of a given sample of coal.
4. To determine the Degree of dissociation of a weak acid by Conductometry
5. Determination of the strength and  $pK_a$  value of the weak acid by titration with an alkali.
6. Estimation of calcium in Lime stone
7. To determine the Aniline point of the given sample of a Lubricating oil
8. To test the validity of Beer-Lambert law using spectrophotometer and determine the unknown concentration of solution.

### **Demonstration Experiments**

1. Determination of pH of different concentration of acid and bases by pH meter
2. Determination of calorific value of solid fuels using Bomb Calorimetry

**OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING**

**Semester-II**

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit (L+P)</b>	<b>Subject Type</b>
<b>PHY-211T</b>	<b>Physics-II</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CHM-211T</b>	<b>Chemistry II</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>MTH-211T</b>	<b>Mathematics-II</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CSE-201T</b>	<b>C Programming</b>	<b>4 – 0</b>	<b>4</b>	<b>CF</b>
<b>CIV-201T</b>	<b>Elements of Civil Engineering</b>	<b>3 – 0</b>	<b>3</b>	<b>CF</b>
<b>ECE-201T</b>	<b>Basic Electronics and communication Engineering</b>	<b>3– 0</b>	<b>3</b>	<b>CF</b>
<b>PHY-212P</b>	<b>Physics-II Lab</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>CHM-212P</b>	<b>Chemistry II Lab</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>CSE-202P</b>	<b>C Programming Lab</b>	<b>0– 2</b>	<b>1</b>	<b>CF</b>
	<b>Total Credits</b>	<b>22-6</b>	<b>25</b>	

## PHY-211T – Physics – II

L – P  
4 – 0

Credit: 4

### UNIT I

**Quantum Mechanics:** Blackbody Spectrum, Particle nature of light, Compton Effect, double slit experiment, de-Broglie hypothesis, Davison-Germer experiment, wave function and its properties, expectation value, quantum mechanical operator, wave packet, Normalisation condition, uncertainty principle.

Schrodinger wave equation: Time-Dependent and Time-Independent, Free Particle, Particle in 1D box. Tunnelling effect and its applications.

### UNIT II

**Elementary Solid State Physics:** Crystal Structure, Unit cells, Miller indices, Bravais Lattice, X-ray diffraction, Bragg Law, Fermi energy, Fermi Level in an Intrinsic and an Extrinsic Semiconductors.

**Superconductivity:** Meissner Effect, Type I and Type II superconductors, BCS-Theory (Qualitative only), Application of superconductors.

### UNIT III

**Introduction to Nuclear and Particle Physics:** Hypothesis of Structure of Nucleus. Basic Properties of Nucleus (Size, Charge, Spin, Density), Binding Energy, Q-value of a Nuclear Reaction. Nuclear Fission and Fusion, Liquid-Drop Model.

Fundamental Interactions, Fundamental Particles and their quantum numbers (Charge, Spin, Parity, Strangeness etc), Quark Model, Baryons and Mesons, Gell-Mann- Nishijima Relation, Conservation Rules.

### UNIT IV

**Special Theory of Relativity:** Frames of reference, Galilean Transformation, Michelson-Morley experiment, Basic postulates of special theory of relativity, Lorentz Transformation (No Derivation), length contraction, time dilation, Mass-Energy relation, Relativistic Momentum.

### UNIT V

**Lasers:** Introduction, Principle of laser, stimulate and spontaneous emission, population inversion, Einstein Coefficients, Optical pumping, Resonant Cavity and its modes, He-Ne Laser, Ruby Laser, Semiconductor Laser, Application of Lasers.

**Optical Fibre:** Principle, types and applications.

### References:

1. Introduction to Modern Physics: Aurthur Beiser
2. Introduction to Modern Physics: Kenneth S. Krane
3. Introduction to Quantum Mechanics. D.J.Griffiths
4. Introduction to Solid State Physics: M.A.Wahab
5. Introduction to Solid State Physics: Charles Kittel
6. Introduction to Special theory of Relativity: Robert Resnick
7. Introduction to Nuclear and Particle Physics: V.K.Mittal
8. Introduction to Optics: A. Ghatak
9. Introduction to Lasers: A. Ghatak, K.Thayagarajan

## **CHM-211T- Chemistry-II**

**L – P**

**4 – 0**

**Credit: 4**

### **Unit-I NANO-TECHNOLOGY**

Nanoscale and Its Significance, Properties at Nanoscale: Optical, Electrical, thermal, mechanical and Magnetic. General Methods of Preparation of Nanomaterials viz. Top Down (Ball Milling, Nanolithography) and Bottom up Methods (Sol-Gel, Solution Based Method), Carbon Nanotubes (Properties and Applications)

### **Unit-II CORROSION**

Introduction, Effects of Corrosion, Factors Effecting the Rate of Corrosion (Nature of the Metal and Nature of the Environment), Electrochemical Theory of Corrosion, Dry Corrosion and Wet Corrosion, Types of Corrosion (Pitting Corrosion, Crevice Corrosion, Galvanic Corrosion and Stress corrosion), Testing and Measurement of Corrosion, Corrosion Protection and Inhibition, Cathodic Protection, Anodic Protection, Protective Coatings.

### **Unit-III POLYMERS**

Advantages of Polymers over other Engineering Materials, Functionality, Degree of Polymerization, Concept of Molecular Weight, Polymerization (Addition, Condensation and Copolymerization), Polymerization Techniques (Bulk, Solution, Suspension and Emulsion polymerizations), Preparation, Properties and Engineering application of some Important Polymers, Polythene (LDPE and HDPE), Polyvinyl Chloride, Polystyrene, Teflon, Phenol Formaldehyde, urea-formaldehyde resin. Introduction to polymeric composites.

### **Unit-IV LUBRICANTS**

Introduction, Function of Lubricants, Mechanism of Lubrication, Classification of Lubricants (Liquid, Semisolid, Solid), Properties of Lubricants (Flash Point and Fire Point, Viscosity, Aniline Point Acid value).

### **Unit-V INSTRUMENTAL TECHNIQUES II**

Nuclear Magnetic Resonance: Principle, shielding mechanism, chemical shift, number of Signals, application of nuclear magnetic resonance to simple organic molecules.

Introduction to Thermal Analysis: Principle, Working and Application (TGA, DTA).

X-ray Spectroscopy: Principle and Applications.

### **Books Recommended:**

1. S.S Dara A Text Book of Engineering S Chand & Co limited New Delhi
2. Advanced Practical Physical Chemistry by Yadav, Goyal publication
3. Spectroscopic methods: Williams and Fleming
4. Applied Chemistry: Theory and Practice by O. P. Vermani
5. A Text book of Engineering Chemistry by S.S. Dara, S.Chand& Co, New Delhi
6. Laboratory Manual on Engineering Chemistry by S.K. Bhasin and Sudha Rani, Dhanpat Rai Publishing Company, New Delhi (2004).
7. Applied chemistry, Balsaraf V. M. Et. Al., I. K. International Publishing House Pvt. Ltd (2010)
8. Electrochemistry and Corrosion Science by N.Perez
9. Analytical chemistry: An Introduction By Douglas A. Skoog, Donald M. West, F. James Holler 6<sup>th</sup> edition
10. Polymer Science (Wiley Eastern Limited New Delhi) V.R. Goowriker, N.V Viswanathan and Jayadev Sreedhar,
11. Nanotechnology Fundamentals And Applications, Manasi Karkare, Rajni Bahuguna
12. Nanotechnology Importance And Application, Fulekar
13. Physical Chemistry – Puri Sharma and Patharua.
14. Solid State Chemistry and its Applications, Anthony R. West, Wiley Publisher



## **MTH 211T– Mathematics-II**

**L – P**

**4– 0**

**Credit: 4**

### **Unit-I:**

Non-linear differential equation of first order, Simultaneous differential equation, Simultaneous differential equation of the form  $dx/P = dy/Q = dz/R$ , Applications of ordinary differential equations, Differential Equation: Partial differential equations of first order, langrage linear equation Standard form, Charpit's method to solve nonlinear partial differential equation.

### **Unit-II:**

Partial differential equations of second and higher, Homogeneous Partial Differential equations with constant coefficients, vibration of stretched flexible string, heat flow equation. Wave equation, solutions by the method of separation of variables.

### **Unit-III:**

Fourier Series: FourierSeries, Integral Calculus: Differential under the sign of integration. Double and triple integrals, change of variables, Beta and Gamma functions

### **Unit-IV:**

Matrices: Review of algebra of matrices, Orthogonal and unitary matrices, partitioning of Matrices, Traces of Matrices, Triangular matrices, Rank of a matrix, elementary transformations, Inverse by elementary transformation form

### **Unit-V:**

Normal form of a matrix and solution of simultaneous equation by elementary operation, Normal form, Eigen values, and Eigen vectors of a matrix, Caley- Hamilton theorem, Quadratic Form.

### **Books Recommended:**

1. Advanced Engineering Mathematics by E.Kreyszig
2. Differential equations and its applications, H.T.Piaggio, Prentice-Hall
3. Applied Mathematics for Engineers by P.N.Wartikar
4. Advanced Engineering Mathematics, 2/e by Greenberg, Pearson education, 2004
5. Ordinary and partial Differential equation, M.D.Raisingania, S.Chand and Co.
6. Linear Algebra, Hoffmann & Kunze, Prentice-Hall
7. Mathematical Analysis by S.C.Malik & Savita Arora New Age international Limited
8. Integral Calculus by Shanty Narayan.

## CSE 201T - C Programming

**L –P**

**Credit: 4**

**4– 0**

### **Unit I**

Introduction to problem solving, Algorithms, Programming Methodologies. Structure of C program, Identifiers, Keywords, Data Types, Constant and Variables

### **Unit II:**

Operators: Precedence and Associativity, Expressions, Statements, Input and Output functions, Storage Classes. type casting, Control structures: Branching.

### **Unit III**

Control structures: Looping, One dimensional Array, Multidimensional Array and their applications, String Manipulation., Structures, Unions

### **Unit IV**

Library and User defined functions, Formal and Actual parameters, function prototypes, Parameter passing (Call-by-value), Recursion, Macros

### **Unit V**

Pointer variable, Pointer Arithmetic, passing parameters by reference, pointer to pointer, pointers to functions, dynamic memory allocation., pointer to structure & pointer to union, Pointers to Multidimensional Arrays, Introduction to files.

### **Books Recommended:**

1. Programming in ANSI C – E. Balaguruswami, Sixth Edition, TMH
2. Programming in C – Byron Gottfried, Third Edition, 2010, TMH
3. Computer fundamentals and programming in C – PradipDey&ManasGhosh, Second Edition, 2013, OXFORD University Press
4. The ‘C’ programming language, Ritchi, Kernighan, Second Edition, 2012 D.M.Ritchie, PHI
5. C The Complete Reference - H.Sohildt, Fourth edition,2000 TMH
6. Let us C - Y. Kanetkar, Twelfth Edition, 2012, BPB Publications
7. Computer Science - A Structured Programming Approach using C – B.A. Forouzan& R.F. Gillberg, Third Edition, 2007, Cengage Learning
8. Richard Petersen, "Linux:The Complete Reference", 6th edition, Tata McGraw-Hill, 2007.
9. Mark G. Sobell. "Practical Guide to Fedora and Red Hat Enterprise Linux", 6th Edition, Prentice Hall, 2011.

## CIV-201T- Elements of Civil Engineering

**L - P**

**3 - 0**

**Credit:3**

### UNIT I

**Introduction to Civil Engineering:** Overview of Civil Engineering; Civil Engineering landmarks; Impact (social, economic, environmental) of Civil Engineering on society; introduction to various branches of civil Engineering Future directions: Job opportunities in Civil Engineering.

Center of Gravity (symmetrical & un-symmetrical sections), moment of inertia of symmetrical & unsymmetrical sections, parallel axis theorem, perpendicular axis theorem, radius of gyration.

### UNIT II

**Stress&Strain:** Forces & stresses, Body Forces, surface forces, Internal forces, components of stress in rectangular coordinates Uni-axial tensile test, Elasticity, An-elasticity, Work-hardening, anisotropy, homogeneity and continuity, generalized Hooke's law, Lamé's constants, Modulus of rigidity, Bulk modulus, relation between the elastic constants, Principle of superposition, Uniqueness theorem, Thermal effects. Principal stresses and Mohr's Circle.

### UNIT III

**Bending moment & Shearing Force:** Notation & sign convention for flexural loads, shear force & bending moment diagrams of determinate structures, (Cantilever, simply supported beams & varying load beams) supported to point loads, UDL and VDL; computing of reactions using equation of equilibrium.

### UNIT IV

**Trusses:** Planar Truss structures, idealization of planar structures, sign convention & member force representation, analysis of trusses by methods of Joints, graphical and sections.

### UNIT V

**Torsion of shafts:** Geometry of deformation of a twisted circular shaft, Stress and deformation in twisted circular solid and hollow shafts, Strain energy due to torsion, Power transmitted by circular shafts.

