

Course Curriculum  
B.TECH  
IN  
CIVIL ENGINEERING



**2016**

**Department of Civil Engineering**

**JAYPEE UNIVERSITY OF ENGINEERING & TECHNOLOGY**

**A.B. ROAD, RAGHOGARH, DT.-GUNA-473226 (M.P.), INDIA**

COURSE CURRICULUM, B-Tech (Civil Engineering)

SEMESTER – I (B-1)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B11HS111	Presentation and Communication Skills	Core	3	0	0	3
2	14B19HS199	English - Audit Course	Core	-	-	-	0
3	14B11MA111	Mathematics-I	Core	3	1	0	4
4	14B11PH111	Physics-I	Core	3	1	0	4
5	14B11EC111	Electrical Circuit Analysis	Core	3	1	0	4
6	14B11CI 111	Introduction to Computers and Programming	Core	3	1	0	4
7	14B17PH171	Physics Lab-I	Core	0	0	2	1
8	14B17EC171	Electrical Circuits Lab	Core	0	0	2	1
9	14B17CI 171	Computer Programming Lab	Core	0	0	4	2
			<b>Sub Total</b>				<b>23</b>

SEMESTER – II (B-2)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B11HS211	Group and Cooperative Processes	Core	3	0	0	3
2	14B11MA211	Mathematics - II	Core	3	1	0	4
3	14B11CL212	Chemistry	Core	3	1	0	4
4	14B11CE211	Building Materials & Construction	Core	3	0	0	3
5	14B11CE212	Engineering Mechanics	Core	3	1	0	4
6	14B11CE314	Engineering Geology	Core	3	0	0	3
7	14B17CE271	Workshop Practices (Lab)	Core	0	0	2	1
8	16B17CE272	Engineering Mechanics Lab	Core	0	0	2	1
9	14B17CL272	Chemistry Lab	Core	0	0	2	1
			<b>Sub Total</b>				<b>24</b>

SEMESTER – III (B-3)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B11HS311	Managerial Economics	Core	3	0	0	3
2	14B11CE311	Mechanics of Solids	Core	3	1	0	4
3	14B11MA312	Numerical Methods	Core	3	1	0	4
4	14B11CE312	Fluid Mechanics	Core	3	1	0	4
5	14B11CE313	Concrete Technology	Core	3	0	0	3

6	14B11GE211	Environmental Studies	Core	3	0	0	3
7	14B17CE371	Engineering Graphics & CAD Lab	Core	0	0	4	2
8	14B17CE372	Fluid Mechanics Lab	Core	0	0	2	1
9	14B17CE373	Concrete Technology Lab	Core	0	0	2	1
10	14B17CE374	Strength of Material Lab	Core	0	0	2	1
			Sub Total				26

SEMESTER – IV (B-4)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B11HS411	Financial Management	Core	3	0	0	3
2	14B11CE411	Water Supply Engineering	Core	3	1	0	4
3	14B11CE412	Surveying	Core	3	1	0	4
4	14B11CE413	Geotechnical Engineering	Core	3	1	0	4
5	14B11CE414	Water Resource Engineering	Core	3	1	0	4
6	14B11CE415	Structural Analysis	Core	3	1	0	4
7	14B17CE471	Environmental Engineering Lab	Core	0	0	2	1
8	14B17CE472	Surveying Lab	Core	0	0	4	2
9	14B17CE473	Geotechnical Engineering Lab	Core	0	0	2	1
			Sub Total				27

SEMESTER – V (B-5)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS541- HS544	HSS Elective	Elective	3	0	0	3
2	14B11CE511	Sewage Treatment & Disposal	Core	3	1	0	4
3	14B11CE512	Highway Engineering	Core	3	1	0	4
4	14B11CE513	Design of Concrete Structures	Core	3	1	0	4
5	14B11CE514	Advanced Structural Analysis	Core	3	1	0	4
6	14B17CE572	Highway Engineering Lab	Core	0	0	2	1
7	14B17CE573	Building Drawing Lab	Core	0	0	2	1
8	14B19CE591	Seminar	Core	0	0	2	1
9	14B14CE541- CE544	Department Elective - 1	Elective	3	0	0	3
			Sub Total				25

SEMESTER – VI (B-6)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS611- HS644	HSS Elective	Elective	3	0	0	3
2	14B11CE611	Foundation Engineering	Core	3	1	0	4
3	14B11CE612	Design of Steel Structure	Core	3	1	0	4
4	14B11CE613	Transportation Engineering	Core	3	1	0	4
5	14B11CE614	Estimation and Costing	Core	3	1	0	4
6	14B17CE671	Foundation Engineering Lab	Core	0	0	2	1
7	14B17CE672	Civil Engineering Software Lab	Core	0	0	2	1
8	14B14CE641- CE644	Department Elective - 2	Elective	3	0	0	3
<b>Sub Total</b>							<b>24</b>

**After completion of 6<sup>th</sup> Semester, Industrial Training of Six Weeks is Compulsory for All Students.**

SEMESTER – VII (B-7)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS741- HS746	HSS Elective	Elective	3	0	0	3
2	14B14CE741- CE746	Department Elective – 3	Elective	3	0	0	3
3	14B14CE747- CE752	Department Elective – 4	Elective	3	0	0	3
4	14B14*****	<b>Outside</b> Department Elective – 5	Elective	3	0	0	3
5	14B11CE711	Construction Technology & Management	Core	3	1	0	4
6	14B19CE791	Project Part-I	Core	0	0	14	7
<b>Sub Total</b>							<b>23</b>

SEMESTER – VIII (B-8)

S. NO.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS841- HS845	HSS Elective	Elective	3	0	0	3
2	14B14CE841- CE844	Department Elective – 6	Elective	3	0	0	3
3	14B14CE845- CE849	Department Elective – 7	Elective	3	0	0	3
4	14B14CE850- CE854	Department Elective – 8	Elective	3	0	0	3
5	14B14CE855- CE858	Department Elective – 9	Elective	3	0	0	3
6	14B19CE891	Project Part-II	Core	0	0	16	8
			<b>Sub Total</b>				<b>23</b>
			<b>TOTAL CREDITS</b>				<b>195</b>

**LIST OF DEPARTMENT ELECTIVES**

**SEMESTER B-5**

**ELECTIVE 1**

14B14CE541	Open Channel Hydraulics
14B14CE542	Advanced Construction Materials
14B14CE543	Advanced Surveying
14B14CE544	Geosynthetics and Reinforced Soil

**SEMESTER B-6**

**ELECTIVE 2**

14B14CE641	Environmental Legislation & Auditing
14B14CE642	Disaster Management and Mitigation
14B14CE643	Selected Concrete Structures
14B14CE644	Traffic Engineering

**SEMESTER B-7**

**ELECTIVE 3**

14B14CE741	Ground Improvement Techniques
14B14CE742	Risk & Reliability in Geotechnical Engineering
14B14CE743	Soil Dynamics & Machine Foundations
14B14CE744	Rock Mechanics

14B14CE745                      Underground Technology  
14B14CE746                      Advanced Foundation Engineering

**ELECTIVE 4**

14B14CE747                      Metal Structures  
14B14CE748                      Pre-stressed Concrete Structure  
14B14CE749                      Earthquake Engineering  
14B14CE750                      Bridge Engineering  
14B14CE751                      FEM and its Applications to Civil Engineering  
14B14CE752                      Advanced Concrete Technology

**ELECTIVE 5                      FROM OUTSIDE DEPARTMENT**

14B14PH731                      Nanotechnology & its Application (**Physics**)  
14B14MA733                      Optimization Technique (**Mathematics**)  
14B14CL844                      Computational Fluid Dynamics (**CHE**)  
14B14CI 853                      Artificial Neural Network (**CSE**)  
14B14WE753                      Wind Resistant Design of Structures (**WEAC**)

**SEMESTER B-8**

**ELECTIVE 6**

14B14CE841                      Hydropower Engineering  
14B14CE842                      Dam and Reservoir Design  
14B14CE843                      River Engineering  
14B14CE844                      Design of Hydraulic Structures

**ELECTIVE 7**

14B14CE845                      Advance Pavement Design  
14B14CE846                      Airport Engineering  
14B14CE847                      Urban Transportation Planning & Design  
14B14CE848                      Highway Construction, Maintenance and Management  
14B14CE849                      Docks and Harbor Engineering

**ELECTIVE 8**

14B14CE850                      Environmental Management & Impact Assessment  
14B14CE851                      Geo-environmental Engineering  
14B14CE852                      Energy Resources & Conservation  
14B14CE853                      Industrial Waste Treatment  
14B14CE854                      Design of Water & Wastewater Treatment Plants

## **ELECTIVE 9**

14B14CE855	Remote Sensing and GIS Applications
14B14CE856	Sustainable Design & Construction
14B14CE857	Repair, Retrofitting & Rehabilitation of Structures
14B14CE858	Forensic Geotechnical Engineering

## **HS ELECTIVES**

### **SEMESTER B-5**

14B14HS541	Social & Legal Issues
14B14HS542	Human Psychology
14B14HS543	Professional Ethics
14B14HS544	Macro Economics

### **SEMESTER B-6**

14B14HS641	Project Management
14B14HS642	Business Environment
14B14HS643	Fundamentals of Financial Market
14B14HS644	Marketing Management

### **SEMESTER B-7**

14B14HS741	Entrepreneurial Development
14B14HS742	Managing & Marketing of Technology
14B14HS743	Entrepreneurship and Small Business
14B14HS744	Marketing Management
14B14HS745	Human Resource Management
14B14HS746	Total Quality Management

### **SEMESTER B-8**

14B14HS841	Knowledge Management
14B14HS842	Industrial Psychology
14B14HS843	Business Environment
14B14HS844	Management of Technology
14B14HS845	Strategic Management

SEMESTER – I (B-1)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
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2	14B19HS199	English - Audit Course	Core	-	-	-	0
3	14B11MA111	Mathematics-I	Core	3	1	0	4
4	14B11PH111	Physics-I	Core	3	1	0	4
5	14B11EC111	Electrical Circuit Analysis	Core	3	1	0	4
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7	14B17PH171	Physics Lab-I	Core	0	0	2	1
8	14B17EC171	Electrical Circuits Lab	Core	0	0	2	1
9	14B17CI 171	Computer Programming Lab	Core	0	0	4	2
			<b>Sub Total</b>				<b>23</b>



# Course Description

**Title of Course: Presentation and Communication Skills**

**Course Code: 14B11HS111**

**L-T Scheme: 3-0**

**Course Credits: 3**

**Objectives:** To develop effective presentation and communication skills that enable the students to speak, write and present in clear, correct, concise, and audience-centered manner, which has grammatical correctness, and a graceful, uncluttered style.

**Learning Outcomes:** Students will be able to:

- inculcate effective listening skills that enable them to comprehend instructions and become a critical listener
- augment effective oral skills that enable them to speak interpersonally
- develop active reading skills that is reading with an awareness of a purpose, and
- Instill the writing skills in a lucid style which ensures careful and nuanced textual analysis, command of primary and secondary materials, and interpretive judgment.

**Course Contents:**

- Introduction to Communication
- Oral Communication skills: Stress, Rhythm, Intonation, Coherence, Phonetics etc.,
- Listening Skills, Reading Skills: Intensive and Extensive Reading, SQ3R, Vocabulary and morphology
- Writing Skills: Letter Writing, Circulars, Notices, Agenda, Minutes, Report Writing, Power point presentation

**Text Book**

1. Business Communication by K. K. Sinha

**References**

1. Basic Business Communication by Lesikar Flatley

## Course Description

**Title of Course: English**  
**L-T Scheme: 1-0**

**Course Code: 14B11HS199**  
**Course Credit: 0**

**Objectives:** To enable the students to use English language as a tool for their specific professional and individual requirements.

**Learning Outcomes:** Students will be able to write and speak a proficient English language as specific professional and individual requirements.

### **Course Contents:**

- Conversational Skills
- Vocabulary and comprehension
- Functional English grammar
- Noun, Pronoun, Verb, Tenses, Narration
- Active and Passive voices, Clause etc.
- Compositions

### **Text Books**

1. Wren and Martin: English Grammar and Composition
2. Raymond Murphy : Essential English Grammar

## Course Description

**Title of Course: Mathematics-I**  
**L-T Scheme: 3-1**

**Course Code: 14B11MA111**  
**Course Credits: 4**

**Objective:** To make students aware of the basic mathematical concepts and methods which will help them in learning courses in engineering and Technology

**Learning Outcomes:** At the end of the course the student will have the background of mathematics necessary for understanding other courses of engineering and allied sciences.

### Course Contents:

- Partial differentiation, Taylor's Series, Maxima and Minima,
- Jacobians, Double Integrals, Equations to a line, plane, curve and surfaces, Line and Surface integrals.
- Gradients, divergence and curl, Normal and Tangent to a surface, Gauss and Stokes theorems.
- Differential equations with Constant coefficients,
- Laplace transforms, Algebra of Matrices, Determinants, Rank,
- Gauss elimination Method, Eigen values and vectors, Quadratic forms.

### Text Books

1. Thomas, G.B., Finney, R.L. : Calculus and Analytical Geometry, 9<sup>th</sup> Ed., Addison Wesley, 1996

### References

1. Grewal, B. S., Higher Engineering Mathematics, Khanna Publishers, Delhi.
2. Prasad Mudralaya, Advanced Mathematics for engineers, 1992.
3. Lipschuts, S., Lipsom M.: Linear Algebra, 3<sup>rd</sup> Ed, Schaum series 2001.
4. Simmons, G.F, Differential Equations with Appln, 2<sup>nd</sup> Ed, McGraw Hill 1991.

## Course Description

**Title of Course: Physics-I**

**Course Code: 14B11PH111**

**L-T Scheme: 3-1**

**Course Credits: 4**

**Objective:** Broadly, the study of Physics improves one's ability to think logically about the problems of science and technology and obtain their solutions. The present course is aimed to offer a broad aspect of those areas of Physics which are specifically required as an essential background to all engineering students for their studies in higher semesters.

**Learning Outcomes:** At the end of the course, the students will have sufficient scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, and lasers.

### Course Contents:

**Unit-I (Relativity):** Frames of reference, Galilean transformation, Michelson Morley Experiment, Postulates of special theory of relativity, time dilation and length contraction, twin paradox, Lorentz transformations, addition of velocities, Relativistic Doppler effect, Mass variation with velocity, Mass-energy relation, electricity and magnetism. Brief discussion on General theory of Relativity. Black holes, bending of light by gravity, gravitational red shift, global positioning system(GPS).

**Unit-II (Elements of Quantum Mechanics):** Quantization of Radiation: Black body radiation, Wein,s law, Rayleigh Jeans law, Planck's law of radiation, photo electric effect Compton scattering. Quantization of Matter: Atomic spectra, Bohr model of hydrogen atom, Frank hertz experiment, Matter waves, de Broglie hypothesis, Davisson Germer experiment, wave packets, phase and group velocity Heisenberg's uncertainty principle, Schrödinger wave equation and its applications to the free particle in a box, potential barrier and Harmonic oscillator. Quantum numbers, Spin and orbital angular momentum, L-S and j-j coupling. Atoms in magnetic field, Zeeman effect.

**Unit-III (Statistical Mechanics):** Micro and Macro states, temperature and the partition function, Concept of Entropy, Shannon's information entropy, Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac distributions and their applications.

**Unit-IV (Elements of Solid State Physics):** Basic ideas of bonding in solids, Crystal structure, X-ray diffraction, Band theory of solids, Distinction between metals, semiconductors and insulators.

**Unit-V (Lasers):** Principle and working of laser, Different types of lasers (He-Ne Laser, Ruby Laser, Semiconductor Laser), Applications of Lasers.

### Text Books and References:

1. A. Beiser, Perspectives of Modern Physics, Tata McGraw Hill.
2. J R Taylor, C D Zafiratos, M A Dubson, Modern Physics for Scientist & Engineers, Pearson Education.
3. K Krane, Modern Physics, Wiley India
4. J Bernstein, P M Fishbane, S. Gasiorowicz, Modern Physics, Pearson Education.
5. B. B. Laud, Laser and Non-Linear Optics, New Age International (P) Ltd.
6. Resnick, Relativity, New Age.

# Course Description

**Title of Course: Electrical Circuit Analysis**

**Course Code: 14B11EC111**

**L-T Scheme: 3-1**

**Course Credits: 4**

**Objectives:** The objective of this course is to build basic concepts of electrical circuits. To understand network theorems and to build fundamental concepts in the design and implementation of different electrical circuit. To build basic concepts for the understanding of different electrical components and devices.

**Learning Outcomes:** The Students will be able to learn-

1. Basic concepts of electrical circuits
2. Implementation of network theorems.
3. Characteristics of different electrical components
4. Application of circuit theory in electronics circuit.

## Course Contents:

Introduction to circuit elements  $R$ ,  $L$ ,  $C$  and their characteristics, Different types of sources (like AC and DC, current and voltage, dependent and independent), KCL and KVL, Node and Loop analysis, Star and Delta conversion, Thevenin's and Norton's theorem, Superposition, Reciprocity, Maximum Power Transfer, Graph Theory, Tree and links, planar networks, Ideal opamp as a circuit element, AC waveform analysis frequency, phase, amplitude, peak, rms and average value of ac waveform.

Single phase ac circuit analysis containing  $R$ ,  $L$  and  $C$ , and their combinations, Concepts of impedance, power, active, reactive and apparent power and power factor, Series and parallel resonance, bandwidth and quality factor, Concept of 3-phase ac circuits, star and delta connections, Frequency domain analysis – Laplace transform solution of Integral differential equations, Forced and natural responses, Transient analysis, Concept of two-port Network,  $Z$ ,  $Y$ , transmission (ABCD) and Hybrid parameter, Introduction to electrical filters and transmission line.

## Text Books

1. B. L. Theraja, "Basic Electrical Engineering", vol. 1 ( For unit 1 and 2)
2. K. M. Soni, "Circuits and System" S. K. Kataria & Sons ( for unit 3,4 ,5, and 6)

## References

1. M. E. Van Valkenburg, Network Analysis, (PHI)
2. Dr.Abhijit Chakrabarti "Circuit Theory".
3. W. H. Hayt Etal:Engineering Circuit Analysis(6<sup>th</sup> Edition), Tata McGraw-Hill, 2006

# Course Description

**Title of Course: Introduction to Computer Programming**

**Course Code: 14B11CI111**

**L-T Scheme: 3-1**

**Course Credits: 4**

**Objective:** This class is designed to explore computing and to introduce you to the art of computer programming. You will develop a sense of style and aesthetics for programs that will help your programming. You will be introduced to the design principles for writing good programs. This course teaches not only the mechanics of programming, but also how to create programs that are easy to read, maintain, and debug.

## Learning Outcomes

1. Knowledge of structured programming in program design
2. Writing programs in C, Pascal
3. Program documentation skills
4. Program testing skills

## Course Contents:

### Unit -I: Introduction to Computers and Number Systems

Introduction to computers, Applications, Memory Hierarchy, Introduction to Operating system as user interface, Introduction to Input and Output Devices, Number system & representation - Fixed and Floating point numbers, Complement of numbers and arithmetic operations. Character and Instruction Representation.

### Unit -II: Program Design and Problem solving

Structured Programming, Types of Programming Languages, Problem solving and programming, Quality aspects of structured programs, Programming Design tools (Pseudo code and Flowcharts), Operating Systems, Device driver ,Loader, Linker, BIOS Software.

### Unit -III: C Operators, Case Control and Loop Control Structures

Arithmetic Operators, Assignment, Logical/Relational, Bitwise, Odds and ends Operators, if, if – else, Nested if, if – else if, switch-case, conditional operator and goto. Entry control and exit control loops, while , do while , for etc.

### Unit -IV: Array, String, Functions and Pointers

One Dimensional and Two Dimensional Arrays, Strings, Function and basic concepts of pointers. Accessing array using pointers.

### Unit -V: Recursion, Dynamic Memory Allocation

Storage classes, recursion and overview of malloc, calloc, free functions

### Unit -VI: Structures, Union, Linked List and File Handling

Overview of structures and union, structures v/s union, enumeration, overview of linked list, File handling.

**Text Book:**

1. "The Complete Reference C", Herbert Schildt.

**References:**

1. "Understanding Pointers in C", Yashwant Kanetkar
2. "The Practice of Programming", Brian W. Kernighan and Rob pike.
3. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie. Prentice Hall, Inc.
4. "Program Design and Development", Charles Dickson.

## Course Description

**Title of Course: Physics Lab-I**

**L-T-P Scheme: 0-0-2**

**Course Code: 14B17PH171**

**Course Credit: 1**

**Objective:** Broadly, the study of Physics improves one's ability to think logically about the problems of science and technology and obtain their solutions. The present course is aimed to offer a broad aspect of those areas of Physics which are specifically required as an essential background to all engineering students for their studies in higher semesters.

**Learning Outcomes:** At the end of the course, the students will have sufficient scientific understanding of different phenomena associated with light, relativity, statistical physics, atomic physics, and lasers.

### Course Contents:

#### Experiments Lists-

1. To study the variation of magnetic field along the axis of Helmholtz Galvanometer and to determine its reduction factor.
2. To determine the specific rotation of cane sugar solution using Biquartz polarimeter.
3. To observe Newton's rings and to determine the wavelength of sodium light.
4. To determine the wavelengths of spectral lines Red, Green and Violet of mercury using plane transmission grating.
5. To study the presence of energy levels in an atom by Franck-Hertz Experiment.
6. To determine the resistance per unit length of a Carey Foster's bridge and to obtain the specific resistance of a given wire.
7. To determine the Planck's constant using solar cell.
8. To determine the wavelength of sodium light with the help of Fresnel's biprism.
9. To draw hysteresis loop of a ferromagnetic material and to calculate its retentivity and coercivity.
10. To study ultrasonic waves in aluminium and to obtain Young's modulus for it.



# Course Description

**Title of Course: Electrical Circuit Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 14B17EC171**  
**Course Credit: 1**

**Objectives:** The objective of this course is to build basic concepts of Electrical Circuits. To understand network theorems and to build fundamental concepts in the design and implementation of different electrical circuit.

**Learning Outcomes:** The Students will be able to learn:

1. Basic concepts of Electrical circuits
2. Implementation network theorems.
3. Characteristics of different electrical components
4. Application of circuit theory in electronics circuit.