### BOOKS RECOMMENDED:

1. Shames I.H., Engineering Mechanics, Prentice Hall, New Delhi.
2. Beer, F.P. and Johnston, Vector Mechanics for Engineers, McGraw Hill – Eighth Edition.
3. D.S. Kumar, Engineering Mechanics, S.K. Kataria & Sons, New Delhi.
4. J. L. Meriam and L. G. Kraige, Engineering Mechanics, Vol I – Statics, 6th Ed, John Wiley.
5. Khurmi, Strength of Materials.
6. Ramamurtha, Strength of Materials

## **ECE-201T – Basic Electronics and Communication Engineering**

**L – P**

**Credit:3**

**3 – 0**

### **UNIT-I**

**Electronic Components:** Active and Passive (Resistors, Capacitors and Inductors) components  
**Introduction to Semiconductors:** P and N Type Semiconductors, Transport Mechanism of Charge Carriers, Charge Densities in a Semiconductor, Electric properties, Hall Effect, Generation, Recombination, Diffusion, Continuity Equation, Injected Minority Carrier Charge.

### **UNIT-II**

**PN Junction:** Open Circuited PN Junction, Current Components in PN junction Diode, Basic Principle, Operation and Volt-Ampere Characteristics of PN Junction Diode, Temperature Dependence of V/I Characteristics, Piecewise linear Diode Characteristics, Diode Resistance, Diode Capacitances in detail, Charge Control Description of a Diode, Junction Diode Switching Times. BJT and its types.

### **UNIT-III:**

**Digital Electronics:** Introduction to digital Electronics, Gates (Basic & universal) Boolean algebra, laws & theorems-simplification of Boolean expression, Basics of Microprocessor 8085 and its pin diagram.

### **UNIT-IV**

**Communication Systems:** Introduction to Communication System, elements of Communication System, Benefits of Communication, Communication Media, Modulation and Demodulation (brief idea).

### **UNIT-V**

**Transducers:** Classification of Transducers, Basic Requirements of Transducers, Passive Transducers: Strain Gauge, Thermistor, LVDT, Active Transducers: Piezoelectric and Thermocouple.

### **TEXT BOOKS:**

1. Electronic Devices & Circuits by J.B.Gupta
2. Integrated Electronics by Millman & Halkias.
3. Communication system; Analog and Digital, Sanjay Sharma

### **REFERENCE BOOKS:**

1. Electronic Communication system; G. Kennedy
2. Electronic Communication Systems (Fundamentals through advanced), W. Tomassi, Pearson Education.
3. Electronic Devices and Circuit Theory by Boylestead and Nashelsky.

## **PHY-212P – Physics - II Lab**

**L – P**

**0 – 2**

**Credit:1**

### **Experiment No: 1**

- To determine the refractive index of Crown Glass Prism.

### **Experiment No: 2**

- To determine the wavelength of Sodium Light by Plain Diffraction Grating.

### **Experiment No: 3**

- To study the characteristics of Zener Diode.

### **Experiment No: 4**

- To determine the Wavelength of Prominent lines of Mercury Light by Plain Diffraction Grating.

### **Experiment No: 5**

- To study the characteristics of PN Junction Diode.

### **Experiment No: 6**

- To study the characteristics of G.M. Tube.

### **Experiment No: 7**

- To determine Planck's Constant by LED Method.

### **Experiment No: 8**

- To study Hall Effect and determine Hall Coefficients and charge carrier density.

### **Experiment No: 9**

- To determine Energy Band Gap of a semi-conductor specimen by Four Probe Method.

### **Experiment No: 10**

- To verify Stefan's Law by Electrical method.

## CHM - 212P Chemistry-II Lab

L - P

0 - 2

Credit:1

### List of Experiments

- 1) Synthesis of the phenol formaldehyde resin.
- 2) To titrate Fe(II) with  $\text{KMnO}_4$  spectrophotometrically.
- 3) To determine the dissociation constant of methyl red by spectrophotometric method.
- 4) To determine the temporary and permanent hardness of a sample of water by complexometric titration.
- 5) To determine the Alkalinity of the given sample of water.
- 6) Determination of the ion exchange capacity of cation exchange resin.
- 7) Separation of a mixture of inorganic ions by paper chromatography.

### Demonstration of experiments

1. Determination of specific rotation of the sucrose by polarimetry.
2. Spectrophotometer (concentration determination, wavelength maximum).

## **CSE 202P -C Programming Lab**

**L – P**

**0 –2**

**Credit:1**

1. Installation of Linux.
2. Basic Commands in Linux.
3. Introduction to Vi Editor.
4. Programs to understand the basic data types.
5. Program for looping and decision statements.
6. Programs to generate odd, even, Fibonacci, Lucas and other common series using loops.
7. Programs using built-in math functions.
8. Programs on arrays.
9. Program to implement linear search.
10. Program on two-dimension arrays.
11. Program to add and multiply two Matrices.
12. Program to find transpose of a Matrix
13. Program to read and display array using functions
14. Programs on string manipulations.
15. Write functions for finding sum, difference, product and remainder between two numbers and return the result
16. Programs on functions.
17. Write a function to find factorial using recursion
18. Programs on structures and unions.
19. Programs on pointers
20. Write a function to swap two numbers using call by reference?
21. Write a function to find minimum of an array using pointers.?
22. Write a function to reverse a string using pointers?
23. Programs on basic file operations
24. Small project as Assignment.

## OVERVIEW FOR B. TECH COURSE CIVIL ENGINEERING

### Semester-III

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit (L+P)</b>	<b>Subject Type</b>
<b>CIV-311T</b>	<b>Structural Analysis I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-312T</b>	<b>Surveying I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-313T</b>	<b>Fluid Mechanics I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-314T</b>	<b>Building materials &amp; construction techniques</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>MTH-312T</b>	<b>Probability &amp; Statistics</b>	<b>3 – 0</b>	<b>3</b>	<b>C</b>
<b>CIV-315P</b>	<b>SOM Lab</b>	<b>0– 2</b>	<b>1</b>	<b>C</b>
<b>CIV-316P</b>	<b>Surveying Lab-I</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>CIV-317P</b>	<b>Fluid Mechanics Lab I</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>XXX-xxxTP</b>	<b>Elective I (Generic*)</b>	<b>x – x'</b>	<b>X</b>	<b>GE</b>
	<b>Total Credits</b>	<b>19+x – 6+x'</b>	<b>22+X</b>	

**\*From other departments of university not from parent department, minimum credits=2 maximum credits =4**



## **CIV-311T-Structural Analysis-I**

**L- P**

**4 – 0**

**Credit: 4**

### **UNIT I: Introduction to Structural Analysis & Basic Concepts of Structural Analysis:**

Structure; Structural Engineering; History of Structural Engineering; Structural Analysis; Structural form; simplification for purpose of analysis; Types of loads (uniformly, triangular, point, trapezoid)

Specification of a force; free body diagrams; Equations of equilibrium; Condition Equations; Displacements; Compatibility; Boundary Conditions; Principle of Superposition; Stiffness and Flexibility.

### **UNIT II: Determinate Structures:**

Introduction to Determinate Structures; bending moment and Shear force in determinate beams; 3-Hinged Arches; Determinate beams with overhang, with various loading patterns and a propped cantilever with a moment hinge.

### **UNIT III: Bending and Shear Stress in Beams:**

Flexural Formula; Bending Stress and Shear Stress Diagrams for Homogenous Beam Sections of various shapes; Composite sections; Applications to simpler problems.

### **UNIT IV: Slopes, Deflections&Compound stresses:**

Slope and Deflection of determinate beams by Double Integration Method; Moment Area; conjugate Beam and energy methods; Compound stresses (including Mohr's Circle method).

### **UNIT V: Analysis of Columns:**

Stresses in Columns; short and long columns; buckling phenomenon; Euler's and Rankine's theory of Crippling loads; stresses in eccentrically loaded columns.

### **BOOKS RECOMMENDED:**

1. Introduction to Structural Engineering John M.Biggs
2. Determinate Structures: R.L.Jindal
3. Theory of Structures: Ramamurtham
4. Analysis of Structures: Thandavamoorthy
5. Strength of Materials: Singer and Pytel

## **CIV-312T-Surveying-I**

**L- P**

**4 – 0**

**Credit: 4**

### **UNIT I: FUNDAMENTALS AND CHAIN SURVEYING**

Definition- Classifications - Basic principles-Equipment and accessories for ranging and chaining – Methods of ranging - well conditioned triangles – Errors in linear measurement and their corrections - Obstacles - Traversing – Plotting – applications- enlarging the reducing the figures – Areas enclosed by straight line irregular figures- digital planimetre.

### **UNIT II: PRISMATIC COMPASS AND PLANE TABLE SURVEYING**

Compass – Basic principles - Types - Bearing - Systems and conversions- Sources of errors - Local attraction - Magnetic declination-Dip-Traversing - Plotting - Adjustment of closing error – applications - Plane table and its accessories - Merits and demerits - Radiation - Intersection - Resection – Traversing- sources of errors – applications. Temporary adjustments of a prismatic compass

### **UNIT III: LEVELLING**

Level line - Horizontal line - Datum - Bench marks -Levels and staves - temporary and permanent adjustments – Methods of levelling - Fly levelling - Check levelling - Procedure in levelling - Booking -Reduction - Curvature and refraction - Reciprocal levelling – Sources of Errors in levelling- Precise levelling - Types of instruments - Adjustments - Field procedure

### **UNIT IV: LEVELLING APPLICATIONS**

Longitudinal and Cross-section-Plotting - Contouring - Methods - Characteristics and uses of contours – Plotting – Methods of interpolating contours – Computations of cross sectional areas and volumes - Earthwork calculations - Capacity of reservoirs - Mass haul diagrams.

### **UNIT V: THEODOLITE SURVEYING**

Theodolite - Types - Description - Horizontal and vertical angles - Temporary and permanent adjustments – Heights and distances– Tangential and Stadia Tacheometry – Subtense method - Stadia constants - Anallactic lens

### **BOOKS RECOMMENDED:**

1. Surveying volume I by Dr. K.R.Arora
2. Surveying Vol.II by Dr. K. R. Arora
3. Surveying Vol.II by S.K Duggal, Tata McGraw Hill, N.Delhi.
4. Basak “Surveying and levelling”
5. Surveying Volume I by Duggal S.K.
6. Surveying and leveling by P.B. Shahni

# **CIV-313T-Fluid Mechanics-I**

**L- P**

**4 – 0**

**Credit: 4**

## **UNIT I INTRODUCTION AND FLUID STATICS:**

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.

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.

## **UNIT II. 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.

## **UNIT III. 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.

## **UNIT IV. MOMENTUM EQUATION AND DIMENSIONAL ANALYSIS AND HYDRAULIC SIMILITUDE**

Momentum equation and its application to stationary and moving vanes, pipe bends.

Dimensional analysis, Buckingham's theorem, Important dimensionless numbers and their significance, Geometric, Kinematic and dynamic similarity; Model analysis.

## **UNIT V. BOUNDARY LAYER ANALYSIS**

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.

Books Recommended:

1. Bansal, R.K. "Fluid Mechanics and Hydraulic machines"
2. Kumar, D.S. "Engg. Fluid Mechanics"
3. Engg; Fluid Mechanics by R.J.Garde

## **CIV-314T-Building Materials& Construction Techniques**

**L- P**  
**4 – 0**

**Credit: 4**

### **UNIT I:**

Bricks and Timber: Bricks, classification, characteristics of good bricks, testing of bricks as per BIS, defects of bricks. Terms used and types of brick bonds. Timber, seasoning of timber, defects in timber, decay and preservation, testing of timber.

### **UNIT II:**

Cement and Lime: OPC and its composition, types of cement

Lime, classification of lime, slaking and hydration, hardening, testing of lime.

### **UNIT III:**

Floors and Roofs: types of floors and their suitability, flooring material and their construction details, Roofs and roof coverings, classification of roofs with special reference to pitched roofs, roof covering materials.

### **UNIT IV:**

Foundations, their types and suitability, walls, different types of walls including cavity walls, doors, windows, lintels, types of doors and windows, brief introduction to ramps, lifts and escalators.

### **UNIT V:**

Wall finishes, plastering, pointing and painting. special treatments, fire resistance, damp proofing, thermal insulation, acoustical construction of buildings.

### **Books Recommended:**

1. Building materials by Parbin Singh.
2. Building materials and construction by Gurcharan Singh.
3. Building materials and construction by Ragawala.
4. Building construction by Sushil Kumar.

## **MTH-312T- Probability & Statistics**

**L- P**

**3 – 0**

**Credit:3**

### **Unit-I:**

Statistics: Measures of central tendency and Measures of variations (Dispersions), Moments, Measures of Skewness and Kurtosis. Moment generating functions, problems.

### **Unit-II:**

Probability: Random experiment, sample space, events, classical, statistical and axiomatic definitions of probability. Statements and proof of theorems on addition and multiplication of probabilities, problems.

### **Unit-III:**

Conditional Probability: Bayes theorem on conditional probability. Random variables, Derivation of formulae for mean, variance and moments of random variables for discrete and continuous cases. Laws of expectation problems. Problems.

### **Unit-IV:**

Standard Distributions: Binomial, Poisson and Normal Distributions, Beta and Gamma Distribution, t Distribution, F-Distribution, Chi-square Distribution and their applications.

### **Unit-V:**

Method of Least Squares & Correlation: Methods of least squares, fitting of straight line and parabola of degree 'p'. Regression and Correlation. Multiple and Partial Correlation. Problems

### **Books Recommended:**

1. Fundamentals of Mathematical Statistic by S.C.Gupta and V.K. Kapoor, Sulltan Chand & Sons New Delhi, Latest edition.
2. Statistical Theory and Methodology in Science & Engineering by Brownlee, John Wiley & Sons.
3. Introduction to Mathematical Statistics by R.E.Walpole 3<sup>rd</sup> edition New York Macmillan publication.
4. Data Analysis for Scientists & Engineers by Meyer, John Wiley & Sons.

## CIV-315P-SOM Lab

L- P

0 – 2

Credit: 1

### List of Experiments:

- 1. Tensile Test of Steel-** To determine yield strength, ultimate tensile strength, percentage elongation and modulus of elasticity of structural steel (Plot, stress strain curve)
- 2. Tensile Test of Steel-** To determine yield strength, ultimate tensile strength, percentage elongation and modulus of elasticity of round steel bars (Plot, stress strain curve)
- 3. Tensile & Compressive strength of Timber-** a) Parallel to grains, b) Perpendicular to grains.
- 4. Bending test of Steel/Timber-** To measure deflection and determine stiffness factor (Plot load-deflection curve)
- 5. Shear test of steel/Timber-** To measure ultimate shear strength, shear modulus and Plot shear stress-strain curve.
- 6. Impact test of Steel-** To determine the impact strength of notched mild steel test piece using Charpy Test and Izode Test
- 7. Buckling load of columns with various end conditions-** To determine crippling load of columns with different end conditions and compare theoretical values.
- 8. Testing of Bricks and Stones** as per IS specifications.
- 9. Specifications and Common tests** as per ISS for Roofing Tiles
- 10. Specifications and Common tests** as per ISS for Flooring Tiles Mosaic, Marble and Ceramic tiles

## **CIV-316P-Surveying Lab-I**

**L- P**

**0 – 2**

**Credit:1**

### **LIST OF EXPERIMENTS:**

1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection – Three point problem
9. Plane table surveying: Resection – Two point problem
10. Study of levels and leveling staff
11. Fly leveling using Dumpy level
12. Fly leveling using tilting level
13. Check leveling
14. LS and CS
15. Contouring
16. Study of Theodolite.

## **CIV-317P-Fluid Mechanics Lab-I**

**L- P**

**0 – 2**

**Credit:1**

### **LIST OF EXPERIMENTS:**

1. To determine 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.



**OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING**

**Semester –IV**

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit</b>	<b>Subject Type</b>
<b>CIV-411T</b>	<b>Structural Analysis-II</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-412T</b>	<b>Surveying-II</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-413T</b>	<b>Fluid Mechanics-II</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-414T</b>	<b>Concrete Technology</b>	<b>3 – 0</b>	<b>3</b>	<b>C</b>
<b>CIV-415TP</b>	<b>Building Drawing &amp; AutoCAD</b>	<b>2 – 2</b>	<b>3</b>	<b>C</b>
<b>CIV-419T</b>	<b>Engineering Geology &amp; Seismology</b>	<b>3 – 0</b>	<b>3</b>	<b>C</b>
<b>CIV-416P</b>	<b>Fluid Mechanics Lab II</b>	<b>0– 2</b>	<b>1</b>	<b>C</b>
<b>CIV-417P</b>	<b>Structural Lab</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>CIV-418P</b>	<b>Surveying Lab II</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>CIV-418(SC)P</b>	<b>Surveying Camp</b>	<b>0 - 3</b>	<b>2</b>	<b>C</b>
	<b>Total Credits</b>	<b>20 - 11</b>	<b>26</b>	

## **CIV-411T-Structural Analysis-II**

**L – P**

**4 – 0**

**Credit:4**

### **UNIT I: Introduction to indeterminate structures:**

Introduction to Indeterminate structures, Types of structural supports (hinged, roller and Fixed), Degrees of Freedom, Kinematic and Static indeterminacy of structures (Statically indeterminate structures, Redundant Frames, Order of redundancy).

### **UNIT II: Energy Methods of Analysis of structures:**

Strain Energy Method of analysis of Indeterminate Structures; Strain Energy stored due to axial loading, bending, torsion; Castigliano's 1st & 2nd theorem of minimum energy and its application to analysis of internally and Externally Indeterminate Beams, Frames, and Trusses.

### **UNIT III: Force methods of Analysis of structures:**

Method of consistent deformation for analysis of indeterminate beams; continuous beams; Deflection of truss joints, First theorem of Castigliano's and its application; Analysis of two hinged arches, 3 Moment Equation.

### **UNIT IV: Displacement methods of Analysis of structures:**

Analysis of Indeterminate Beams & Frames (with & without Sway) by Classical Displacement Methods viz; Slope Deflection Method & Moment Distribution Method.

### **UNIT V: Analysis of Influence lines and Cables:**

Influence lines for beams for point loading, udl loading, for wheel loads; Analyze the beam for shear and moments and for their maximum value; analysis of a cable for moments and shear.

### **BOOKS RECOMMENDED:**

1. Indeterminate Structural Analysis by C.K.Wang
2. Indeterminate Structural Analysis by R.L.Jindal.
3. Structural mechanics by Norris and Wilbur.
4. Theory of Structures by S.Ramamrutham R.Narayan
5. Analysis of Structures: Thandavamoorthy
6. RC Hibbler- Analysis of Structures

## **CIV-412T-Surveying-II**

**L- P**

**4 – 0**

**Credit: 4**

**UNIT I: TACHEOMETRY:** Stadia and its principle, analytic lens, Heights and distances from stadia intercepts; sub tense method, tangential method; Accuracy, Tacheometric alidade.

**UNIT II: 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.

**UNIT III: CURVES AND SETTING OUT WORKS:** Elements of simple curve; design and setting out of a simple curve, compound curve, transition curve, Vertical curves. Setting out Buildings, Culverts and Bridges, Tunnels, Transfer of alignment. Fixing of horizontal and vertical controls

**UNIT IV: HYDROGRAPHIC SURVEYING & REMOTE SENSING:** Shoreline and River Survey, the sextant, vertical and Horizontal control, soundings, current meter measurement,

Introduction to satellite imaging and Remote Sensing

**UNIT V: PHOTOGRAMMETRY & GPS SURVEYING:** Introduction to ground photographic survey-Photo theodolites, Stereo-photogrammetry, Arial surveying, Arial Photography, instruments used, scale of Photograph, number of photographs, mapping. Introduction to various types of instruments for mapping,GPS and application in Civil Engineering, Future of GPS

Introduction to Total Station.

### **BOOKS RECOMMENDED:**

- 1) Surveying Vol. II by Dr. K. R. Arora
- 2) Surveying Vol. II by S.K Duggal, Tata McGraw Hill, N. Delhi.
- 3) Surveying and Leveling by Basak, Tata Mcg raw Hill, N. Delhi
- 4) Surveying Vol. II by B.C Punima, Vol 2, Laxmi Publications Pvt. Ltd. N. Delhi
- 5) Surveying & Levelling by P.B. Shahni

## **CIV-413T-Fluid Mechanics - II**

**L – P**

**4 – 0**

**Credit: 4**

### **Unit I: - 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.

### **Unit II: - 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, branched pipes, pipes in series and parallels, Simple networks, Transmission of power.

### **Unit III: - FLUID FLOW PAST SUBMERGED BODIES:**

Drag and lift, Drag on a sphere, cylinder and disc: Lift, Magnus effect and Circulation.

### **Unit IV: - WATER HAMMER AND SURGE TANKS:**

Sequence of events after sudden valve 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.

### **Unit V: - 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.

**BOOKS RECOMMENDED:**

1. Engineering Fluid Mechanics by R.J.Garde.
2. K.Subramanaya “Open channel Flow”3rd.Tata McGraw HillPub.Co.New Delhi
3. Kumar, D.S. “Fluid Mechanics and Fluid Power Engineering”. Seventh Ed. S.K. Kataria& Sons Publishers, New Delhi,
4. Handbook of Hydroelectric Engg. by Nigam
5. RangaRaju, K.G., “Flow Through Open Channels”, 2nd.Tata McGraw Hill Publishing Company Ltd., New Delhi,1986
6. Deshmukh, M.M, “Water Power Engineering” DanpatRai&Sons, NaiSarak New Delhi
7. Asawa, GL “Fluid Flow in Pipes and Channels” CBS Publishing

## **CIV-414T- Concrete Technology**

**L- P**

**3 – 0**

**Credit:3**

### **UNIT I: CEMENT, AGGREGATES AND WATER**

Chemical composition of cement, Hydration of cement, Types of cement, Testing of cement; Fineness test, Standard consistency test, Setting time tests, Strength test, properties of aggregates, Qualities of water required as per Codal guidance.

### **UNIT II: FRESH CONCRETE AND PROPERTIES OF HARDENED CONCRETE**

Strength of concrete: W/C ratio –Gel/Space ratio, Relation between compressive and tensile strength, Workability, Factors affecting workability, Measurements of workability, Bleeding of concrete, Segregation of concrete, curing of concrete, Elasticity, creep and shrinkage; Bond strength; Durability of cement, Testing of hardened concrete.

### **UNIT III: ADMIXTURES, CONCRETE MIX DESIGN, SPECIAL CONCRETE**

Various types of admixtures used, concrete mix design, light weight concrete, Cold weather concreting, Hot weather concreting, Self-compacting concrete, Aerated concrete.

### **UNIT IV: PROJECT PLANNING TECHNIQUES**

Network planning and scheduling, resource leveling and allocation with examples using Critical Path method. Computerized network techniques.

Form work, Scaffolding, Shoring and Underpinning –their types and application to Building process.

### **UNITV: CONSTRUCTION EQUIPMENTS**

Succranes, Hoists, Mixers, Conveyors, Vibrators, Scaffolding, shuttering etc., their characteristics, performance and applications to building process.

### **BOOKS RECOMMENDED:**

- 1) Concrete Technology by M.S.Shetty, S.Chand & Company, N, Delhi.
- 2) Gambhir, M.L. “Concrete Technology”, Tata McGraw Hill New Delhi.
- 3) Neville, A.M.”Properties of Concrete “Pearson Publishers.
- 4) Construction Methods Plant and Equipment by R.L.Purifoy

# **CIV-415TP-Building Drawing and AutoCAD**

**L – P**

**2 –2**

**Credit:3**

## **UNIT I: Introduction**

Introduction of CADD (Computer Aided Drafting & Designing) Practice on Drawing Basics  
Drawing Elementary CADD command – Line, Polyline, Polygon, Circle, Polyline, arc, ellipse, TextSingle Text, Multitext, Dtext.

Modifying Elementary Commands – Erase, Move, Copy, Mirror, Offset, Scale, Stretch, Chamfer, fillet & explode. Making layers, line type & Line weight.

## **UNIT II: CADD (2D)**

Function keys, Shortcut keys, Paper size. Making Title Block, writing it & inserting it in any drawing file with scale, angle & explode options. Drafting of building plan, Elevation, Section Views giving construction details of important building components including foundation, plinth. DPC, lintels, slabs and roofs; full specifications for each component.

Creating a new template file (. dwt file) & applying it to every drawing file. Dimensioning and Annotating Drawings: Annotation and Annotation symbols, creating dimensions, Editing Dimensions

## **UNIT III:**

Drawing of doors, windows and ventilators. Location, size and different types. Drawing of RCC slabs (One and two way); beams (including cantilever);

## **UNIT IV:**

Drawing of Columns, Stair and Staircase, Various types and materials, Drawing of various components of a Doglegged stair case (section and Plan).

## **UNIT V:**

Foundations: Principles of foundations, types and suitability of foundations including strip, pad, raft, pile and pier foundation, Roofs & Roof Coverings: Classification of roofs with special reference to pitched roofs; Drawing of various timber trusses.

## **BOOKS AND SOFTWARES RECOMMENDED:**

1. AutoCADD software
2. Building Drawing by M.G.Shah
3. Civil Engineering Drawing by Chakorbarty
4. Civil Engineering Drawing by J.B.Mckay
5. Building Drawing by V.B.Sikka

## **CIV-419-Engineering Geology & Seismology**

**L – P**

**3 – 0**

**Credits: 3**

### **UNIT I:**

Geology and its relevance to civil engineering, Structural Geology; Folds, Faults and Mechanism of Faulting, Joints, Unconformities.

### **UNIT II:**

Engineering Geology; geological considerations in tunnels, dams, bridges, building sites; landslides.

### **UNIT III:**

Earthquakes; types and causes, distribution in the world, basic definitions, seismic zones.

### **UNIT IV:**

Engineering Seismology (Definitions), Introduction to Seismic Hazards and Earthquake Phenomenon. Geographical Distribution of Earthquakes and Seismo-tectonics.

### **UNIT V:**

Earthquake recording instruments, Warning systems, Global network, Monitoring of Earthquakes.

### **BOOKS RECOMMENDED**

- 1) Engineering Geology by Parbin Singh
- 2) Physical Geology by Arthur Holmes
- 3) Engineering Geology by F.G. Bell
4. Engineering Seismology by PN Aggarwal.
5. An introduction to Seismology, Earthquakes & Earth Structures by Sethstein & Michael Wysession



## **CIV-416P-Fluid Mechanics Laboratory-II**

**L – P**

**0 –2**

**Credits: 1**

### **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.

## CIV-417P-Structural Laboratory-I

L – P

0 –2

Credits 1

### LIST OF EXPERIMENTS:

1. Deflection of curved beams
2. Behavior of Portal Frame under different load combinations
3. Deflection of Truss
4. Behavior of 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
8. Study of Loading frame and Degrees of loading.
9. **Verification of Maxwell's Theorem-** To verify the Principle of Maxwell's Theorem
10. **Verification of Horizontal Thrust in a 3-Hinged Arch-** To evaluate experimentally horizontal thrust in a 3-Hinged arch and draw influence line diagram for the horizontal thrust.