## Course Contents:

### List of Experiments-

1. To familiarization with the Digital multimeter (DMM) and measurement of various signals and circuit elements.
2. To familiarization with the CRO, Function generator and power supply.
3. a) To study & draw the volt-ampere characteristics of the resistor.  
b) To study the loading effect of a voltmeter
4. To verify Thevenin's Theorem.
5. To verify Tellegen's Theorem.
6. To verify Superposition Theorem.
7. To verify Reciprocity Theorem.
8. To verify Maximum Power Transfer Theorem.
9. To determine the Z parameters of the given two port network.
10. To determine the Y parameters of the given two port network.
11. To sketch the transient response of RC Low pass filter.
12. To sketch the transient response of RC High pass filter.

# Course Description

**Title of Course: Computer Programming Lab**  
**L-T-P Scheme: 0-0-4**

**Course Code: 14B17CI171**  
**Course Credits: 2**

**Objectives:** This course is designed to familiarize students with the basic components of a computer, so as to be able to operate it and be able to interact with it, and carry out simple tasks. Also, it will initiate the students into the discipline of Programming. It aims to start off the development of problem solving ability using computer programming. This course teaches not only the mechanics of programming, but also how to create programs that are easy to read, maintain, and debug. Students are introduced to the design principles for writing good programs.

**Learning Outcome:** Students will be able to develop their ability to design, develop, test and document structured programs in C language.

## **Course Contents:**

### **Unit -I: Microsoft Office**

Preparing resume in MS word, Using MS Excel for calculating Average marks and grade of students, making interactive Slide in Microsoft power point.

### **Unit -II: C Operators and Case Control**

Arithmetic Operators, Assignment, Logical/Relational, Bitwise, Odds and ends Operators if, if – else, Nested if, if – else if, switch-case, conditional operator and goto.

### **Unit-III: Loop Control Structures and Patterns**

Entry control and exit control loops, while , do while , for etc. generating patterns for various pyramids.

### **Unit -IV: Array, String, Functions and Pointers**

One Dimensional and Two Dimensional Arrays, Strings, Function and basic concepts of pointers. Accessing array using pointers.

### **Unit -V: Recursion, Dynamic Memory Allocation**

Storage classes, recursion and overview of malloc, calloc, free functions

### **Unit -VI: Structures and Union**

Overview of structures and union, structures v/s union, enumeration

## **Text Book**

1. “The Complete Reference C”, Herbert Schildt, McGraw-Hill Education.

## **References**

1. “Understanding Pointers in C”, Yashwant Kanetkar.
2. “The Practice of Programming”, Brian W. Kernighan and Rob pike.
3. “The C Programming Language”, Brian W. Kernighan and Dennis M. Ritchie. Prentice Hall, Inc.
4. “Program Design and Development”, Charles Dickson.
5. “Programming in PASCAL”, Schuam’s Series.

SEMESTER – II (B-2)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B11HS211	Group and Cooperative Processes	Core	3	0	0	3
2	14B11MA211	Mathematics - II	Core	3	1	0	4
3	14B11CL212	Chemistry	Core	3	1	0	4
4	14B11CE211	Building Materials & Construction	Core	3	0	0	3
5	14B11CE212	Engineering Mechanics	Core	3	1	0	4
6	14B11CE314	Engineering Geology	Core	3	0	0	3
7	14B17CE271	Workshop Practices (Lab)	Core	0	0	2	1
8	16B17CE272	Engineering Mechanics Lab	Core	0	0	2	1
9	14B17CL272	Chemistry Lab	Core	0	0	2	1
			Sub Total			24	

## Course Description

**Title of Course: Group and Cooperative Process**  
**L-T Scheme: 2-1**

**Course Code: 14B11HS211**  
**Course Credits: 3**

**Objectives:** To make the students understanding how to work with and through others to accomplish individual and group goals. Methods of instruction will include cases, simulations, lectures and group activities.

**Learning Outcomes:** After completing this course the students will have an understanding of individual, interpersonal and group processes that influence behaviour within teams and organizations. They will also be able to effectively use the various tools in their daily activities.

### **Course Contents:**

- Group- Behavior, Development, Structure and Process
- Team- Types and Contemporary issues, Individual-- Personality, Learning, Perception, Values, Attitudes and Job satisfaction
- Assertiveness- Communication Styles, Self expression, Social Boldness, Emotional intelligence
- Transactional Analysis-- Ego states, Life position, Transaction, Stroking
- Motivation, Leadership, Conflict and Negotiation.

### **Text Books**

1. Stephen P. Robbins, Organizational Behaviour, 9<sup>th</sup> Edition, Prentice-Hall India.

### **References**

1. Daniel Goleman, Emotional Intelligence;
2. Randy J. Paterson, The Assertiveness Workbook
3. Daniel Goleman, Working With Emotional Intelligence, Bantom Books

# Course Description

**Title of Course: Mathematics-II**  
**L-T Scheme: 3-1**

**Course Code: 14B11MA211**  
**Course Credits: 4**

**Objective:** In this course we have two goals:

1. To learn about a number of different mathematical concepts and methods that is used as tools in mathematical formulations on of many computational problems.
2. To gain more experience with mathematical arguments and proof techniques, that provide essential background for reasoning and computation.

**Learning Outcomes:** Students will be able to learn many mathematical techniques which are very helpful in analyzing and solving computational problems which occur in engineering.

**Course Contents:**

**Unit-I:** Second order linear differential equations, Convergence of series, convergence tests, solution in series

**Unit-II:** Bessel's and Legendre functions, Chebyshev polynomials and orthogonality, Second order partial differential equations and classification, one dimensional,

**Unit-III:** Wave and diffusion equations with their applications, Functions of complex variable, analytical functions and Cauchy-Riemann, Equations.

**Unit-IV:** Conformal mapping, Poles and singularities, complex integration,

**Unit-V:** Taylor's and Laurent's series, Cauchy residue theorem, contour integration and their application.

**Text Books**

1. Kreyszig, Erwin Advanced Engineering Mathematics, John Wiley & Sons, Inc.
2. Differential Equations with Applications, 2<sup>nd</sup> Ed., McGrawHill, 1991.
3. Complex Variables and Applications, 6th Ed., McGraw-Hill, 1996.

**References**

1. Prasad Mudranalaya, Higher Engineering Maths, Khanna Publishers Delhi, 1982.
2. Simmons, G.F.
3. Brown, J.W., Churchill, R.V.
4. Prasad, C.
5. Grewal, B. S.

## Course Description

**Title of Course: Chemistry**  
**L-T Scheme: 3-1**

**Course Code: 14B11CL212**  
**Course Credits: 4**

**Objective:** To develop fundamental concepts related to chemistry and to practically use the same in engineering fields.

**Learning Outcomes:** Students will be able to appreciate the application of chemistry in engineering areas.

### Course Contents:

- Chemical Bonding & Characteristics of solids
- Physical chemistry
- Conductivity of Electrolytes
- Applied chemistry
- Chemistry of materials
- Chemistry in the environment

### Text Books/References:

1. B.S.Jai Prakash, R.Venugopal, Sivakumaraiah & Pushpa Iyengar., "Chemistry for Engineering Students", Subhash Publications, Bangalore.
2. R.V.Gadag & A.Nityananda Shetty., "Engineering Chemistry", I K International Publishing House Private Ltd. New Delhi.
3. P.C.Jain & Monica Jain., "Engineering Chemistry", Dhanpat Rai Publications, New Delhi. Reference Books: 1. O.G.Palanna, "Engineering Chemistry", Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint.
4. V.R.Gowariker, N.V.Viswanathan & J.Sreedhar., "Polymer Science", Wiley-Eastern Ltd.

## Course Description

**Title of Course: Building Materials & Construction**  
**L-T Scheme: 3-0**

**Course Code: 14B11EC211**  
**Course Credits: 3**

**Objectives:** The objective of this course is to introduce the conventional building materials and techniques used in the civil engineering construction.

**Learning Outcomes:** The Students will be able to learn-

1. Building materials: properties, selection criteria, manufacturing techniques and testing.
2. Building construction techniques presently in practice

### **Course Contents:**

#### **Building Materials:**

Classification, Properties and selection criteria of Bricks Burning of Bricks ,tests for bricks, stone Classification, characteristics of good building stone, common building stones in India, lime , timber, Characteristics of good timber, defects in timber, seasoning of timber, tests on timber, plywood, cement, concrete, steel , glass, plastics, P.V.C., paint, Varnish, Adhesive material, Bitumen, Composite Material, Ceramics, Material from industrial wastes.

#### **Building Construction:**

Classification of buildings, Brick masonry, stone masonry, Types of walls, partition and cavity walls Pre-fabricated construction. Plastering and pointing. Types of roofs and roof covering, treatment for water proofing, Types of floors, foundations. Damp proofing materials and techniques, Anti-termite treatment, Doors and windows: sizes and locations, proportions, Stair and staircases, Lifts and escalators, White washing, colour washing, painting, distempering, Shuttering, scaffolding and centering. Expansion and construction joints, Sound and fire proof construction, Recommendation of NBC and Building bylaws.

### **REFERENCE BOOKS:**

1. ‘A Text Book of Building Construction’ by Arora, S.P. & Bindra, S.P., Dhanpat Rai & Sons, Delhi.
2. “Building Construction”, by Jha, J. & Sinha, S.K., Khanna Publishers, Delhi
3. “A Text Book of Engineering Materials”, by Kulkarni, C. J., Ahmedabad Book Depot, Ahmedabad, 1968.
4. “A Text Book of Engineering Construction”, by Kulkarni, C. J. Ahmedabad Book Depot, Ahmedabad.
5. “Engineering Materials, by Kumar Sushil, “Standard Publishers Distributors, Delhi.

6. "Building Construction", by Kumar Sushil, Standard Publishers, Distributors, Delhi.
7. "Building Construction, by McKay W.B., "Vol.1 to 4, Orient Longman Ltd., Hyderabad, Bombay, Madras, Delhi, Vol.1 & 2 -1995, Vol. 3-1996, Vol. 4-1998.
8. "A Text Book of Building Construction" by Punmia, B.C., Laxmi Publications, Delhi, Madras.
9. "Engineering Materials," by Singh Surendra, Konark Publishers Pvt. Ltd. 1994.
10. Civil Engg. Materials, TTTI Chandigarh, Tata McGraw- New Delhi



## **Course Description**

**Title of Course: Engineering Mechanics**

**Course Code: 14B11CE212**

**L-T Scheme: 3-1**

**Course Credits: 4**

### **OBJECTIVE:**

The primary objective of a course on engineering Mechanics is to learn how to use the knowledge of mechanics in understanding the behavior of structures. This course serves as an introduction to structural systems, and to methods of analyzing these systems under various loading conditions.

### **LEARNING OUTCOMES:**

At the end of the course students will have knowledge of various force systems, joint systems and various day to day phenomena of mechanics.

### **COURSE OUTLINE:**

Introduction and application of Equivalent force system and equations of equilibrium. Basic concept of force - couple system, planar force system, parallel force system, general force system Analysis of pin jointed frames.

### **Friction and its application**

Kinematics of particle and rigid body, Dynamics of particle and rigid body, Virtual work, Impulse and Momentum, Centroid & center of gravity, Moment of inertia

Mechanical Vibrations: Introduction, Equations of motion for single degree of freedom system, free and forced vibrations and damped vibrations. Compound springs with linear motion.