## **CIV-418P-Surveying Lab-II**

**L- P**

**0 – 2**

**Credit:1**

### **LIST OF EXPERIMENTS:**

1. Study of theodolite
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Theodolite survey traverse
4. Heights and distances - Triangulation - Single plane method.
5. Tacheometry - Tangential system - Stadia system - Subtense system.
6. Setting out works - Foundation marking - Simple curve (right/left-handed) - Transition curve.
7. Field observation for and Calculation of azimuth
8. Field work using Total Station.

## **CIV-418(SC)P- Survey Camp**

**L – P**

**0 –3**

**Credits: 2**

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

## OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING-2016& ONWARDS

### Semester-V

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit</b>	<b>Subject Type</b>
<b>CIV-511T</b>	<b>Design Of Concrete Structures I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-512T</b>	<b>Geotechnical Engineering-I</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-513T</b>	<b>Water supply Engineering</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-514T</b>	<b>Quantity Survey &amp; Cost Estimation</b>	<b>4– 0</b>	<b>4</b>	<b>C</b>
<b>CIV-515T</b>	<b>Advanced Structural Analysis</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>XXX-xxxT</b>	<b>Elective II (Open)</b>	<b>x – x'</b>	<b>X</b>	<b>OE</b>
<b>CIV-516P</b>	<b>Geotechnical Lab I</b>	<b>0– 2</b>	<b>1</b>	<b>C</b>
<b>CIV-517P</b>	<b>Water Quality Lab</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
<b>CIV-518P</b>	<b>Concrete Technology Lab</b>	<b>0 - 2</b>	<b>1</b>	<b>C</b>
	<b>Total Credits</b>	<b>20 +x -6+x'</b>	<b>23 +X</b>	

# **CIV-511T-Design of Concrete Structures-I**

**L – P**

**4 – 0**

**Credits: 4**

## **UNIT I: PROPERTIES OF CONCRETE AND REINFORCING STEEL AND GENERAL DESIGN PHILOSOPHIES-**

Characteristic strength, stress-strain curves for Concrete and steel, IS specifications. Design Philosophies-Working stress method, Ultimate load method & limit state method of design. Analysis & design of structures in flexure/torsion by limit state method.

## **UNIT II: ANALYSIS & DESIGN OF BEAMS**

Flexural behavior of reinforced concrete beams, Analysis & design of Rectangular, T & L Sections, Codal Provisions. Behavior of RCC Beams in shear, design for shear, anchorage & slipping of reinforcement. Torsion of Beams and design; Detailing of reinforcement as per Codal provisions with reference to IS:456. Serviceability limit state of deflection & cracking. Calculation of deflection, Codal requirements.

## **UNIT III: DESIGN OF COLUMNS**

Types RCC Columns- Short & long Columns, Analysis and design of Axially loaded RCC Columns, Design of RCC columns for uni-axial and bi-axial moments, Helical Reinforcement and Transverse Reinforcement.

## **UNIT IV: DESIGN OF SLABS**

Design of one-way and two-way RCC slabs with and without corners held down. Introduction to design of slabs by Moment Coefficient Method. Introduction to Flat Slabs.

## **UNIT V: DESIGN OF STRUCTURAL ELEMENTS.**

Shear and torsion in structural elements, Working stress method

## **BOOKS RECOMMENDED:**

1. Design of Reinforced Concrete & Pre-Stressed Concrete Structures by Kong & Evans.
2. Design of Reinforced Concrete: Limit State Design by A.K.Jain.
3. Design of RCC Structures by Sinha.
4. Design of RCC Structures by Karve & Shah.
5. Reinforced Concrete Design by Pillia Menon.
6. Treasure of RCC Design by Sushil Kumar.
7. IS Code 456-2000.

## **CIV-512T- Geo-Technical Engineering-I**

**L – P**

**4 – 0**

**Credits 4**

### **UNIT I: INTRODUCTION**

Soil and its formation, various agencies for formation; Types of Soils. Three phase soil Model, Index properties and classification of soils. Soil structure.

### **UNIT II: 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 homogenous embankments with & without toe filters.

### **UNIT III: SOIL CONSOLIDATION & COMPACTION:**

One Dimensional consolidation, Terzaghi's equation, Assumptions of terzaghis equation. Consolidation test, e log p curves. Consolidation settlement, time required for settlement, Settlement during construction. Compaction, laboratory compaction tests, proctor compaction, compaction curve and control on field compaction.

### **UNIT IV: EFFECTIVE STRESS & STRESS DISTRIBUTION:**

Total & effective stresses, Pore Water pressure, Stress distribution under concentrated load. Westergard's and Boussineq's method

### **UNIT V: SOIL INVESTIGATION & CLAY MINERALOGY:**

Laboratory & Field Investigation. Sub-soil exploration, Penetration methods, Geo-Physical methods, electromagnetic method, electric resistivity method and Seismic method. Minerals Present in clay, dependence of behavior of clay on type of mineral.

### **BOOKS RECOMMENDED:**

1. Soil Mechanics by Alam Singh
2. Theoretical Mechanics by Terzaghi & Peck
3. Soil Mechanics by S.B. Saighal
4. Geotechnical Engineering by Purushotama Raj
5. Geotechnical Engineering by C.Venkataramiah
6. Geotechnical Engineering by K.R.Arora.
7. Geotechnical Engineering by S.K.Garg.

## **CIV-513T-Water Supply Engineering**

**L – P**

**4 -- 0**

**Credits 4**

### **UNIT I: WATER QUALITY**

Water Quality parameters, methods for physico-chemical analysis of water, Limits & their significance, National & International Standards.

### **UNIT II: WATER CONSUMPTION & WATER DISTRIBUTION**

Consumption for various uses, variation in Demand & Supply. Methods & modes of supply, Population forecasting methods, Sources of supply.

Distribution system, Patterns of Distribution, Pipe and pump design. Various losses in the Pipe system, types of pipes and Joints.

### **UNIT III: TREATMENT PROCESS**

Design of various units, i.e; screens, sedimentation units, clarification, filtration. Slow Sand and Rapid Sand Filters. Coagulation, flocculation, screening, softening, filtration equipments.

### **UNIT IV: MISC TREATMENTS**

Water softening, disinfection processes/units and their design. Misc. Treatment processes like aeration, addition of Fluorides, iodine, re-carbonation, etc.

### **UNIT V: SANITATION**

Sanitation of Buildings, ill effects of Poor sanitation, diseases associated with poor sanitation, lighting, heating and ventilation of various types of buildings.

Recommended plumbing fixtures as per codes.

Public awareness programmes for Rural & Urban Sanitation.

Role of a Civil Engineer in promoting sanitation awareness.

### **BOOKS RECOMMENDED:**

1. Water supply Engineering by P.N.Modi
2. Water supply & sewerage by E Steel
3. Water supply Engg. By Punmia
4. Water supply & Sanitary Engg by S K Hussain.



## **CIV-514T-Quantity Survey& Cost Estimation**

**L – P**

**4 –0**

**Credits 4**

### **UNIT I: ESTIMATE**

Importance, items of a work and their units. Types of Estimate, viz; preliminary; approximate; Abstract estimate; plinth area estimate; detailed estimate; revised estimate; supplementary estimate, bill of quantities and abstract of cost.

### **UNIT II: ANALYSIS OF RATES**

Preparing of rates, Labour schedule, material schedule and rate schedule. Analysis of rates-of lime concrete in Foundation; Brickwork in foundation in superstructure; stone masonry; RCC masonry; RCC work; RB work; Plastering; Pointing; white washing; colour; washing; painting; woodwork; earthwork in foundation; earthwork in road; DPC; steel work for reinforcement; steel work in trusses; woodwork in frames, shutters, etc.

### **UNIT III: SPECIFICATIONS & WORKS ESTIMATE**

General specifications & detailed specifications, Book of specifications, specifications, specifications for earthwork in foundation; LC in foundation; RCC work; Brick work; RB work; woodwork in doors, windows, etc. DPC centering & shuttering; earthwork in canal & road.

Estimates of building; Estimates of walls; methods of building estimate; Longwall, shortwall&centerline methods; Estimate of masonry platform; estimate of a masonry tank, estimate of roof trusses; Estimate of a single roomed building; estimate of a 2 roomed building with CGI roof over wooden trusses and over steel truss; estimate of a shop; estimate of a RCC Beam; RCC slab.

### **UNIT IV: ESTIMATE OF ROAD**

Methods of estimate; materials for different items of works and labour; methods of estimating earthwork; estimate of a metaled road.

### **UNIT V: VALUATION & RENT FIXATION**

Valuation of building various methods; rent fixation, plinth area requirements.

### **BOOKS RECOMMENDED-**

1. Estimating & Costing by Datta
2. Estimating & Costing by Mahajan
3. Estimating, Costing & Valuation by SC Rangawala

## **CIV-515T-Advanced Structural Analysis**

**L – P**

**4 – 0**

**Credits 4**

### **UNIT I: PLASTIC ANALYSIS**

Concept, Assumptions, Shape Factor for different cross sections, Collapse Load, Load Factor, Plastic modulus of a section, Plastic moment of resistance, Computation of Collapse load for a fixed beam and continuous beam.

### **UNIT II: MATRIX METHODS OF STRUCTURAL ANALYSIS**

Introduction to matrix analysis, Concept of Matrix Method & Flexibility Method. Formulation of Stiffness matrix for simple Planar Elements- Trusses & Beams.

### **UNIT III: APPLICATION OF MATRIX METHODS**

Analysis of Planar Trusses beams and frames using stiffness method (basic truss, basic beam, basic frame).

### **UNIT IV: FINITE ELEMENT METHOD AND ITS APPLICATIONS**

Introduction to Finite Element Method of Structural Analysis. Review of principle of Virtual work. Formulation of Element Stiffness Matrix for 1D Bar & Beam Element. Application on simple beam and simple truss. (Subjected to simple loading concentrated load & UDL)

### **UNIT V: INFLUENCE LINES DIAGRAMS FOR INDETERMINATE STRUCTURES**

Principles of Influence Lines for indeterminate Structures; Beams, Arches. Muller-Bresslau Principle, Criteria for maximum moment & shear under series of moving concentrated loads in beams.

### **BOOKS RECOMMENDED:**

1. Finite Element Method by Deb Debasis
2. Theory of Structures by Ramamurathan
3. Matrix Analysis of Framed Structures by Harry H. West
4. Concepts & Applications of Finite Element Analysis by Robert D Cook
5. Basic Structural Analysis by CS Reddy

## **CIV-516P-Geo-Technical Lab-I**

**L – P**

**0 –2**

**Credits 1**

### **LIST OF EXPERIMENTS:**

1. Determination of bulk density, water content, and dry density.
2. Particle size distribution by sieve analysis: Dry sieve analysis and wet sieve analysis.
3. Particle size distribution in fine grained soils by hydrometer analysis.
4. Determination of constancy limits: liquid limit, plastic limit and shrinkage limit.
5. Determination of coefficient of permeability of soils by constant head and falling head methods.
6. Determination of O.M.C and M.D.D.
7. Determination of consolidation parameters/characteristics of soil.

## **CIV-517P-WATER QUALITY LAB**

**L – P**

**0 –2**

**Credits 1**

### **LIST OF EXPERMENTS:**

1. To determine the total solids, suspended solids and dissolved solids for a given sample of water.
2. To determine the alkalinity of a given sample of water.
3. To determine the total hardness and the carbonate hardness for a given sample of water.
4. To determine the turbidity of a given sample of water.
5. To find the color and odor of a given sample of water.
6. To determine the percentage of Magnesium, Calcium, Iron, Silica and Aluminium in a given sample of water.
7. To determine the percentage of Sulphates, Chlorides, Iodide and Fluoride.
8. To determine the percentage of Na and K in a given sample of water.
9. To determine the concentration of dissolved oxygen in a given sample of water and find out the oxygen consumed.
10. To determine the percentage of Ammonia and Nitrogen present in a given sample of water.

## CIV-518P-Concrete Technology Laboratory

**L – P**

**0 –2**

**Credits: 1**

### **List of Experiments:**

#### **A) CEMENT:-**

1. Determination of standard consistency of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of fineness of cement.
4. Determination of compressive strength of cement.

#### **B) CONCRETE:-**

1. Determination of consistency of fresh concrete by Slump test
2. Determination of workability of freshly mixed concrete by Compaction factor Test.
2. Determination of cube strength of concrete for different mixes and different W/C ratios.
3. Determination of flexural strength of concrete (Nominal mix).
4. Determination of direct tensile strength of concrete by cylinder splitting test.
5. Determination of bond strength between mild steel plain bars and concrete & between Tor Steel and Concrete.

## OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING

### Semester-VI

<b>Course Code</b>	<b>Course Title</b>	<b>L – P</b>	<b>Credit</b>	<b>Subject Type</b>
<b>CIV-611T</b>	<b>Design Of Steel Structures</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-612T</b>	<b>Geotechnical Engineering-II</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-613T</b>	<b>Transportation Engineering-I(Highway &amp; Pavement Management System)</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-614T</b>	<b>Water Resources Engineering</b>	<b>4 – 0</b>	<b>4</b>	<b>C</b>
<b>CIV-618T</b>	<b>Computer Applications in Civil Engineering</b>	<b>2 – 2</b>	<b>3</b>	<b>C</b>
<b>YYY-yyyT</b>	<b>Elective IV (Open)</b>	<b>y – y'</b>	<b>Y</b>	<b>OE</b>
<b>CIV-615P</b>	<b>Geotechnical Lab II</b>	<b>0– 2</b>	<b>1</b>	<b>C</b>
<b>CIV-616P</b>	<b>Transportation Lab</b>	<b>0– 2</b>	<b>1</b>	<b>C</b>
<b>CIV-617P</b>	<b>Geophysical Lab</b>	<b>0 – 2</b>	<b>1</b>	<b>C</b>
	<b>Total Credits</b>	<b>18 +(y) - 8+(y')</b>	<b>22 +( Y)</b>	

## CIV-611T-Design of Steel Structures

L – P

4 – 0

Credits 4

### UNIT I: CONCEPTS OF DESIGN OF STEEL STRUCTURES

Structural steels and their properties. Working stress and Plastic design concepts. Riveted, bolted and welded connections and their design.

### UNIT II: DESIGN OF TENSION MEMBERS

Limit State design of tension members; Design of cables and of other tension members; Codal Provisions.

### UNIT III: DESIGN OF FLEXURAL MEMBERS

Design of axial and flexural forces, Design of flexural member: Steel beams, built-up sections. Design of Plate Girders.

### UNIT IV: DESIGN OF COMPRESSION MEMBERS

Buckling phenomenon of compression members, Design of column bases & grillage foundation. Steel roof Truss: Evaluation of gravity and wind loads on roof trusses. Design of truss members and Purlins.

### UNIT V: TIMBER STRUCTURES

Structural timbers and their properties, Introduction to IS Codes on timber design. Design of members in tension, compression and flexure. Bolted, nailed joints and splices.

### BOOKS RECOMMENDED:

1. Design of Steel structures (Vol I & II) by Ramachandra
2. Design of Steel Structures by Arya&Ajmani
3. Design of Steel Structures by Duggal
4. Design of Steel Structures by Vizrani&Ratwani
5. Design of steel structures by Negi
6. Design of steel structures by Gaylord
7. Design of wooden structures by Donald Breyer, Kinneth Fridley, Kelly Cobeen, Jr. pollock
8. Design of Steel Structures by Subramanyam
9. IS code 800-2007.

# **CIV-612T-GEOTECHNICAL ENGINEERING-II**

**L – P**

**4 – 0**

**Credits 4**

## **UNIT I: SHEAR STRENGTH**

Shear Strength concept, Mohr's Coulomb's equation, laboratory determination. Tri-axial compression test under different Drainage conditions, viz; undrained, drained and consolidated, direct shear test. Vane Shear test. Unconfined compression test. Strength envelope.

## **UNIT II: BEARING CAPACITY & FOUNDATION**

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.

## **UNIT III: FOUNDATION DESIGN (GEOTECHNICAL ASPECTS)**

Basic terminology, bearing capacity of shallow foundations. Importance and types of foundations. Design principles for footings and rafts. Foundations on clays and sands. Foundations-types and applications. Pile foundation types. Classification and determination of load carrying capacity, dynamic and static methods. Pile load test, pile groups, efficiency of pile groups.

## **UNIT IV: EARTH PRESSURE AND EARTH STABILIZATION**

Lateral earth pressure. Rankine's Theory of 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.

Methods of Stabilization. Brief introduction to each of the methods of the methods of stabilization such as Shot-creting, geo-reinforcement.

## **UNIT V: STABILITY OF SLOPES AND SOIL DYNAMICS**

Infinite slopes, conjugate stresses, stability number. Swedish circle methods. Submergence case, complete Draw-down case. Steady seepage case.

Introduction to Soil dynamics.

### **BOOKS RECOMMENDED:**

1. Soil mechanics by Alam Singh
2. Soil mechanics & Foundation Engineering by K.R. Arora
3. Soil Mechanics by S.B. Saighal
4. Soil Mechanics and Foundation Engineering by P Purushotham
5. Soil Mechanics and Foundation Engineering by S.K. Garg



## **CIV- 613T-Transportation Engineering-I**

**L – P**

**4 – 0**

**Credits:4**

**UNIT-I:** Scope, history, classification of roads. Comparison with other modes of transportation

**UNIT-II:** Alignment design: route survey and highway location. Geometric design: cross section elements; sight distances, horizontal and vertical alignment

**UNIT-III:** Pavement design: factors effecting pavement design, types of pavements, Empirical methods of flexible pavement design (e.g., C.B.R, GROUP INDEX AND Burmister's layer theory) stress due to load and temperature in rigid pavements, Introduction to design methods of rigid pavements

**UNIT-IV:** 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.

**UNIT-VI:** Pavement management system: basic concept, data requirements & collection methods, maintenance and rehab treatments, priority programming, implementation of PMS

### **BOOKS RECOMMENDED:**

1. Khanna, S.K. and Justo, C.E.G. 2002. "Highway Engineering". Nem Chand Brothers, Roorkee.
2. Bhanot, K.L. 1990. "Highway Engineering", S. Chand and Company (P) Ltd., New Delhi.
3. Rao, G.V. 1996. "Principles of Transportation and Highway Engineering", Tata McGraw Hill, New Delhi
4. Pavement Design and Management Guide by Transportation Association of Canada, Ottawa, Ontario, Edn. Dr. Ralph Haas,

## **CIV-614T-Water Resources Engineering**

**L – P**

**4 – 0**

**Credits 4**

### **UNIT I: HYDROLOGY**

Scope and applications of Hydrological cycle; precipitation measurement by rain Gauges, gauge networks. Hyetographs and methods of determining mean rainfall.

Hydrological Abstractions: Evaporation, Transportation, Interception, Depression storage, Infiltration.

### **UNIT II: STREAM FLOW**

Factors affecting runoff. Rainfall-Runoff relationships. Unit Hydrograph, Peak Flow, low flows, requirements for Hydrological design, velocity & Discharge measurements.

### **UNIT III: FLOOD ESTIMATION AND GROUND WATER**

Occurrence and distribution of floods; various methods of flood estimation; viz rational method and Unit hydrograph method, etc.

Occurrence and distribution of ground Water, specific yield of aquifers, movement of ground water. Darcy's Law, safe yield of a basin, steady flow in a well for confined and unconfined aquifers.

### **UNIT IV: FLUVIAL HYDRAULICS**

Principles of sediment transport, critical tractive force, Shield's plot, Bed and suspended load. Bed movement, Einstein's Analysis, White's Theory, Rigid and loose Boundaries.

### **UNIT V: RESERVOIR DESIGN STUDIES**

Area-Volume curves, types of reservoirs and zones of storage, storage capacity of reservoirs. Mass-curve technique, reservoir flood routing, sedimentation of reservoirs.

### **BOOKS RECOMMENDED:**

1. Irrigation, Water Power & Water Resources Engineering by K.R. Arora
2. Engineering hydrology by K Subramanya
3. Engineering Hydrology by EM Wilson
4. Mechanics of sediment transportation and alluvial stream problems by RJ Garde & KG Rangaraju
5. Hydrology Principles Analysis & design by HM Ragunath
6. Applied Hydrology by K Linsley, A Kohler, LH Paulhus
7. Hydrology & Water Resources Engineering by SK Garg

## **CIV-618T-Computer Applications In Civil Engineering**

**L – P**

**3 –0**

**Credits: 3**

### **UNIT I: Introduction to Topographic Survey and Assessment Using AUTOCAD™ CIVIL-3D®:**

Introduction to Software, Terrain Points (Topo&Cogo), Formation of Point groups and Clouds, Surface and its formation using points, Surface formation using Google Earth™, Creation of Profile Views, Creation of Section Views, Importing Points and Mesh from Google Earth™ and GIS, Terrain Analysis using Contours, Slope Arrows, Water Shed, Importing and Plotting of Point Data from XML, CSV Point Data files

### **UNIT II: Introduction to Soil Analysis (Geotechnical Aspect) using TERRASOL™ PLAXIS 2D®:**

Quick start Introduction to Software, Settlement of Circular Footing on Sand (Rigid & Flexible), Submerged Construction of an Excavation (input, mesh generation, calculations, results), Construction of Road Embankment (Input, Mesh Generation, Calculations, safety Analysis, Using Drains), Pile Driving (input, mesh generation, calculations, results)

### **UNIT III: Introduction to Structural Analysis using CSI™ SAP®:**

Introduction to software, Creating a new model from the Model Wizard, Creating a new model from the Grid, Defining Materials, Load Patterns Load Cases, Load Combinations, Using of Special Joints in a Model, Assigning Joint properties, Frame Properties, Area Properties, Solid Properties, Assigning Joint Loads, Frame Loads, Area Loads, Analyzing the Model, Selecting Load Cases to run, Introduction to Model Alive® Features, Displaying of Results (Deformed Shape, M3, VMAX, Axial Force)

### **UNIT IV: Introduction to Structural Design Using CSI™ ETABS®:**

Introduction to software, Creating a new model from the Model Wizard, Creating a new model from the Grid, Defining the Diaphragm from the Wizard, Defining Material Properties, Section Properties, Addition of new materials using Indian Codes IS-456 and IS-800-LSD, Drawing Joint Objects, Beam/Column/Brace Objects, Drawing Floor/Wall Objects, Drawing grid, Assigning Joints Properties and Loads, Frame Properties and Loads, Shell Properties and Loads, Link Properties, Analysing the Model, Automatic Meshing for Slabs & Walls, Display Deformed Shape, Force/Stress Diagrams, Designing of Concrete Members, Designing of Steel Members, Detailing of the Results, Exporting the Detailing's to .DWG, .DXF, .IGS, formats, Printing of Detailed Design Drawings

### **UNIT V: Introduction to Costing and Estimation using MICROSOFT™ EXCEL®:**

Introduction to the Software, Assigning Formulas to Columns, Insertion of Charts, Creation of Comparative Statements, Creation of BOQ, Detailed Estimate of Sub-Structure, Detailed Estimate of Super-Structure.

## **CIV-615P-Geo-Technical Laboratory II**

**L – P**

**0 –2**

**Credits 1**

### **LIST OF EXPERIMENTS:**

1. Shear strength tests:
  - a. Unconfined Compression Test
  - b. Direct Shear Test
  - c. Tri-axial Compression test (UU)
  - d. Vane Shear Test.

Conduct and determination of Shear Parameters.

2. Conduct of Plate Load Test
3. Conduct of SPT
4. Sub-soil exploration by electric resistivity method

## CIV-616P-Transportation Laboratory

**L – P**

**0 –2**

**Credits 1**

### **LIST OF EXPERIMENTS:**

#### **1. TESTS ON AGGREGATE-**

- a. Aggregate grading
- b. Specific Gravity
- c. Crushing
- d. Abrasion
- e. Impact
- f. Soundness
- g. Flakiness
- h. Shape
- i. Fineness Modulus
- j. Silica content
- k. Silt content,
- l. Alkalinity.

#### **2. TESTS ON BITUMEN-**

- a. Viscosity
- b. Penetration,
- c. Softening point
- d. Flash & Fire Point.
- e. Ductility,
- f. specific gravity,
- g. elastic recovery,
- h. marshall stability

#### **3. TESTS ON SUB-GRADE-**

- a. Sub-grade Modulus
- b. CBR.

### **Books recommended:**

1. Khanna, S.K. and Justo, C.E.G. 2002. “Highway Engineering”.Nem Chand Brothers, Roorkee
- 2.Highway Materials and Pavement Testing by Khanna, Justo &Veeraragavan, Nem Chand Brothers, Roorkee
- 3.Material Testing Laboratory Manual by Kukreja, Kishore &Chawla, Standard Publishers, NaiSarak, Delhi

## **CIV-617P-Geophysical Lab**

**L-P**

**CREDITS : 1**

**0-2**

### **LIST OF EXPERIMENTS:**

1. The study of Physical Properties of Minerals.
2. Determination of specific Gravity by:
  - a. Jolly's Spring Balance
  - b. Walker's Steel Yard Balance
  - c. Beam Balance
3. Study of Rocks and their characteristics.
4. Study & Sketching of various types of Geological structures.
5. Determination of Dip and Strike with a clinometer Compass.

**OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING**

**Semester-VII**

<b>Course Code</b>	<b>Course Title</b>	<b>L - P</b>	<b>Credit</b>	<b>Subject Type</b>
CIV-711T	Design Of Concrete Structure-II	4 - 0	4	C
CIV-712T	Irrigation & Flood Structures	4 - 0	4	C
CIV-713T	Structural Dynamics	4 - 0	4	C
CIV-714T	Environmental Engineering	3- 0	3	C
CIV-719T	Traffic Engineering & Transportation Facilities	3 - 0	3	C
YYY-yyyT	Elective VI (Open)	y - y'	Y	OE
CIV-715P	Pre Project Work	0 - 4	2	C
CIV-716P	Seminar	0 - 4	2	C
CIV-717P	Tour & Training	0-4	2	C
CIV-718P	Dynamics & earthquake Lab	0 - 2	1	C
	<b>Total Credits</b>	<b>18+(y) -14+(y')</b>	<b>25+(y)</b>	

## **CIV-711 T-Design of Concrete Structures-II**

**L – P**

**4 –0**

**Credits: 4**

### **UNIT I: FOUNDATIONS**

Various types of RCC footings, Design of combined footings. Introduction to Raft foundation and design procedure as per IS: 456-2000.