### **TEXT BOOKS:**

1. Vector Mechanics; Static & Dynamics by Beer & Johnston, TMH Publication.
2. Engineering Mechanics; A.K.Tayal, Umesh Publication

### **REFERENCE BOOKS:**

1. Engineering mechanics, Strength of materials & Elements of Structural analysis by C Venkatramaiah & Narsimha Rao, CBS publication.

## Course Description

**Title of Course: Engineering Geology**

**Course Code: 14B11CE314**

**L-T Scheme: 3-0**

**Course Credit: 3**

**Objective:** To introduce the students with basic concepts of geology and thereby prepare a strong base for geo-technical engineering.

**Learning Outcomes:** At the end of the course, the students will be able to identify different types of minerals and rocks and develop some fundamental concepts on application of geology in civil engineering.

**Course Contents:**

- General Geology
- Mineralogy
- Petrology
- Structural geology
- Engineering Geology
- Geological investigation
- Earthquakes and landslides
- Geology of dams and reservoirs
- Geological studies in tunneling and bridges:

**TEXT BOOKS:**

1. Engineering Geology by Parbin Singh
2. Engineering Geology by P.K. Mukherjee
3. Mineralogy by Dana
4. Structural Geology by H.P. Billings

## Course Description

**Title of Course: Workshop Practice Lab**

**Course Code: 14B17CE271**

**L-T-P Scheme: 0-0-2**

**Credits: 1**

**OBJECTIVE:** The course provides an opportunity to students to get an exposure to various workshop practices which help in equipment and machinery design, fabrication and machinery.

**LEARNING OUTCOMES:** At the end of this course the student will have:

1. Hands on experience in basic workshop practices like welding, carpentry, foundry, machines shop.
2. Fair understanding of the workshop processes.

### **COURSE OUTLINE:**

- Carpentry Shop
- Wood Working tools
- Fitting Shop
- Welding
- Black Smithy Shop
- Forging operations
- Foundry
- Moulding

### **REFERENCE BOOKS:**

1. Manufacturing Processes – by Chapman, Vol. I & II.
2. Production Technology – by P. N. Rao., Tata McGraw hill
3. Workshop Technology – by Raghuwanshi, Vol. I & II.
4. Workshop Technology- by Hazara Choudhary, Vol. I & II, Media Promoters & Publishers Pvt. Ltd.

## Course Description

**Title of Course: Engineering Mechanics Lab**

**Course Code: 16B17CE272**

**L-T-P Scheme: 0-0-2**

**Credits: 1**

**PREREQUISITE:** Engineering Mechanics

**OBJECTIVE:** To develop knowledge of different types of forces and their application.

### **LEARNING OUTCOME:**

At the end of this course student will have knowledge of different forces and how it is applied on different structures.

### **LIST OF EXPERIMENTS:**

1. To find the Law of triangular of forces by gravensand's Apparatus.
2. To find the law of parallelogram of forces by gravensand's Apparatus
3. To verify the law of polygon of forces by gravensand's Apparatus
4. To verify Lami's theorem by Jib crane apparatus.
5. To find the forces in Jib crane apparatus.
6. To find coefficient of friction between two surfaces on a horizontal surface.
7. To find coefficient of friction between two surfaces on a inclined plane.
8. To verify support reaction by parallelogram force apparatus.
9. To find the forces in a member of a triangular truss.
10. To find the resultant of forces graphically.

### **TEXT BOOKS:**

1. Vector Mechanics; Static & Dynamics by Beer & Johnston, TMH Publication.
2. Engineering Mechanics; A.K.Tayal, Umesh Publication

## Course Description

**Title of Course:** Chemistry Lab

**Course Code:** 14B17CE272

**L-T-P Scheme:** 0-0-2

**Credits:** 1

**Objective:** Laboratory experiments are helpful for civil engineering students for understanding the physical chemistry, applied chemistry etc.

**Learning Outcomes:** At the end of the course the students will have basic knowledge of chemistry its practical applications.

### List of Experiments:

**Experiment No.1:** Preparation of standard solution: NaOH,

**Experiment No.2:** Preparation of standard solution: HCl,

**Experiment No.3:** pH metric titration of: Strong acid (HCl) against Strong base (NaOH),

**Experiment No.4:** pH metric titration of: Weak acid (Oxalic acid) against Strong base (NaOH),

**Experiment No.5:** Column chromatography,

**Experiment No.6:** Determination the order of saponification of ethyl acetate with NaOH,

**Experiment No.7:** Thin layer chromatography,

**Experiment No.8:** Double titration,

**Experiment No.9:** Oxidation and Reduction titration,

**Experiment No.10:** Hardness of water by complexometric titration.

### Textbooks:

1. Laboratory manual on engineering chemistry by S. K. Bhasin and Sudharani. Dhanpat Rai Publishing Pvt. Ltd. New delhi.

SEMESTER – III (B-3)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B11HS311	Managerial Economics	Core	3	0	0	3
2	14B11CE311	Mechanics of Solids	Core	3	1	0	4
3	14B11MA312	Numerical Methods	Core	3	1	0	4
4	14B11CE312	Fluid Mechanics	Core	3	1	0	4
5	14B11CE313	Concrete Technology	Core	3	0	0	3
6	14B11GE211	Environmental Studies	Core	3	0	0	3
7	14B17CE371	Engineering Graphics & CAD Lab	Core	0	0	4	2
8	14B17CE372	Fluid Mechanics Lab	Core	0	0	2	1
9	14B17CE373	Concrete Technology Lab	Core	0	0	2	1
10	14B17CE374	Strength of Material Lab	Core	0	0	2	1
			Sub Total				26

# Course Description

**Title of Course: Managerial Economics**  
**L-T Scheme: 3-0**

**Course Code: 14B11HS311**  
**Course Credits: 3**

**Objectives:** To make the students understanding how to work with and through others to accomplish individual and group goals. Methods of instruction will include cases, simulations, lectures and group activities.

**Learning Outcomes:** Students will be able to understand individual, interpersonal and group processes that influence behavior within teams and organizations.

## **Course Contents:**

### **Unit 1. Introduction to Managerial Economics & Macro-economic Concepts**

Definition of Economics, Meaning & Scope of Managerial Economics, Micro & Macro Economics, Concept of economic profit, (Opportunity Cost), Concept of Present value.

### **Unit 2. Demand Analysis**

Law of demand, Individual & market demand, Determinants of market demand, Marginal Utility theory, Elasticity of demand – Price, Income, Cross, Advertising Theory of Consumer choice using Indifference Curve analysis, Demand forecasting techniques, Delphi, Survey, Time series analysis.

### **Unit 3. Production Theory and Analysis**

Production with one variable, optimal employment of a factor of production, Cobb Douglas production function, Production with two variable inputs, Production Isoquants, Production Isocosts, Optimal employment of two inputs, the expansion path, Basics of Supply, Market Equilibrium

### **Unit 4. Cost Theory and Analysis**

Cost concepts – Opportunity, Explicit, Marginal, Incremental and Sunk, Relation between Production & Cost, Short run cost function, Long run cost function, Special topics -Profit contribution analysis, - Break Even analysis, Operating Leverage

### **Unit 5. Pricing under Different Market Structures**

Perfect Competition - Determination of Price output relationship in short run, long run, Monopoly Determination of Price output relationship in short run & long run, Price discrimination, Monopolistic Competition - Determination of Price output relationship in short run & long run, Product Differentiation ,Oligopoly -Types, Determination of Price output relationship, Kinky demand curve {Stickiness of Price}, Price leadership model.

## **Text Books**

1. Managerial Economics – Analysis, Problems & Cases by P. L. Mehta, Sultan Chand & Sons.

## **References**

1. Managerial Economics by Craig Peterson, Pearson Education.
2. Modern Economic Theory by K. K. Dewett.

## Course Description

**Title of Course: Mechanics of Solids**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE311**  
**Course Credits: 4**

**PREREQUISITES:** Engineering Mechanics

**OBJECTIVE:** To develop knowledge of mechanics related to solids.

### **LEARNING OUTCOMES:**

At the end of the course students will have in-depth knowledge of material responses to load and their strength properties.

### **COURSE OUTLINE:**

- Simple stresses and strains
- Complex Stresses
- Simple theory of bending
- Slope and deflection of beams
- Torsion in circular shaft

### **TEXT BOOKS:**

1. Strength of Materials by Ramamutham
2. Analysis of Structures by Vazirani & Ratwani, Khanna Publishers Delhi
3. Strength of Materials by B.C. Punmia

### **REFERENCE BOOKS:**

1. Solid Mechanics, 1st revised edition. by: S. M. A. Kazimi, Tata McGraw Hill, New Delhi, 1988.
2. Introduction to Mechanics of Solids, by: E. P. Popoo, Prentice Hill of India, New Delhi, 1973.
3. Mechanics of Solids: An Introduction, by: S. H. Crandall, N.C. Dahl and T.V. Lardner, McGraw Hill International, Tokyo, 1994.
4. Mechanics of Materials by Gere and Timoshenko, CBS Publishers New Delhi.



## Course Description

**Title of Course: Numerical Methods**  
**L-T Scheme: 3-1**

**Course Code: 14B11MA312**  
**Course Credits: 4**

**Objective:** To make students aware of the concepts of numerical methods necessary for computations in mechanics, civil engineering, computer science and information technology and other engineering applications.

**Learning Outcomes:** At the end of the course the student will have the background of numerical methods necessary for implementing these techniques in solving the various problems of engineering and allied sciences.

### **Course Outline:**

- Solution of linear system of equations
- Eigen values and Eigen vectors
- Numerical differentiation
- Numerical Integration
- Solution of a system of non-linear equations
- Initial and boundary value problems
- Method of weighted residuals (MWR).

### **Text Books:**

1. Gerald C.F., Wheatley P.O. : Applied Numerical Analysis
2. Jain, Iyengar & Jain : Numerical Methods

### **Reference Books:**

1. Grewal, B. S. : Numerical Methods
2. Kreyszig, Erwin : Advanced Engineering Mathematics

## Course Description

**Title of Course: Fluid Mechanics**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE312**  
**Course Credits: 4**

### **OBJECTIVE:**

To develop knowledge of properties, movement and behavior of fluid (water) under various flowing conditions

### **LEARNING OUTCOME:**

At the end of the course students will have in-depth knowledge of fluid mechanics, measurement of fluid flow.

### **COURSE OUTLINE:**

- Introduction
- Kinematics of fluid flow
- Dynamics of fluid flow
- Boundary Layer Theory
- Analysis of pipe flow

### **TEXT BOOKS:**

1. Fluid Mechanics & Hydraulics, A. K. Jain
2. Fluid Mechanics & Hydraulics, Modi & Seth, Standard Book House, New Delhi.
3. Fluid Mechanics, A. K. Bansal, Laxmi Publication, New Delhi

### **REFERENCE BOOKS:**

1. Fluid Mechanics, Fluid Machines & Hydraulics by Gupta & Alam Singh, CBS Publishers & Distributors, New Delhi.
2. Fluid Mechanics through Problems by Garde, New Age International Publication, New Delhi.
3. Open Channel Hydraulics, by K. Subramanya, Tata McGraw-Hill, New Delhi.