### **UNIT II:RETAININGWALLS**

Stability analysis of retaining walls, design of cantilever and counter-fort type RCC retaining walls.

### **UNIT III: WATER RETAINING STRUCTURES**

Design of underground, circular & rectangular water tanks with reference to IS: 3370.

### **UNIT IV: PRE-STRESSED CONCRETE**

General principles, methods of pre-stressing, pre-tensioning & post-tensioning, losses in pre-stress. Design of rectangular, T & I section beams.

### **UNIT V: SHELL STRUCTURES**

Membrane analysis of spherical & conical domes by static methods. Design of domes & ring beams.

### **BOOKS RECOMMENDED**

1. Design of footings by Kurien
2. Design of RCC structures by Jain & Jai Krishan
3. Pre-stressed concrete structures by Krishna Raju
4. Relevant IS codes & specifications



## **CIV-712T-Irrigation& Flood Structures**

**L – P**

**4 –0**

**Credits: 4**

### **UNIT I: GENERAL INTRODUCTION**

Necessity of Irrigation in India, advantages and disadvantages of Irrigation, Techniques of water distribution in farms, Soil moisture & crop water requirements; Duty, Delta, Consumptive use, irrigation requirements.

### **UNIT II: CANAL IRRIGATION**

Types of canals, parts of canal irrigation system, channel alignment, assessment of water requirements, estimation of channel losses; design of channels by regime & semi-theoretical approaches; canal lining

### **UNIT III: CROSS DRAINAGE WORKS**

Necessity of Cross Drainage works, their types & selection; Design of various types of Cross Drainage works- Aqueduct, Syphon Aqueduct, Super passage, siphon, Level Crossing.

### **UNIT IV: DIVERSION HEADWORKS**

Parts of diversion headworks, types of weirs and barrages, introduction to design of weirs on permeable foundations, control of silt entry into canal, silt excluders & their types.

### **UNIT V: WATER LOGGING & FLOOD CONTROL**

Causes & preventive measures of water logging , Drainage of irrigated lands, saline & alkaline lands. Flood problems, types of floods, Flood control measures.

### **BOOKS RECOMMENDED**

1. Arora, K.R. “ Irrigation Water power & water Resources Engineering”, standard publishers Distributors, Delhi, 2002.
2. B. Singh, *Irrigation Engineering*, Nem Chand and Sons, Roorkee.

### **SUPPLEMENTARY READING:**

1. Varshney& Gupta, *Theory and Design of Irrigation Structures*, Nem Chand and Bros, Roorkee.
2. I. E. Hook, *Irrigation Engineering*, John Wiley and Sons, New York.
3. J. D. Zimmerman, *Irrigation*, John Wiley and Sons, New York.

## **CIV-713T -Structural Dynamics**

**L – P**

**4 –0**

**Credits: 4**

### **UNIT 1**

Introduction to dynamic load(earthquake and blast loading), types of dynamic loads ,basic background of dynamics methods available ( D'Alembert's principle,Newton's IInd law), basic review of stiffness of structures,development of equation of motion ( problem statement and solution method).

### **UNIT II**

Dynamics equation of equilibrium, components of basic dynamic system , Free vibration of SDOF ( damped and undamped case),Models for energy loss, logarithmic decrement

### **UNIT III**

Dynamic equation of equilibrium ,forced vibration of SDOF( undamped and damped case) , response to harmonic and periodic loads , pulse loadings ,SDOF response to arbitrary functions ,duhamel's integral ,dynamic response factors

### **UNIT IV**

Dynamic equation of equilibrium for MDOF systems ( undamped case), solution of free vibration response for undamped systems , eigen value problems , natural modes and their properties

### **UNIT V**

Dynamic response of MDOF systems by mode superposition method , orthogonality relationships of principal modes , general approach of linear systems ,static condensation method

### **BOOKS RECOMMENDED**

1. Dynamics of structures by Anil K. Chopra
2. Dynamics of structures by Clough &Penzien
3. Structural Dynamics by Mario Paz

### **SUPPLEMENTARY READING:**

1. S. P. Timoshenko and D. H. Young, Vibration Problem in Engineering, D. Van -Nostrang Company. Inc. Affiliated East-West Press Pvt. Ltd., New Delhi

## **CIV-714T-Environmental Engineering**

**L – P**

**3 – 0**

**Credits: 3**

### **UNIT I: ENVIRONMENTAL POLLUTION**

Importance of clean environment, Sources of pollution to land, water & air, General effects of pollution, pollution by sewage, calculation of storm water & sewage, pollution of water resources with special reference to J&K State.

### **UNIT II: Air POLLUTION**

Air Pollution & its effects on human health, factors responsible for air pollution, measurement of air pollution, air quality standards, and Engineering interventions to check air pollution, case studies relating to the topic.

### **UNIT III: SEWAGE DISPOSAL**

Methods of sewage disposal, effects of disposal on land & in water bodies, self-purification of streams, BOD & COD calculations, Types & design of sewers.

### **UNIT IV: UNIT OPERATIONS IN DESIGN OF SEWAGE TREATMENT**

Screening, sedimentation (septic & inhoff tanks), soakage's for isolated systems, sewage filtration, activated sludge process, grit removal etc.

### **UNIT V: SOLID WASTE MANAGEMENT**

Solid waste problems, constituents of solid waste, sanitary land filling, composting, incineration.

### **BOOKS RECOMMENDED**

1. Environmental engineering & management by Suresh K Dhameja
2. Environmental Engg. (A design approach) by Sincero&Sincero
3. Waste water treatment by P.N. Modi
4. Water supply & sanitary Engg. by B.C.Punmia

### **SUGGESTED READINGS**

1. Metcalf & Eddy Inc., George Tchobanoglous, Franklin, L., Burton, H. D. Stensel, *Wastewater Engineering: Treatment and Reuse*, McGraw-Hill Higher Education; 4th edition, 2002.
2. T. J. McGhee, E. W. Steel, *Water Supply and Sewerage*, McGraw-Hill College; 6th edition, 1991.

## **CIV-719T -Traffic Engineering & Transportation Facilities**

**L – P**

**3 – 0**

**Credits: 3**

### **UNIT I:**

Components of traffic system- vehicle characteristics; human characteristics, road characteristics & traffic-control devices

### **UNIT II:**

Intersections- signalized intersections, channelization and roundabouts, interchanges- requirement & design, flyovers and grade separators.

### **UNIT III:**

Traffic signs- role and types, signalized intersections, signal timing design; signal coordination

### **UNIT IV:**

Traffic flow theory-flow parameters; fundamental relation of traffic flow, road capacity and level of service concept

### **UNIT V:**

Parking facilities- parking demand, on-street parking, off-street parking.

Traffic Safety: Accident Analysis, Traffic safety issues, countermeasures.

### **BOOKS RECOMMENDED**

1. Transport New York; Toronto.Planning and Traffic Engineering by CA O’Flaherty, John Wiley & Sons, Inc.,
2. Traffic Engineering by McShane&Roess, Prentice-Hall of India Private Ltd, New Delhi-110001.
3. Principles and Practices of Highway Engineering by Kadiyali&Lal, Khanna Publishers, Delhi-6
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 , NaiSarak, Delhi-110006

## **CIV-715P-Pre-Project Works**

**L – P**

**0 –4**

**Credits: 2**

A project will be assigned to the students & the students shall start working on the project assigned to them under internal & external guides. The students shall have to submit an acknowledgement from the agency executing the project & the project shall be duly approved by the project approving authority from the department. At the end of the semester a preliminary synopsis report on the project shall be submitted to the Department for assessment.

The students are required to appear for viva voce which shall be conducted in the department, in presence of the faculty members under the supervision of the HOD.

## **CIV-716P- Seminar**

**L – P**

**0 –4**

**Credits: 2**

A seminar shall be organized at the 7<sup>th</sup> semester of the Civil Engineering curriculum leading to the Degree of B. Tech. The students shall do research on a topic of their choice which may be either library research and/or laboratory research. The students shall be guided in their research work by the staff members of the department. The students shall make a power-point presentation of 15-20 minutes duration on the research work in front of their fellow students under the supervision of the staff members of the department. A discussion on the talk follows the presentation.

The students shall make a hard-copy of their seminar report & present it before the intended date of the presentation.

## **CIV-717P-Tour & Training**

**L – P**

**0 –4**

**Credits: 2**

The students shall go for tour & training to study an ongoing project work in the state or outside so as to acquaint themselves with the latest technologies in engineering. The students are required to submit a detailed tour & training report and shall submit the same to the evaluation board to be constituted by the HOD.

The weightage shall be as follows:

- i) Expert/supervisor ( From the department) = 40 %
- ii) Project Report = 20 %
- iii) HOD/Board/Viva = 40 %

## **CIV-718P Dynamics and Earthquake Lab**

**L – P**

**0 - 2**

**Credits: 1**

### **List of Experiments**

1. Study the various parts of shake table and its operation.
2. Operation of oscilloscope and data acquisition.
3. Response of single degree lumped mass system.
4. Response of two degree of freedom system.



**OVERVIEW FOR B.TECH COURSE CIVIL ENGINEERING**

**Semester-VIII**

<b>Course Code</b>	<b>Course Title</b>	<b>L - P</b>	<b>Credit</b>	<b>Subject Type</b>
<b>CIV-811T</b>	<b>Design of Bridge Structures</b>	<b>4 - 0</b>	<b>4</b>	<b>C</b>
<b>CIV-812T</b>	<b>Earthquake Resistant Design</b>	<b>4 - 0</b>	<b>4</b>	<b>C</b>
<b>CIV-813TP</b>	<b>Project</b>	<b>5 - 10</b>	<b>10</b>	<b>C</b>
<b>CIV-814P</b>	<b>Professional viva-voce</b>	<b>0-3</b>	<b>2</b>	<b>C</b>
<b>XXX-xxxT</b>	<b>Elective VII (Open)</b>	<b>x - x'</b>	<b>X</b>	<b>OE</b>
<b>YYY-yyyT</b>	<b>Elective VIII (Open)</b>	<b>y - y'</b>	<b>Y</b>	<b>OE</b>
	<b>TOTAL CREDITS</b>	<b>13+(x+y) -13+(x'+y')</b>	<b>20+(x+Y)</b>	

# **CIV-811 T- Design of Bridge Structures**

**L – P**

**4 –0**

**Credits: 4**

## **UNIT I:INTRODUCTION TO BRIDGES**

Introduction to bridges and types of bridges, History and development of bridges, Bridge components; Various types of Loads on bridges, Standard loadings for highway; Introduction to Hydraulic Design of Bridges, Scour depth, Afflux, stream flow (discharges) measurements; Introduction to Sub-structure of Bridge and types of loads on sub-structure.

## **UNIT II:DESIGN OF RCC CULVERTS**

Introduction to culverts, Types of culverts, components of culverts, Design principles for culverts, Design of solid slab culvert.

## **UNIT III:DESIGN OF TRUSS BRIDGES**

Various forms of steel trussed bridges, Analysis and Design of trussed bridges based on standard IRC loading; Design of Stringers and Cross Girders for single & multi-lane bridges for standard IRC loadings.

## **UNIT IV:DESIGN OF PLATE GIRDER BRIDGES**

Analysis and Design of Plate Girder Bridges, Composite bridges.

## **UNIT V:DESIGN OF BRIDGE DECK SLABS**

Analysis and Design of RCC bridge deck slabs; Courbon's Method of Bridge Deck Analysis.

## **BOOKS RECOMMENDED:**

1. Design of Bridges by John victor
2. Design of Bridges by Krishna Raju
3. Design of Masonry& timber structures by A.S. Arya
4. Relevant IRC/IS codes & specifications.

## **CIV-812T Earthquake Resistant Design**

**L – P**

**4 – 0**

**Credits: 4**

### **UNIT I:**

Introduction to earthquakes, Acceleration time history, Response spectrum, Design spectra

### **UNIT II:**

Response of buildings subjected to ground motion based on modal analysis.

### **UNIT III:**

Seismic design of R.C.C. structures (up to 2-storey Buildings) based on Codal provisions IS: 1893.

### **UNIT IV:**

Detailing of RCC Elements as per IS: 13920.

### **UNIT V:**

Seismic Codal provisions of brick masonry structures.

Repair & seismic strengthening of buildings as per IS: 13935.

### **BOOKS RECOMMENDED:**

1. Dynamics of structures by Anil K Chopra.
2. Seismic design of structures by Pankaj Aggarwal, Shrikhande.
3. Seismic design of RCC & Masonry structures by Pauley, T & Priestley.
4. Fundamental Concepts of Earthquake Engineering by Roberto Villaverde.

## **CIV813TP- Project**

**L – P**

**5 –10**

**Credits: 10**

The project assigned to the group of students at the 7<sup>th</sup> semester level will have to be completed at the 8<sup>th</sup> semester. It may require complete field survey, a design & calculations of various structures associated with the project, comparative economic studies, preparations of estimates, laboratory/experimental work etc.

On completion of the project work, a detailed technical report is to be submitted by every student in accordance with the standards adopted for technical report. There will be a viva-voce examination after the submission of the technical report. The H.O.D. would constitute a project evaluation board which will assess the individual project work. The weightage will be as follows:

- i) Supervisor or Internal guide (From the department) = 40 %
- ii) Project Report = 20 % (To be assessed by the evaluation board).

Evaluation board assessment will be done by internal expert/supervisor & the external expert in the ratio of 1:1.

- iii) Presentation & viva-voce = 40 %.

The evaluation board will comprise of supervisor, internal expert & one subject expert preferably from outside the University.

## **CIV-814 P-Professional Viva -Voce**

**L – P**

**0 –3**

**Credits: 2**

A viva-Voce shall be conducted at the 8<sup>th</sup> semester to assess the students' knowledge of the various subjects that have been taught all through the Engineering degree. The HOD shall constitute an evaluation board to conduct the Viva-Voce.

**LIST OF OPEN ELECTIVES****ELECTIVES****LIST OF OPEN ELECTIVES**

<b>Course Code</b>	<b>Subject</b>	<b>L - P</b>	<b>Credits</b>	<b>Preferred semester</b>	<b>Prerequisite</b>
<b>CIV-E07T</b>	<b>Railway and Airport Engineering</b>	<b>3 - 0</b>	<b>3</b>	<b>V</b>	Civil Engineering Background
<b>CIV-E02T</b>	<b>Disaster Management</b>	<b>3 - 0</b>	<b>3</b>	<b>V</b>	Engineering Science Background
<b>ECE-E24T</b>	<b>Applied Electronic Instrumentation</b>	<b>3 - 0</b>	<b>3</b>	<b>V</b>	Basic Electronics Engineering
<b>MTH-412T</b>	<b>Numerical Methods</b>	<b>4-0</b>	<b>4</b>	<b>VI</b>	-
<b>CIV-E04T</b>	<b>Advanced Measurement Techniques (Remote Sensing / GPS)</b>	<b>3 - 0</b>	<b>3</b>	<b>VI</b>	Computer Science/Physics/Math/Engineering discipline/Geology/Geo-informatics
<b>CIV-E06T</b>	<b>Civil Engineering Management</b>	<b>3 - 0</b>	<b>3</b>	<b>VI</b>	Civil Engineering Background
<b>CIV-E08T</b>	<b>Green Architecture &amp; Town Planning</b>	<b>3 - 0</b>	<b>3</b>	<b>VII</b>	Engineering Background
<b>CIV-E10T</b>	<b>Advanced Geo-Technical Engineering</b>	<b>3 - 0</b>	<b>3</b>	<b>VII</b>	Geotechnical Engineering I & II
<b>CIV-E11T</b>	<b>Advanced Pre-stressed Concrete</b>	<b>3 - 0</b>	<b>3</b>	<b>VII</b>	Civil Engineering Background
<b>CIV-E12T</b>	<b>Hydraulic Machines &amp; Water Power Engineering</b>	<b>3 - 0</b>	<b>3</b>	<b>VIII</b>	Water Resource Engineering
<b>MTH-E01T</b>	<b>Operation Research &amp; Optimization</b>	<b>3 - 0</b>	<b>3</b>	<b>VIII</b>	Transportation Engg I/Advanced Structural Analysis/Geotechnical Engg I & II
<b>CIV-E03T</b>	<b>Advanced Construction Technology</b>	<b>3 - 0</b>	<b>3</b>	<b>VIII</b>	Structural Analysis I & II
<b>CIV-E13T</b>	<b>Rock Mechanics &amp; Tunneling Technology</b>	<b>3 - 0</b>	<b>3</b>	<b>VIII</b>	Civil Engineering Background
<b>CIV-E14T</b>	<b>Transportation Planning &amp; Economics</b>	<b>3 - 0</b>	<b>3</b>	<b>VIII</b>	Transportation Engineering I)

# **CIVE07T:Railway and Airport Engineering**

**L – P**

**3 – 0**

**Credits:3**

## **UNIT I: TRANSPORTATION SYSTEM**

Importance of transportation systems, history of railways and its development, development of Indian railways.

## **UNIT II: PERMANENT WAY**

Permanent way and its component parts, formation, ballast, sleepers, rails. Creep and tilt in rails.

## **UNIT III:RAILWAY TRACKS**

Track resistance and tractive effort, gauge problem, super-elevation near branching of curves,gradients. Track fittings and fastenings, points and crossings, station Platforms, yards and sidings.

## **UNIT IV:AIRPORT**

Classification of airports; planning, surveys and site selection of airports; Airport geometrics: runway length and patterns & orientation, wind rose diagram, width and grades of runway, taxiways and aprons.

## **UNIT V: AIRPORT PAVEMENT DESIGN**

Airport pavement design: difference between highway and airport pavements, introduction to various design methods, airport drainage.

## **BOOKS RECOMMENDED:**

1. Rangawala, S.C. 2002. “Railway Engineering”, Charotar Publishers, Anand
2. Arora, S.P. and Saxena. 2001. “ Railway Engineering” , DhanpatRai Publishers, New Delhi.
2. Khanna, Arora and Jain. 2002. “Airport Planning and Design”, Nem Chand and Brothers, Roorkee.
3. Horren Jeff. “Airport Planning and Design

## **CIV-E02T- Disaster Management**

**L – P**

**3 –0**

**Credits: 3**

### **UNIT 1**

Earthquake, causes and classification, Estimation of size of earthquake, Magnitude and intensity, seismic waves, Isoseismal maps, Recurrence intervals, Fault slip rates, Response spectrum.

### **UNIT 2**

Floods, causes of floods, Flood damages, Flood analysis and flood plain zoning, Drought and its impact.

### **UNIT 3**

Cyclones and Tsunami, their causes characteristics and their impact, Prediction and control Measures, Avalanches – Mechanism, Classification, Control measures.

### **UNIT 4**

Landslides - Mechanism, Causative factors, Landslides monitoring and prediction, Landslide hazard zonation.

### **UNIT 5**

Vulnerability and Risk Management, Case studies for natural hazards, Fire hazard.

### **BOOKS RECOMMENDED:**

1. Reiter, L Earthquake Hazard Analysis, Issues and Insights, Columbia University Press.
2. Hyndman D. and Hyndman D, Natural Hazard and Disasters, Brooks/cole.
3. Mileti D.S., Disasters by Design: A Reassessment of Natural Hazards in United States.



## **ECE-E24T-Applied Electronic Instrumentation**

**L – P**

**3 – 0**

**Credits 3**

### **Unit I: Basic measurement concepts:**

Measurement system- static and dynamic characteristics, units and standards of measurements, primary and secondary standards- error, accuracy and precision.

### **Unit II: Basic electronic measurements:**

Electronic multi-meters ' CRO - block schematic-applications, AC and DC measurement-DC voltmeter, ammeter, ohmmeter, digital type voltmeter, ammeter, ohmmeter, AC measurement, ammeter, ohmmeter.

### **Unit III: Transducers and sensor:**

Active and passive transducers, types-resistive, inductive, capacitive, piezoelectric, measurement of physical, physiological, chemical quantities(temperature, pH, luminescence, flow, torque, pressure, speed, acceleration, rotation, stress, strain).

### **Unit IV: Signal generators and analysers:**

Function generators, RF signal generator, sweep generator, frequency synthesizer, wave analysers for audio and radio frequency waves.

### **Unit V: Data acquisition system:**

Components of data acquisition system, interfacing of transducer, single and multichannel system. Multiplexing, interfacing with micro controllers.

### **BOOKS RECOMMENDED:**

1. Electronic measurements by W.Cooper
2. Electrical & Electronic measurements by A.K.Sawhney

## **MTH-412T-Numerical Methods**

**L – P**

**4 – 0**

**Credits: 4**

### **Unit-I:**

**Finite Difference:** Difference Table and its usage. The difference operators  $\Delta$ ,  $\nabla$  and the operator  $E$ . Interpolation with equal intervals, Newton's advancing difference formula. Newton's backward difference formula. Interpolation with unequal intervals. Newton's divided difference formula. LaGrange's interpolation formula.

### **Unit-II**

**Central Differences and Inverse interpolation:** The central difference operator  $\delta$  and the over ranging operator  $\mu$ . Relations between the operators. Gauss forward and backward interpolation formula, Sterling's, Bessel's, Laplace and Everett's formulae.

Inverse interpolation by (i) LaGrange's (ii) Methods of successive approximation & (iii) Methods of elimination of third differences

### **Unit-III:**

**Numerical solution of algebraic and Transcendental Equations and Numerical differentiation & Numerical Integration:**

Graphic Method, Regula-Fast method, Bolzano's Process of bisection of intervals, Newton-Raphson Method and its geometrical significance.

Numerical differentiation of a function. Differential coefficient of a function in terms of its differences. Numerical Integration, General Quadrature Formula, Trapezoidal rule, Simpson's one-third and three-eight rules, Weddle's rule, Euler- Maclaurin expansion formula.

### **Unit-IV**

**Difference Equations and Numerical Solution of ordinary differential equations:**

Linear-homogeneous and non-homogeneous difference equations of order  $n$  with constant coefficient, and their solution, methods of undetermined coefficient.

Numerical solution of ordinary differential equations, Picard's method. Taylor's series method, Euler's method, Runge-Kutta Method.

### **Unit-V**

**Numerical solution of simultaneous equations and Eigen value problem:**

Gauss elimination method, Gauss Jordan method, Gauss- Jacobi and Gauss- Seidel iteration methods, power methods for solving Eigen value problems.

### **BOOKS RECOMMENDED:**

1. Numerical Methods for Scientists and Engineering by M.K.Jain, S.R.Iyengar&R.K. Jain, Wiley Eastern Ltd.
2. Mathematical Numerical Analysis by S.C. Scarborough, Oxford and IBH publishing Company.
3. Introductory methods in Numerical Analysis by S.S.Sastry, Prentice Hall of India.
4. Numerical Solution of Differential equations by M.K.Jain.
5. Numerical Methods for Science & Engineering by R.G.Stanton.

## (Remote sensing/ GPS)

**L – P**

**3 – 0**

**Credits: 3**

### **UNIT I Field Astronomy:**

Definitions of astronomical terms, coordinate systems for locating heavenly bodies, geographic, geodetic, geocentric, Cartesian, local and projected coordinates for earth resources mapping, spherical trigonometry & spherical triangle, astronomical triangle, Napier's rule of circular parts, convergence of meridian, parallel of latitude, shortest distance between two points on the earth, determination of time, true meridian, azimuths, latitude and longitude. Nautical sextant.

### **UNIT II: Remote sensing**

Remote Sensing: Principle, components, classification, remote sensing data acquisition. Process, different types of remote sensing satellite imagery with special relevance to Indian Remote Sensing Satellites (IRS) and applications. Digital Image processing, its objectives and different steps in it. Introduction to LIDAR & Underground utility Survey.

### **UNIT III: GIS (Geographic information system):**

GIS: Definition, components and advantages Concepts and terminology, essential components, data acquisition, raster and vector data, Data format conversions, capabilities/functionalities of GIS, neighborhood functions, map overlay analysis, data quality, Watershed analysis & Preparation of thematic maps. Limitations of GIS, sources of errors in GIS applications of GIS

### **UNIT IV: Global positioning system. (GPS):**

Introduction & components of GPS, Space segment, control segment and User segment, Elements of Satellite based surveys-Map datums, GPS Receivers, GPS observation methods and their advantages over conventional Methods. Calculation of user position, GPS system time, carrier phase measurement techniques, indian coordinate system for using GPS, GPS error sources , GPS accuracy, uses and applications of GPS.

### **UNIT V: Total station survey:**

Introduction, features of total station, setting up and orientation of total station, on-board software, electronic data recording, total station characteristics, field procedures for total stations in topographic surveys.

### **BOOKS RECOMMENDED:**

1. Surveying Vol.I& II by S.K. Duggal, Tata McGraw Hill Publishing Company Ltd. New Delhi
2. Engineering Surveying: Theory and Examination Problems for Students by W. Schofield, Butterworth, Heinemann, Oxford.
- 3 Surveying by K,RArora volume II & III
4. Advance Surveying by A.M. Chandra, New Age International Publishers N. Delhi.
- 5 Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.

## **CIV-E06T-Civil Engineering Management**

**L – P**

**3 – 0**

**Credits: 3**

### **UNIT I: BASIC CONCEPTS**

Construction Management, its necessity; objectives & Functions, Introduction of Project management – Project planning, Scheduling, Controlling.

Role of decision in project management, Techniques for analyzing alternatives: Operation research, Methods of planning & programming Problems.

### **UNIT II: ELEMENTS & DEVELOPMENT OF NETWORK**

Introduction to Bar Charts & Milestone Charts, Event, Activity, Dummy, Network rules, Graphical guidelines for network, Common partial situations for network, Cycles.

Planning of network construction, Modes of network construction, Steps in development of network, Work breakdown structure.

### **UNIT III: TIME ESTIMATES & TIME COMPUTATION**

Introduction, Time estimates, Frequency distribution, Mean, Variance & Standard deviation, Expected time.

Earliest expected time, Formulation of TE , Latest allowable occurrence time, Formulation of TL , Combined computations of TE & TL.