## Course Description

**Title of Course: Concrete Technology**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE313**  
**Course Credits: 3**

**Prerequisite:** Concrete Technology

**Objective:** To develop the basic knowledge of Concrete as a building material and learn about various properties of fresh and hardened concrete.

**Learning Outcome:** On completion of this course student will develop understanding of various ingredients of concrete, their properties and properties of fresh and hardened concrete.

### Course Content:

- Cement
- Aggregates
- Fresh concrete
- Hardened concrete
- Testing of hardened concrete
- Elasticity, creep & shrinkage
- Concrete mix design

### TEXT BOOKS:

1. Properties of Concrete by A.M.Neville - Low priced Edition - 4th edition
2. Concrete Technology by M.S.Shetty. - S.Chand & Co. ; 2004
3. Handbook of concrete mixes: SP 24, BIS

### REFERENCE BOOKS:

1. Concrete Technology by M.L. Gambhir. - Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi

## Course Description

**Title of Course: Environmental Studies**

**Course Code: 14B11GE211**

**L-T Scheme: 3-0**

**Course Credits: 3**

**Objective:** Objective of this course is how to help environmental varieties, help using modern technology which is eco-friendly, “Preserve is better than Cure”.

**Learning Outcome:** Upon successful completion of the course, students should be able to:

1. Measure environmental variables and interpret results.
2. Evaluate local, regional and global environmental topics related to resource use and management.
3. Propose solutions to environmental problems related to resource use and management.
4. Interpret the results of scientific studies of environmental problems.
5. Describe threats to global biodiversity, their implications, and potential solutions.

### Course Contents:

**Unit-1:** The Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, biogeochemical cycles.

**Unit-2:** Natural resources, their consumption & Protection: Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources.

**Unit-3:** Pollution- a threat to environment: Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, toxicity limits of pollutants. Critical issues concerning global Environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and the Roots in: Cultural, Social, Political, Commercial, industrial, territorial domains.

**Unit-4:** Biodiversity loss: Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity, Environmental Impact assessment: Objectives of impact assessment, Study of impact parameters, Methods for impact identification, Economics. Environmental standards & Quality: Air, Water & Soil Quality, Pollutant sampling, pollution control systems. Sustainable building, Urban planning, Disaster Management and Contingency Planning, Modern safety systems.

**Unit-5:** Sustainability & Planned reversal of human destruction to environment: redevelopment of brown fields, energy plantations, social forestry, engineering aspects of Re-use & Recycling, biogas for marginal income groups, organic farming, eco-consumerism, dematerialization, green technologies, eco-tourism.

**Unit-6:** Regulation of technology and innovation, Policy and law: Environmental Laws & Regulations (Different Acts – Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National Environmental Policy;

**Unit-7:** Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Eco-mark Scheme, Laws relating to Urbana and Rural land use, Ethics.

**Unit-8:** Case studies: Industry – Environment interface, Field Work: Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc.

### **Textbooks**

1. Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India.
2. Textbook of Environmental Studies for UG Courses-Erach Bharucha, University Press.

### **References**

1. Nebel, B.J. & Wright, R.T., 1993, Environmental Science, 8<sup>th</sup> Edition, Prentice Hall, USA.
2. Jadhav, H. & Bhosale, V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p.
3. Chiras D. (Ed.). 2001. Environmental Science – Creating a sustainable future. 6<sup>th</sup> ed. Jones & Barlett Publishers.
4. David Laurence. 2003. Environment Impact assessment, Wiley publications.
5. Chhokar KB, Pandya M & Raghunathan M. 2004. Understanding Environment. Sage publications, New Delhi
6. Non-Conventional Energy Resources – Chauhan, DS. and Srivastava, SK, New Age International Pvt. Ltd

# Course Description

**Title of Course: Engineering Graphics Lab**  
**L-T-P Scheme: 0-0-4**

**Course Code: 14B17CE371**  
**Course Credit: 2**

## **OBJECTIVE:**

To develop knowledge of Engineering graphics and drawing.

## **LEARNING OUTCOMES:**

At the end of the course students will be able to draw and read the engineering drawings. They will also be able to work with AUTO CAD software.

## **COURSE OUTLINE:**

### **Engineering graphics**

- Introduction
- Lettering and dimensioning
- Geometric constructions
- Conic sections
- Curves
- Orthographic Projections
- Isometric Projections
- Development of Surfaces

### **AutoCAD Software:**

- Basic terminology and commands
- Project Planning
- 3-Dimensional drawing
- Advance Tools

## **TEXT BOOKS:**

1. Engineering Drawing & Graphics + AutoCAD by K.Venugopal, New Age International (P) Ltd.
2. Engineering Drawing by N. D. Bhatt & V. M. Panchal, Charotar Publishing House.

# Course Description

**Title of Course: Fluid Mechanics Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 14B17CE372**  
**Course Credit: 1**

**PREREQUISITE:** Fluid Mechanics

## **OBJECTIVE:**

Laboratory experiments are helpful for civil engineering students for understanding the flow phenomenon in pipes and channels

## **LEARNING OUTCOMES:**

At the end of the course the students will have basic knowledge of fluid mechanics and its practical applications.

## **LABORATORY EXPERIMENTS:**

1. Determination of meta-centric height
2. Calibration of a Venturi-meter
3. Determination of frictional losses in pipes of different diameters.
4. Determination of minor losses in pipes
5. Calibration of Pitot tube
6. Calibration of a, V - notch and rectangular notch
7. Reynolds dye experiment for flow characterization
8. Determination of  $C_c$ ,  $C_v$  and  $C_d$  of an orifice
9. Verification of Bernoulli's theorem
10. Calibration of orifice meter
11. Verify the impulse moment equation (impact of jet)
12. Performance characteristics of a centrifugal pump
13. Valve characteristic

## **TEXT BOOKS:**

1. Fluid Mechanics Laboratory Manual by G. L. Asawa
2. Fluid Mechanics & Hydraulics by A. K. Jain
3. Fluid Mechanics & Hydraulics by Modi & Seth

## **REFERENCE BOOKS:**

1. Fluid Mechanics & Hydraulics by Gupta & Alam Singh.
2. Fluid mechanics & Hydraulics by Garde
3. Fluid Mechanics by A. K. Bansal
4. Open Channel Hydraulics by K. Subramanya

## Course Description

**Title of Course: Concrete Technology Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 14B17CE373**  
**Course Credit: 1**

**PREREQUISITE:** Concrete Technology

**OBJECTIVE:** Students will learn about cement hydration, material properties, and making concrete.

### **LEARNING OUTCOME:**

In the end of the lab student can able to understand:

- Importance and widespread uses of concrete.
- Component materials used to make concrete
- Role of water in the preparation of a concrete mixture.
- Effective ratios of component materials in various concrete structures.
- Effect of porosity and aggregates on the strength of concrete.
- Various test concrete.

### **LABORATORY EXPERIMENTS:**

1. To determine the quantity of water for cement paste for normal consistency
2. To determine initial and final setting time of cement
3. To determine the fineness, specific gravity and unit weight of cement
4. Determination of tensile and compressive strength of cement
5. To determine fineness modulus of fine and coarse aggregate
6. To determine compressive strength of nominal mix concrete of a given grade
7. To determine the modulus of rupture of concrete
8. To determine the workability of concrete by various methods
9. To determine the split tensile strength of concrete of given mix proportions
10. To determine the percentage bulking of fine aggregate
11. To determine soundness of given cement by Le-Chatelier method
12. Effect of water cement ratio on strength of concrete
13. Concrete mix design

### **TEXT BOOKS:**

1. Concrete Technology by M S Shetty
2. Concrete Technology by Neville
3. Concrete by S N Sinha



## Course Description

**Title of Course: Strength of Material Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 16B17CE374**  
**Course Credit: 1**

**PREREQUISITE:** Mechanics of solids

**OBJECTIVE:** To develop the knowledge of properties of various solid materials.

**LEARNING OUTCOME:** At the end of this course students will have knowledge of different type of stresses, how material behave during different loadings and how to test different properties like Young's Modulus, Yield Stress, Hardness, Impact etc.

### LIST OF EXPERIMENTS

1. To determine of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of Young's modulus on mild steel.
2. To determine the compressive strength of given specimen using UTM.
3. To determine the flexural strength of given specimen using UTM.
4. To determine the hardness of given sample by Brinell hardness testing machine.
5. To perform Izod Impact test on the given specimen.
6. To study the Impact testing machine and perform the Charpy test.
7. To draw shear Force, Bending Moment Diagrams for a simply Supported Beam under Point and Distributed Loads.
8. Fatigue test on fatigue testing machine.
9. Determination of torsional strength through torsion testing machine.
10. Experiment on buckling of columns.
11. To determine deflection in simply supported and cantilever beams.
12. To draw the shear and bending moment diagrams of a simply supported beam using graphical method.

### TEXT BOOKS:

1. Analysis of Structures by Vazirani & Ratwani, Khanna Publishers Delhi.
2. Mechanics of Materials by Gere and Timoshenko, CBS Publishers New Delhi.

SEMESTER – IV (B-4)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B11HS411	Financial Management	Core	3	0	0	3
2	14B11CE411	Water Supply Engineering	Core	3	1	0	4
3	14B11CE412	Surveying	Core	3	1	0	4
4	14B11CE413	Geotechnical Engineering	Core	3	1	0	4
5	14B11CE414	Water Resource Engineering	Core	3	1	0	4
6	14B11CE415	Structural Analysis	Core	3	1	0	4
7	14B17CE471	Environmental Engineering Lab	Core	0	0	2	1
8	14B17CE472	Surveying Lab	Core	0	0	4	2
9	14B17CE473	Geotechnical Engineering Lab	Core	0	0	2	1
			Sub Total				27

## Course Description

**Title of Course: Financial Management**  
**L-T Scheme: 3-0**

**Course Code: 14B11HS411**  
**Course Credits: 3**

**Objectives:** In today's dynamic world engineers along with taking technical decisions also have to take financial decision like long term investment decision i.e. expansion, merger& acquisition etc., short term investment decision i.e. inventory management, receivable management etc. and so on. So they need to understand, analyze, and interpret financial data and financial issues.

### **Learning Outcome:**

Students will be able to understand the concepts and principles of accounting and finance with the support of software packages so that they can make quick informed financial decision.

### **Course Contents:**

Introduction, Scope and Objectives, Basic Financial Concept, Time value of money, Capital budgeting techniques, Cash flows, Long term sources of finances.

Concept and measurement of cost of capital, Leverages, EBIT-EPS analysis, Working capital management- Inventory Management, Financial Statement analysis.

### **Text Books**

1. Financial Management by I. M. Pandey.

### **References**

1. Principles of Financial Management by Douglas R. Emery, John D. Finnerty, John D. Stowe.

## Course Description

**Title of Course: Water Supply Engineering**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE411**  
**Course Credits: 4**

**OBJECTIVE:** The objective of this course is to familiarize the students with the basics of water quality and its treatment methods, importance of planning and execution of modern water supply schemes.

**LEARNING OUTCOME:** Students will be able to understand the steps involved in selection of source, analyzing water quality, degree of treatment required for water supply.

**COURSE OUTLINE:**

- Introduction
- Water demands
- Collection and Distribution of water
- Pipes-Joints-Fittings
- Pumps and pumping stations.
- Quality of water
- Treatment of water
- Miscellaneous treatment methods

**TEXT BOOKS:**

1. Water Supply Engineering by S.K. Garg, Khanna publishers.
2. Water Supply, Waste disposal and Environmental pollution engineering by A.K. Chatterjee, Khanna Publishers.
3. Water Supply and Sanitary Engineering by Birdie, Dhanpat Rai Publications.

**REFERENCE BOOKS:**

1. Manual on Water Supply and Treatment, C. P. H. E. E. O., Ministry of Urban Development,  
Government of India, New Delhi
2. Environmental Engineering by Peavy, Rowe and Tchobanoglous, McGraw-Hill International Editions.
3. Water Supply and Sewerage by Steel and McGhee, McGraw-Hill International Editions.

## Course Description

**Title of Course: Surveying**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE412**  
**Course Credits: 4**

**OBJECTIVE:** To learn the fundamentals of different types of surveys, and their applications in the field of civil engineering.

**LEARNING OUTCOME:** At the end of course, the students shall be able to know how to use the different types of surveys in the field.

### **COURSE OUTLINE:**

- Introduction
- Chain Surveying
- Compass Surveying
- Leveling
- Differential leveling,
- Contouring:
- Theodolite
- Plane Table Surveying
- Tachometric Surveying
- Curves
- Photographic Surveying
- Setting Out Works
- Introduction to Remote Sensing, GPS, GIS and Map study

### **TEXT BOOKS:**

1. Plane Surveying by A.M.Chandra (New Age International Publishers, New Delhi)
2. Surveying-1, Surveying-2, by B.C.Punmia, Laxmi Publication Delhi.
3. Surveying & Leveling by N.N.Basak, Tata McGraw Hill Publishing Com. New Delhi.

### **REFERENCE BOOKS:**

1. Higher Surveying by A.M.Chandra, New Age International Publishers New Delhi.
2. Plane Surveying vol-1 & vol-2 by Clark David, CBS Publishers, Delhi.
3. Surveying-3 by B.C.Punia, Laxmi Publication Delhi.

## Course Description

**Title of Course: Geotechnical Engineering**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE413**  
**Course Credits: 4**

**OBJECTIVE:** To learn the fundamentals of different types of soils, classification, properties and their applications in the field of civil engineering.

### **LEARNING OUTCOMES:**

In the end of the course the student will be able to classify the soils, analyze the flow of water through soils, to estimate the stress distribution in the soil mass and compaction characteristics, compressibility characteristics, settlements and to assess the shear strength of the soils. Also, students will be able to estimate the earth pressures on the retaining walls and analyze the stability of slopes.

### **COURSE OUTLINE:**

- Introduction to Geo-technical problems in Civil Engineering
- Flow through soils
- Soil compaction and field control;
- Stress distribution in soil due to applied surface loads;
- Compressibility and one dimensional consolidation characteristics of soils
- Earth pressure theories for retaining walls;
- Stability of Slopes

### **TEXT BOOKS:**

1. Geotechnical Engineering by C. Venkatramaiah, New Age International, 2006.
2. Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering, by V. N. S. Murthy, Marcel Dekker.
3. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New Age International (P) limited publishers.
4. Geotechnical Engineering by Sahashi K. Gulhati, Manoj Datta - 2005.

### **REFERENCE BOOKS:**

1. Soil Mechanics in Engineering Practice by Karl Terzaghi, Ralph Brazeleton Peck, Gholamreza Mesri, Wiley-IEEE, 1996.
2. Principles of Geotechnical Engineering by Braja M. Das, PWS-KENT Pub. Co. 1990.
3. Soil Mechanics by Lambe and Whitman Wiley edition

## **Course Description**

**Title of Course: Water Resources Engineering**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE414**  
**Course Credits: 4**

**PREREQUISITE: Fluid Mechanics**

### **LEARNING OUTCOMES:**

At the end of the course the students will have knowledge of surface hydrology, ground water hydrology, irrigation engineering and river training works.

### **COURSE OUTLINE:**

- Hydrology
- Ground water flow
- Water Resources
- Irrigation Engineering
- Canals
- River training

### **TEXT BOOKS:**

1. Irrigation Engineering and Hydraulic Structures, By: Garg, S. K., Khanna Publishers, 1997.
2. Ground Water Hydrology, By: Todd, D. K., John Wiley & Sons, New York, 1995
3. Fundamentals of Irrigation Engineering, By: Bharat Singh, Nem Chand and Brothers, Roorkee

### **REFERENCE BOOKS:**

1. Water Resource Engineering by Larry W Mays, McGraw-Hill, New Delhi
2. Engineering Hydrology by K. Subramanya, McGraw-Hill, New Delhi
3. Applied Hydrology by Ven T Chow, David R Maidment, Larry W Mays, McGraw-Hill, New Delhi

# Course Description

**Title of Course: Structural Analysis**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE415**  
**Course Credits: 4**

**PREREQUISITE:** Engineering Mechanics, Mechanics of Solids

## **OBJECTIVE:**

1. To calculate loads for structural analysis
2. To identify determinate, indeterminate, stable and unstable structures.
3. To determine forces and deflections in determinate trusses, beams and frames.
4. To determine forces in indeterminate trusses, beams and frames by the force method.
5. To construct influence lines and be able to use them
6. To use computer tools to assist in classical structural analysis.

## **LEARNING OUTCOMES:**

Students have the ability to analyze the different type of indeterminate structures and able to find out the forces.

## **COURSE OUTLINE:**

- Statically determinate & indeterminate structures.
- Analysis of statically determinate structures
- Castigliano's theorem
- Maxwell-Betti's theorem
- Analysis of plane redundant frames up to two degree of redundancy by energy method
- Slope deflection method
- Moment distribution method
- Analysis of propped cantilever, fixed beam, continuous beam,
- Clapeyron's three-moment theorem
- Buckling of columns

## **TEXT BOOKS:**

1. Basic Structural Analysis by C.S Reddy, Prentice Hall of India Pvt. Ltd.
2. Analysis of Structures by Vazirani & Ratwani, Khanna Publishers
3. Analysis of Structures by Ramamrutham, Dhnapat Rai & Company

## **REFERENCE BOOKS:**

1. Strutural Analysis by A. Ghali and A M Neville, E & FN SPON, Fourth Edition
2. Strutural Analysis by R C Hibbeler, Pearson Education, Fifth Edition



## Course Description

**Title of Course: Environmental Engineering Lab**

**Course Code: 16B17CE471**

**L-T-P Scheme: 0-0-2**

**Course Credit: 1**

**PREREQUISITE:** Water supply engineering

**OBJECTIVE:** To determine the physical, chemical and biological parameters of given water and waste water samples.

### **LEARNING OUTCOME:**

This course discusses the fundamentals of environmental quality monitoring such as water, wastewater, air and noise. At the end of this course student will be able to judge the water quality for drinking and wastewater quality requirements for the disposal.

### **LIST OF EXPERIMENTS**

1. To determine the pH, conductivity and turbidity of given sample.
2. To estimate the total solids, suspended solids (settleable and non-settleable) and dissolved solids of the given sample.
3. To estimate the optimum dosage of coagulant using jar test apparatus.
4. To determine the residual chlorine content in the given water sample.
5. To estimate the chlorides content in the given sample.
6. To estimate the dissolved oxygen content in the given wastewater sample.
7. To estimate the biochemical oxygen demand (BOD) of the given wastewater sample.
8. To estimate the chemical oxygen demand (COD) of given wastewater sample.
9. To estimate the most probable number (MPN) of coliforms in the given water sample.
10. To determine the suspended particulate matter (SPM) content and respirable particulate matter (RPM) in the ambient air.
11. To estimate the noise level at various places in the campus.

### **TEXT BOOKS:**

1. Water and Wastewater Testing by Mathur, New chand & bros (publishers) Roorkee.
2. Chemistry for Environmental Engineering by Sawyer, McCarty and Parkin, McGraw Hill, NY.

### **REFERENCE BOOKS:**

1. IS: 3025- Indian Standard Methods of Sampling and Tests (Physical and Chemical) For Water and Waste Water.
2. Standard Methods for the Examination of Water and Wastewater. 20th ed., American Public Health Association, Washington DC, USA.

## Course Description

**Title of Course: Surveying Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 16B17CE472**  
**Course Credit: 1**

**PREREQUISITE:** Surveying & Leveling

**OBJECTIVE:** To learn the fundamental principles and procedures to carryout different types of surveys, and their applications in the field of civil engineering.

**LEARNING OUTCOME:**

At the end of course, the students shall be able to know, how to conduct the different types of surveys in the field.

**LABORATORY EXPERIMENTS:**

1. Chain survey
2. Compass survey
3. Plane table survey
4. Simple leveling
5. Profile leveling
6. Longitudinal & Cross section
7. Contouring
8. Theodolite
9. Tachometry
10. Areas & Volumes
11. Traversing
12. Trigonometric leveling.
13. Total station

**TEXT BOOKS:**

1. Surveying, Vol. I & II by Agor, R. Khanna Publications, Delhi
2. Surveying, Vol. I & II by Arora, K.R., Standard Book House, Delhi,

3. Solving Problems in Surveying, by Bannister, A. and Baker, R., Longman Scientific Technical, U.K.
4. Engineering Surveying Technology, by Kennie, T.J.M. and Petrie, G., Blackie & Sons Ltd., London.
5. Surveying, Vol. I & II, by Punmia, B.C., Laxmi Publications New Delhi,
6. Surveying Vol. I & II by Duggal, S.K., TMH
7. Surveying by N.N. Basak, TMH.
8. Surveying Vol. I, II by Kanetkar
9. Plane Surveying, by Chandra, A.M. New Age International Publishers, Delhi
10. Higher Surveying by Chandra, A.M. New Age International Publishers, Delhi

# Course Description

**Title of Course: Geotechnical Engineering Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 16B17CE471**  
**Course Credit: 1**

**PREREQUISITE:** Geotechnical Engineering

**OBJECTIVE:** To learn the fundamental tests for classification and determination of soil properties.

## **LEARNING OUTCOMES:**

Students will learn to determine all the physical properties of soil grains and soil mass and in situ density, optimum moisture content and maximum dry density etc.