### **UNIT IV: NETWORK ANALYSIS**

Slack, Critical path, Probability of meeting scheduled date.

CPM: process, CPM: networks, Activity time estimate, Earliest event time, Latest allowable occurrence time, Start & finish time of activity, Float, Critical activities & Critical path.

### **UNIT V: WORKS ACCOUNTING**

Cashbook, imprest cash, contractors bills, store accounts, Material at site account, indent, invoice, debit & credit notes, suspense head, stock, Engineering Statements. Forms of agreement.

### **BOOKS RECOMMENDED**

1. Civil Engineering Management by O.N. Wakhloo
2. Project Planning & Control by B.C. Punmia
3. Construction Management by Mahesh Verma

## **CIV-E08T-Green Architecture & Town Planning**

**L – P**

**3 – 0**

**Credits 3**

### **UNIT I: ARCHITECTURE**

Architecture & Civil Engineering, classical Architecture, contemporary Architecture, General aspects of Architectural projects.

Architectural planning and design-Introduction, factors affecting Architectural Design, principles of Architectural design, organization of space, space standards, modular co-ordination.

### **UNIT II: FUNCTIONAL ANALYSIS**

Analytical study of Buildings in respect of functional efficiency, Architectural efficiency, Building Science, environmental controls-both exterior and interior, physical and economic constraints with respect to residential and Public buildings, DhajjiDewari and Takh System.

### **UNIT III: ARCHITECTURAL PLANS AND PROJECTS**

Introduction to Architectural plans, preparation and reading of architectural plans, analytical study of various works/projects of some architects like LE Corbusier, Philip Jhonson, F.L.Wright, etc.

### **UNIT IV: TOWN PLANNING**

Planning at various levels-national, regional, city, village.  
Origin & growth of towns, Horizontal and Vertical development.  
Brief historical review of some ancient towns, present day planning in India.

### **UNIT V: MASTER PLAN & ZONING**

Importance of Master Plan for redevelopment of existing towns & planning of new towns, implementation, building Bye-Laws, concept of Red-hood Neighbourhood Pattern.

Zoning Regulation for various urban land uses including density and height zoning, multi-story buildings and their implications on urban planning.

### **BOOKS RECOMMENDED-**

1. Architectural Design by KR Moudgil
2. Town Planning by Rangawala
3. Town Design by Fredrick Gibberd
4. New concepts in Architecture & design by Yoshikawa

## **CIV-E10T- Advanced Geo-Technical Engineering**

**L – P**

**Credits 3**

**3 – 0**

### **UNIT I: EARTH RETAINING STRUCTURES**

Analysis and Design of Sheet piles and Gravity retaining structures by various methods, Introduction to bulkheads.

### **UNIT II: EARTH STABILISATION**

Methods of Stabilization. Brief introduction to each of the methods of stabilization such as Shot-creting, geo-reinforcement, Ground improvements by Stone Column and preconsolidation, bracings of excavation.

### **UNIT III: ENVIRONMENTAL GEOTECHNIQUES**

Landfills and its types, Clay-Liners, etc.

### **UNIT IV: SOIL DYNAMICS**

Dynamic behavior of soils and its impact on Foundation design, Machine Foundations

### **UNIT-V: FOUNDATION DESIGN**

Analysis and Design of raft footings, pile foundations, well foundations and Caissons

### **Books Recommended**

1. Earth Retaining Structures by Shamsheer Prakash.
2. Design Aids in Geotechnical Engineering by Kani Raj.
3. Foundation Engineering by Teng.
4. Foundation Engineering by Bowe

## **CIV-E11T- Advanced Pre-Stressed Concrete**

**L – P**

**3 –0**

**Credits: 3**

### **UNIT I: INTRODUCTION**

Basic concept of prestressing – Advantages of prestressed concrete over reinforced concrete – materials for prestressed concrete and their characteristics. Uniform prestress distribution in prestressed concrete – non-uniform prestress distribution – moments of resistance.

### **UNIT II: SYSTEMS OF PRESTRESSING & LOSSES IN PRESTRESS**

Tensioning devices, Pre-tensioning systems, post-tensioning systems, thermo-electric prestressing, chemical prestressing; Nature of prestress losses, Losses due to: Elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, anchorage slip. Total losses allowed for in Design.

### **UNIT III: ANALYSIS OF MEMBERS**

Analysis of pre-stressed structural members for axial loads, flexure, shear & torsion. Analysis calculations for various elements.

### **UNIT IV: LIMIT STATE DESIGN CRITERIA FOR PRESTRESSED CONCRETE MEMBERS**

Inadequacies of the Elastic & Ultimate Load Methods, philosophy of Limit state Design, Criteria for limit states, Design Loads & Strengths, Strength & serviceability Limit States, Principles of Dimensioning Concrete Members.

### **UNIT V: DESIGN OF PRESTRESSED CONCRETE SECTIONS**

Design of Pre-stressed sections for flexure, axial tension, shear & Torsional forces. Combination of stresses.

### **BOOKS RECOMMENDED:**

1. N. Krishna Raju, Prestressed Concrete, Tata McGraw Hill Publishing Co. Ltd, New Dehi.
2. S K Mallick, A P Gupta, Prestressed concrete, Oxford and IBI Series.
3. R. H. Evans, Bennet E W, Prestressed concrete theory and design, Chapman and Hall, London.
4. T. Y. Lin, Design of Prestressed Concrete Structures, Asia Publishing House.



## **CIV-E12T-Hydraulic Machines & Water Power Engineering**

**L – P**

**3 –0**

**Credits: 3**

### **UNIT I: GENERAL INTRODUCTION**

Development of water power, Estimation of Hydropower potential, Comparison of hydro, thermal & nuclear power.

Classification of hydro-power plants.

### **UNIT II: ANALYSIS OF STREAM FLOW & DEMAND**

Flow duration curve, firm power, secondary power, load & Load duration curves, load factor etc.

### **UNIT III: WATER CONVEYANCE SYSTEM**

Power canals, Alignment, Design of power canals, flumes, covered conduits & tunnels.

Penstocks- Alignment, types of penstocks, Economic diameter of penstocks, Anchor blocks.

### **UNIT IV: DAMS**

Selection of site, preliminary investigations, Final investigations.

Rigid Dams: Basic principles of design & details of construction.

Embankment Dams: Earthen dams, rock-fill dams, design Considerations.

Spillways: Types of spillways, Spillway gates, Design of stilling basins.

### **UNIT V: POWER HOUSE DETAILS**

Forebay, intakes, General layout of power house & arrangement of hydropower units; Underground power stations.

### **BOOKS RECOMMENDED:**

1. Dandekar, M.M. “Water Power Engineering”.
2. Deshmukh, M.M. “Water Power engineering”, DanpatRai& Sons, New Delhi.
3. Arora, K.R. “Irrigation, Water Power & Water Resources Engineering”, Standard Publishers Distributors, Delhi.

## **MTH-E01T Operation Research & Optimization**

**L – P**

**3 –0**

**Credits: 3**

### **Unit I: Introduction**

Introduction to operation Research, Linear Programming problem à €. Formulation of LPP, Graphical solution of LPP, simplex method, artificial variables, big-M method.

### **Unit II: Transportation Problems**

Formulation, solution of balanced transportation problem. Finding initial basic feasible solutions à €. North-west corner rule, least cost method and Vogoles approximation method.

### **Unit III: Assignment Model and Hungarian method**

Assignment Model Formulation, Hungarian method for optimal solution; solving unbalanced problems; travelling salesman problem and assignment.

### **Unit IV: Sequencing Models**

Solution of sequencing problem à €; processing n jobs through two machines, à € processing n jobs through three machines à €; Processing two jobs through m machines.

### **Unit V: Dynamic Programming**

Introduction to Dynamic programming problems, Characteristics and applications of Dynamic Programming, Mathematical formulation and optimal Solution of Dynamic Programming problems.

### **BOOKS RECOMMENDED:**

1. P. SankaraIyer, à € Operations Research, Tata McGraw Hill 2008
2. A.M. Natarajan, P.Balasubramani, A. Tamilarasi, à € Operations, Pearson Education, 2005.

## **CIV-E03T- Advanced Construction Technology**

**L- P**

**3 - 0**

**Credit: 3**

### **UNIT I:**

Construction Technology and various Construction methods.

Construction equipment: Selection ,cranes, hoists, mixers, conveyors, vibrators, bulldozer, dumpers, trenchers, excavators, hoe, graders, piling hammers, pumps, compressors, bitumen mix plant, rollers, clam shell, aggregate production techniques, crushers.

### **UNIT II:**

Project scheduling: Network planning and scheduling, resource leveling and allocation with examples using various techniques namely Bar chart; CPM and PERT.

### **UNIT III:**

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.**

### **UNIT IV:**

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.

### **UNIT V:**

Form work, Scaffolding, shoring, Shuttering and underpinning; their types, characteristics, performance and application to building processes.

### **Books Recommended:**

1. Construction Methods Plant and Equipment by R.L. Purifoy
2. Building Construction by S.P. Arora& S.P. Bindra
3. Project Management by B.M. Naik
4. The practice of Construction Management by Barry Fayer.

## **CIV-E13T: Rock Mechanics & Tunneling Technology**

**L – P**

**3 - 0**

**Credits: 3**

### **UNIT I: INTRODUCTION TO ROCK MECHANICS**

Introduction, terminology, Rock classification systems, physical & mechanical properties of rocks, laboratory testing, stability of rock slopes, Rock bolting.

### **UNIT II: INTRODUCTION TO TUNNELS**

Introduction, Classification of tunnels. Survey for a tunnel project

### **UNIT III: METHODS OF TUNNELING**

Methods of Tunneling in soft & hard rock. Methods of rock blasting in tunnels.

### **UNIT IV: TUNNEL SERVICES**

Tunnel services in rock tunnels; ventilation, drainage and lighting.

### **UNIT V: TUNNEL LINING & SUPPORTS**

Lining of tunnels in soft grounds methods and types, tunnel supports for weak rocks including rock bolting.

### **BOOKS RECOMMENDED:**

1. Brown, E.T. “Analytical & computational Methods in Engineering Rock Mechanic, CBS Publishers & Distributors, New Delhi.
2. Godman, P.E. “Introduction to Rock Mechanics”, John Wiley, 1989.

## **CIV-E14T-Transportation Planning & Economics**

**L – P**

**3 –0**

**Credits: 3**

### **UNIT I:**

Introduction and scope of transportation planning and transportation economics, transportation planning issues.

### **UNIT II:**

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

### **UNIT III:**

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.

### **UNIT IV:**

Transport economics and finance: pavement economics- construction cost; maintenance cost and vehicle operation cost, economic evaluation of highway projects- basic principles

### **UNIT V:**

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.

### **BOOKS RECOMMENDED:**

1. Transport Planning and Traffic Engineering by CA O’Flaherty, John Wiley & Sons, Inc., New York; Toronto.
2. Transportation Engineering and Planning by Papacostas & Prevedouros, Prentice-Hall of India Private Ltd, New Delhi-110001
3. Principles of Transportation Engineering by Chakarborty & Das, Prentice-Hall of India Private Ltd, New Delhi-110001
4. Urban Transportation Planning by Meyer & Miller, McGraw Hill, New Delhi

**LIST OF GENERIC ELECTIVES**

<b>Course Code</b>	<b>Subject</b>	<b>L - P</b>	<b>Credits</b>	<b>Preferred semester</b>	<b>Prerequisite</b>
<b>CIV-G01T</b>	<b>Civil Engineering and Materials Construction Techniques</b>	<b>3 - 0</b>	<b>3</b>	<b>III</b>	Engineering Science Background (Excluding CE)

# **CIV-G01T Civil Engineering Materials and Construction Techniques**

**L- P**  
**3 – 0**

**Credit: 3**

## **UNIT I: Bricks & Timber:**

Bricks: Classification, Characteristics of good bricks, Ingredients of good brick earth, Different forms of bricks, testing of bricks as per BIS. Defects of bricks.  
Timber :Types of timber, Seasoning of timber; Methods, Defects in Timber, Decay of Timber, Preservation of Timber, Testing of Timber, Veneers , Plywood.

## **UNIT II: Cement, PCC & RCC**

Cement: Cement: OPC, PPC , Composition, Types of cement. Plain concrete, composition and grades of concretes  
RCC : Properties and composition of RCC, Applications and uses of RCC, Types of steel used in RCC.

## **UNIT III: Form work & Scaffolding**

Form work, Scaffolding, shoring, Shuttering and underpinning; their types, characteristics,

## **UNIT IV: Structural elements**

Performance and application to building processes. Foundation, DPC, brick masonry and stone masonry. Beams columns and slabs. Lintel beams and plinth beams, Roofs and floors. Trusses

## **UNIT V: Construction equipment & Repairing**

Selection ,cranes, hoists, mixers, transit mixer, conveyors, vibrators, bulldozer, dumpers, trenchers, excavators, hoe, graders, piling hammers, pumps, compressors, bitumen mixer, bitumen mix plant, rollers, clam shell, aggregate production techniques, crushers.

Minimum repair works, repair of cracks and sinking of floor.

## **Books Recommended:**

1. Building materials by Parbingsingh.
2. Building materials and construction by Gurcharan Singh
3. Construction Methods Plant and Equipment by R.L. Purifoy
4. Building Construction by S.P. Arora & S.P. Bindra