## **LABORATORY EXPERIMENTS:**

1. Soil Identification Test
2. Moisture content determination by oven drying method, pycnometer method, and rapid moisture meter
3. Specific Gravity of soil particles by Pycnometer method and Density Bottle method
4. Particle size distribution of soils (Grain size analysis) by Sieve analysis and Hydrometer analysis.
5. Atterberg's limits tests
6. Field density tests of soils by Core cutter method and sand replacement method
7. Permeability tests of soils by Variable head method and Constant head method
8. Soil compaction test (Density moisture relations)
9. Moisture Content variation with drying duration

## **REFERENCE BOOKS:**

1. BIS Manuals
2. Geotechnical Engineering by R Agor
3. Geotechnical Engineering by BC Punmia
4. Geotechnical Engineering by C Venkatramiah

SEMESTER – V (B-5)

S. No.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS541- HS544	HSS Elective	Elective	3	0	0	3
	14B14HS541	Social and Legal Issues					
	14B14HS542	Human Psychology					
	14B14HS543	Professional Ethics					
	14B14HS544	Macro Economics					
2	14B11CE511	Sewage Treatment & Disposal	Core	3	1	0	4
3	14B11CE512	Highway Engineering	Core	3	1	0	4
4	14B11CE513	Design of Concrete Structures	Core	3	1	0	4
5	14B11CE514	Advanced Structural Analysis	Core	3	1	0	4
6	14B17CE572	Highway Engineering Lab	Core	0	0	2	1
7	14B17CE573	Building Drawing Lab	Core	0	0	2	1
8	14B19CE591	Seminar	Core	0	0	2	1
9	14B14CE541- CE544	Department Elective - 1	Elective	3	0	0	3
	14B14CE541	Open Channel Hydraulics					
	14B14CE542	Advanced Construction Materials					
	14B14CE543	Advanced Surveying					
	14B14CE544	Geo-synthetics and Reinforced Soil					
			Sub Total				25

## Course Description

**Title of Course: Social and Legal Issues**  
**L-T Scheme: 3-0**

**Course Code: 14B11HS541**  
**Course Credits: 3**

**Objectives:** Advancement in technology often comes with unexpected issues and unintended consequences. The central idea is that the society and information technology revolution are shaping each other. Information technology embodies social values and in turn produces change in values. Thus the main objective of this course is to help students grapple with the social, legal and ethical issues. The course shall eventually navigate students through legal, ethical & social issues related to social life and technology on their own.

**Learning Outcome:** At the end of the course the students-

1. Understand the ethical, cultural & social issues related to human life and technology.
2. Practice responsible use of technology systems, information & software
3. To develop positive attitude towards the human conduct and technology uses that support lifelong learning & productivity.
4. Identify and explore the legislative policies.
5. To be able to apply the relevant law to factual situations.

### Course Contents:

Chapter	Topics
1	Social Structure and Institutions
2	Social Stratification
3	Social Inequalities-Overview, Rights and privileges of citizens
4	Public policy for Technology
5	Social Impact on Information system & Technology
6	Corporate Social responsibility
7	Ethics 2- Business Ethics and Values, Code of conduct and Professional practices, Environmental Ethics
8	Factory Act, 1942- Overview
9	Labour Law – Overview 3- Minimum Wages Act, Child Labour
10	Contract Act & Sales of Goods Act 3- Definition, Sale and Agreement to sell, Formalities of the Contract, Condition and Warrant, Transfer of Title, Rights of Unpaid Seller
11	Consumer Protection Act 3- Background and Objectives, Relief under the Consumer Protection Act, General relief of compensation, Meaning and scope of consumer and C.P.A., Consumer rights
12	Intellectual Property Act and Patent 2- Patents, Copyrights, Trademarks, Registered ( industrial) design, Protection of IC layout design, Geographical indications, and Protection of undisclosed information
13	IT ACT 2000 3- Cyber Crime and Laws, Computer crimes: Fraud and Embezzlement, Sabotage and Information Theft, intruders, Hacking and cracking, Digital Forgery, Cyber Terrorism, Wire Tapping, Cyber Space: copyright and cyberspace, offensive speech in cyberspace and

liability of service provider, ICE Bill

- 14 Right to Information Act
- 15 Environment Protection Act
- 16 Corporate Governance

### **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

### **Text Book**

1. Industrial Relations and Labour Laws by S.C. Srivastava.
2. Business Law by PC Tulsian and Bharat Tulsian.
3. Business Law by D Chandra Bose.
4. Social Inequality in India by K.L. Sharma, Yogendra Singh.
5. Information Technology – Law and Practice by Vakul Sharma.
6. Indian ethics by Purusottama Bilimoria, Joseph Prabhu, Renuka M. Sharma.

# Course Description

**Title of Course: Human Psychology**

**Course Code: 14B11HS542**

**L-T Scheme: 3-0**

**Course Credits: 3**

## **Objectives:**

1. To strengthen the fundamental knowledge of human behavior.
2. To strengthen ability to understand the basic nature and behavior of human in organizations as a whole.

**Learning Outcome:** Students will be able to-

1. To understand further the fundamental processes underlying human behavior such as learning, motivation, individual differences, intelligence and personality.
2. Apply the principles of psychology in day-to-day life for a better understanding of themselves and others.

## **Course Contents:**

**Unit-I:** Introduction to psychology: Definition, Perspectives, Schools of psychology, Methods of psychology, Application of psychology for engineers

**Unit-II:** Basic Concepts: Perception, Learning, Intelligence, Motivation.

**Unit-III:** Cognitive Processes: Memory (sub-processes, major models), Thinking, Problem-solving, Decision making, Role of Language in cognitive process.

**Unit-IV:** Organizational Psychology: Leadership, Personality.

**Unit-V:** Engineering/Environmental Psychology: Stress, Emotions & Coping, Psychological disorders.

## **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

## **Text Books**

1. "Introduction to Psychology", 7th edition, 24th reprint. New Delhi: TataMcGraw-Hill, Morgan, C.T, King, R.A., Weisz, J.R., and Schopler, J. (2004).
2. "Introduction to Psychology", Ninth Edition, Wadsworth Cengage Learning, Rod Plotnik and Haig Kouyoumdjian
3. "Introduction to Psychology", Kona Publishing and media group, Douglas Krull
4. "Understanding Psychology", 10th edition, Delhi: Tata- McGraw Hill, Feldman R.S (2011).

## **References**

1. Baron, R.A. Psychology. (1995). 3<sup>rd</sup> edition. Delhi: Prentice Hall.
2. Munn, N.L., Fernald, L.D., & Fernald, P.S. (1997). Introduction to Psychology. Delhi: Houghton Mifflin.
3. Smith, E. E., Hoeksman, S. N., Fredrickson, B., Loftus, G. R. (2003). Atkinson's & Hilgard's Introduction to Psychology. First Reprint. Delhi Thomson Wadsworth.



# Course Description

**Title of Course: Professional Ethics**  
**L-T Scheme: 3-0**

**Course Code: 14B11HS543**  
**Course Credits: 3**

**Objectives:** While many people claim to be professional or to act in professional ways, there is a growing demand for moral behavior amongst professionals. This course will provide a values-based approach to ethical professionalism and provide a method of thinking about and dealing with ethical issues in the work place. The course will provide a discussion of what a profession is and what it means to act professionally. It will include a discussion of the features of moral reasoning and provide a case resolution method for dealing with ethical issues of the work place. The course will cover in-depth those values central to moral life of any professional: integrity, respect for persons, justice, compassion, beneficence and responsibility. The course will conclude with a focus on the ethical issues facing people in the profession of dental hygiene.

**Learning Outcome:** In this course the student will be able to-

1. Determine what a profession is and how it differs from work in general
2. Determine what characterizes a professional and distinguishes one from a nonprofessional
3. Understand what morality is and how it connects to professional ethics
4. Understand the features of moral reasoning, moral explanations and the role of moral theories

**Course Contents:**

## **Unit-1: Values of Liberal Society**

Introduction, History of profession, Scope, The nature and characteristics of professions, Obligations and professional services, Obligation to clients, professions and third parties, Virtues in the Professions.

## **Unit-2: Introduction to Professional Ethics**

History of Ethics, Definition of Ethics, The foundations and norms of professional ethics, Ethical theories, The need for separate code of conduct for professionals, The relation between professional and general ethics, Moral reasoning, Stages of Moral Development, Moral conflict and the issue of autonomy of professional ethics, Certain specific issues pertaining to engineering ethics , Professional code of ethics (COE).

## **Unit-3: Indian Value System and Values**

Indian Philosophy, Basic Principles of Indian Ethos for Management, Indian values and corporate governance, Individual ethics in Indian ethos, Teaching from widely recognized Indian scriptures.

## **Unit-4: Ethics impact in Business**

Ethical Issues in Capitalism and market systems, Ethics and social responsibility, Ethics and marketing, Ethics in finance, Ethics and human resource, Ethics and Information Technology.

### **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

### **Text Books**

1. Managing for Value by S.S. Iyer, New Age International Publishers.
2. Business Ethics by Laura P Hartman and Abha Chatterjee, Tata McGraw Hill.
3. Business Ethics– Concepts and Cases by Velasquez, Prentice Hall.

### **References**

1. Morality and the Professional Life, Brincat and Wike.
2. Ethics, Jurisprudence, and Practical Management, Kimbrough and Lautar.

# Course Description

**Title of Course: Macro Economics**

**Course Code: 14B11HS544**

**L-T Scheme: 3-0**

**Course Credits: 3**

**Objectives:** This course introduces students to the basic concepts in Macroeconomics. In this course the students are introduced to the macroeconomic variables like GDP, consumption, savings, investment, exchange rate and balance of payments. The course also focuses various theories of inflation, its relationship with unemployment and some basic concepts in an open economy.

## **Course Contents:**

### **Unit-1: Introduction**

Introduction to macroeconomics, Macroeconomic issues in an economy, Circular flow of money, National Income Accounting Concepts of GDP and National Income; measurement of national income and related aggregates; nominal and real income; limitations of the GDP concept.

### **Unit-2: Concept of aggregate expenditure**

Consumption function; savings function; investment function; equilibrium GDP; concepts of MPS, APS, MPC, APC; autonomous expenditure; Concept of multiplier.

### **Unit-3: Fiscal & Monetary policy**

Government Budget & Economy, Fiscal Policy: impact of changes in government expenditure and taxes, Concept of money in a modern economy; monetary aggregates; monetary policy; money supply and credit creation.

### **Unit-4: Inflation and Unemployment**

Concept of inflation; determinants of inflation; relationship between inflation and unemployment: Phillips Curve in short run and long run. Derivations of the IS and LM functions; IS-LM and aggregate demand; shifts in the AD curve.

### **Unit-5: Balance of Payments & Exchange Rate**

Balance of payments: current account and capital account; foreign exchange; determination of exchange rate

## **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

## **Text Books**

1. Macroeconomics by R. Glenn Hubbard, Pearson 2006.
2. Macroeconomics Theory and Policy by H. L. Ahuja.

## **References:**

1. Case, Karl E. & Ray C. Fair, Principles of Economics, Pearson Education, Inc., 8<sup>th</sup> edition, 2007.
2. Sikdar, Shoumyen, Principles of Macroeconomics, 2<sup>nd</sup> Edition, Oxford University Press, India
3. N. Gregory Mankiw, Macroeconomics, Worth Publishers.
4. R Dornbusch, S Fischer and R Startz, Macroeconomics, McGraw-Hill.

## Course Description

**Title of Course: Sewage Treatment & Disposal**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE511**  
**Course Credits: 4**

**PREREQUISITE:** Water Supply Engineering

**OBJECTIVE:** The objective of this course is to give the students the basics of sources of waste water, characteristics, modes of collection, treatment methods and options for disposal.

### **LEARNING OUTCOME:**

The students will be able to identify and demonstrate a working knowledge of the domain of waste water analysis, treatment and their management.

### **COURSE OUTLINE:**

- Basic terminology
- Systems of sanitation
- Sewerage systems
- Sewers
- Quality and characteristics of sewage
- Wastewater Disposal and Reuse
- Treatment of sewage
- Plumbing systems

### **TEXT BOOKS:**

1. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publishers.
2. Water Supply, Waste Disposal and Environmental Pollution Engineering by A.K. Chatterjee, Khanna Publishers.
3. Water Supply and Sanitary Engineering by Birdie, Dhanpat Rai Publications.

### **REFERENCE BOOKS:**

1. Environmental Engineering by Peavy, Rowe and Tchobanoglous, McGraw-Hill international Editions
2. Wastewater Engineering: Treatment, Disposal And Reuse by Metcalf Eddy, McGraw-Hill editions.
3. Standard Methods for the Examination of Water and Wastewater. 20th ed., American Public Health Association, Washington DC, USA.
4. Wastewater Treatment For Pollution Control And Reuse by Archievala & Shyam R. Asolekar, Tata Mcgraw Hill

## Course Description

**Title of Course: Highway Engineering**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE512**  
**Course Credits: 4**

**PREREQUISITE: Surveying,**

**OBJECTIVE:** To learn the fundamentals for designing of highway and to implement them for developing a computer based system for fast and efficient design.

**LEARNING OUTCOME:** At the end of course, the students shall be able to design the highway along any given existing or new highway area.

### **COURSE OUTLINE:**

- Importance of transportation, different modes, characteristics & Scope of highway engg in India,
- Geometric design
- Traffic Engineering
- Highway materials
- Pavement Design
- Highway construction
- Highway maintenance

### **TEXT BOOKS:**

1. Highway Engineering by 'A.K.Justo & S.K.Khanna' Nemchand Publ. Roorkee.
2. Transportation Engineering, An Introduction by 'C.Jotin Khisty & B.Kent Lall; PHI,
3. IRC Codes and Manuals

### **REFERENCE BOOKS:**

1. Traffic Engineering & Transportation Planning, L.R.Kadiyali, Khanna Publishers, Delhi (1997)
2. Traffic and Transportation Engineering by 'Animesh Das and P. Chakraborty', PHI Principles of Urban Transportation System Engineering, B.G.Hutchinson', TMG, Publication
3. Principles and Practices of Highway Engg, L.R.Kadyali & N.B.Lal, , Khanna Publishers, Delhi
4. Principles of Pavement Design, Yoder.E.J,& Witezac, John Wiley & Sons ,U.S.A

## Course Description

**Title of Course: Design of Concrete Structures**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE513**  
**Course Credits: 4**

**PREREQUISITE:** Structural Analysis

**OBJECTIVE:** The objective is to have students understand primary mechanisms of behavior and the basic criteria for design of simple reinforced concrete beams, columns and slabs.

### **LEARNING OUTCOME:**

- After completing the course students will be able to understand:
- Define service criteria and factored strength criteria for acceptance of basic reinforced concrete members;
- Understand where and why reinforcing steel should be placed in members during reinforced concrete construction;
- Perform basic shear, bending, and bending-axial capacity analysis and define preliminary design size requirements for basic members

### **COURSE OUTLINE:**

- Introduction to the design of Concrete structures
- Working & Limit state concepts.
- Design of beams (singly & doubly reinforced, T-beams & L-beams);
- Design of columns
- One and two-way Slabs,
- Stair cases;
- Footings
- Retaining wall;

### **TEXT BOOKS:**

1. Limit State Design by A. K. Jain, Nem Chand & Bros., Roorkee
2. Limit State Design of Reinforced Concrete by P.C. Varghese, Prentice Hall of India

### **REFERENCE BOOKS:**

1. Reinforced Concrete Design by Wang & Salmon
2. BIS Code of Practice for Plain & Reinforced Concrete - IS 456
3. BIS Code of Practice for Design Loads (Other than Earthquake) For Buildings & Structures IS875: PartI-V
4. Reinforced Concrete Design by Devdas Menon & S. Pillai, TATA McGraw-Hill
5. Reinforced Concrete Structures by Robert Park & Thomas Paulay, Wiley India Pvt Ltd

## Course Description

**Title of Course: Advanced Structural Analysis**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE514**  
**Course Credits: 4**

**PREREQUISITE:** Structural Analysis

### **OBJECTIVE:**

To provide a more in-depth look at structural mechanics with emphasis on energy and matrix methods used for the analysis of structures

### **COURSE OUTLINE:**

- Kani's method to analyze simple portal frames
- Column Analogy
- Basic Principles of matrix method
- Flexibility and Stiffness matrices and their generation
- Analysis of Fixed arches
- Rolling loads and Influence lines for beams and arches
- Plastic Analysis of beams and frames
- Approximate Methods to analyze portal frames

### **TEXT BOOKS:**

1. Basic structural analysis by C.S Reddy, Prentice Hall of India Pvt. Ltd.
2. Matrix Method of Analysis of Framed structure by Weaver and Gere, CBS Publication.

### **REFERENCE BOOKS:**

1. Advanced Structural Analysis with Computer Applications by Ashok K. Jain., Nemchand and Bros, Roorkee Pub.
2. Theory of Structures - Vol. II by S P Gupta, G S Pandit and R Gupta, Tata McGraw-Hill
3. Structural Analysis Vol. 2 by S S Bhavikatti
4. Theory of Structures by B. C. Punamia

## Course Description

**Title of Course: Highway Engineering Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 14B17CE572**  
**Course Credit: 1**

**PREREQUISITE:** Highway Engineering

**OBJECTIVE:** To learn the fundamental & testing procedures of highway materials.

### **LEARNING OUTCOME:**

At the end of course, the students shall be able to know the highway material testing procedures and their suitability for highways according to standards.

### **LIST OF EXPERIMENTS:**

1. Aggregate crushing strength test.
2. Los angeles abrasion test.
3. Aggregate impact test.
4. Flakiness index & elongation index test.
5. Penetration test.
6. Ductility test.
7. Viscosity test.
8. Softening point test.
9. Flash & fire point test.
10. Determination of bitumen content by centrifuge extractor.
11. Determination of marshal stability value.
12. Determination of rebound deflection of pavement by Benkelman beam.

### **TEXT BOOKS:**

1. Highway Engineering by S. K. Khanna & C.E.G. Justo.
2. Airport Planning & Design by S. K. Khanna, M. G. Arora & S. S. Jain.

### **REFERENCE BOOKS:**

1. Transportation Engineering by L. R. Kadiyali.
2. Highway Engineering by S. K. Sharma
3. Principles of Transportation Engineering by P. Chakraborty & A. Das.



## Course Description

**Title of Course: Building Drawing Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 16B17CE573**  
**Course Credit: 1**

**PREREQUISITE:** Engineering graphics

**OBJECTIVE:** To develop knowledge of various components of a building and, planning of residential and commercial buildings.

### **LEARNING OUTCOME:**

On completion of this course student will have knowledge of principle of planning which includes Site planning; open Space requirement–Establishing areas for different units, Furniture requirements, Roominess, Flexibility, Sanitation, Lighting, Ventilation, Space for equipment for air–conditioning, Space for machinery etc.; Flow diagram and line plan–Grouping, Circulation, Orientation, Aspect and prospect, Privacy, Elegance and economy; Climatic considerations.

Also students will have knowledge of building rules and bye–laws, zoning regulations; Regulations regarding layouts or sub-divisions; Building regulations; Rules for special type of buildings; Calculation of plinth, floor and carpet area; Floor space index, set back distance, floor area ratio (FAR), open space around buildings, built up area for residential buildings, minimum recommended floor area and height of rooms for residential buildings

### **LIST OF DRAWING:**

Plan, elevation and section of:

1. Single storied residential building
  - a) Load Bearing Structure
  - b) Framed Structure
2. Double Storied residential building
3. Single storied educational building
4. Single storied hospital building
5. Staircases
6. Doors and windows

### **TEXT BOOKS:**

1. Civil Engineering Drawing and House Planning by B. P. Verma, Khanna Publications, New Delhi.
2. Building construction details: practical drawings by Banz Hans, CBS Publishers and Distributors, New Delhi.

## Course Description

**Title of Course: Seminar**  
**L-T-P Scheme: 0-0-2**

**Course Code: 14B19CE591**  
**Course Credit: 1**

**OBJECTIVE:** To develop fundamental knowledge of tools and practices to be followed in research.

### **LEARNING OUTCOME:**

On completion of this course student will have clear understanding of the practices to be followed in conduction of research.

### **COURSE CONTENTS:**

Seminar is a course requirement wherein under the guidance of a faculty member a student is expected to do in depth study in a specialized area by doing literature survey, understanding different aspects of the problem and arriving at a status report in that area. While undergoing a seminar course, the student is expected to learn investigation methodologies, study relevant research papers, correlate work of various authors/researchers critically, study concept, techniques, prevailing results etc, analyze it and present a seminar report.

## Course Description

**Title of Course: Open Channel Hydraulics**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE541**  
**Course Credits: 3**

**PREREQUISITE:** Fluid Mechanics

### **OBJECTIVE:**

To introduce the concepts of channel hydraulics.

### **LEARNING OUTCOME:**

The contents of the course are applicable in design of inland waterways needed for irrigation, navigation etc.

### **COURSE CONTENT:**

- Introduction to free surface flows
- Uniform Flow
- Concepts of specific energy and specific force
- Gradually Varied Flow
- Hydraulic Jump
- Flow measurement in open channels

### **TEXT BOOKS:**

1. "Flow Through Open Channels" by Ranga Raju K.G., Tata McGraw-Hill Publishing Company Limited, New Delhi 2003.
2. "Open Channel Hydraulics" by Chow, V.T., Mc Graw Hill Book Company, 1959
3. "Flow of Fluids in Pipes and Channels" by Asawa, G.L., CBS Publishers, New Delhi 2007

## Course Description

**Title of Course: Advanced Construction Materials**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE542**  
**Course Credits: 3**

**PREREQUISITE:** Building materials and construction

**OBJECTIVE:** To introduce the advanced building materials that are being used in the construction industry or being studied at research level.

### **LEARNING OUTCOME:**

Students acquire knowledge about the advanced construction materials that are used in construction sector.

### **COURSE CONTENT:**

- Plastics
- Glass
- Timber
- Miscellaneous Materials
- Steel
- Composite Materials
- Unidirectional Composites
- Short fiber composites.
- Rubber reinforced composites
- Laminated composites- and its applications
- Fiber reinforced plastics (FRP) and its applications.
- Mortars.
- Steel Fibrous Concrete

### **TEXT BOOKS:**

1. Interscience Publication by Broutman .A Wiley John Wiley & sons New York, 1996.
2. Engineering Materials by Rangwala S C Charotar Publishing house , Anand, 1985.
3. Weather Head R G “FRP Technology” Applied Science Publishers Ltd , London ,1998.
4. Civil Engineering Materials by Raina K B Tata McGraw- Hill Publishing Company Ltd, New Delhi, 1999.
5. Engineering Materials .by Budinski K G, Prentice Hall of India, New Delhi, 1985.

## Course Description

**Title of Course: Advanced Surveying**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE543**  
**Course Credits: 3**

**PREREQUISITE:** Surveying

**OBJECTIVE:** To introduce the advanced surveying techniques that suit requirements of measurement at typical construction sites.

**LEARNING OUTCOME:**

Students will be learning advanced surveying techniques that can be used at different situations in construction field.

**COURSE CONTENT**

- Triangulation and trilateration
- Trigonometric Leveling.
- Spherical trigonometry
- Photogrammetry
- Hydrographic survey
- Global Positioning System (GPS)
- Modern surveying electronic equipments

**TEXT BOOKS:**

1. Surveying - Vol. 2& 3 by B.C. Punmia
2. Surveying - Vol. 2 & 3 by K. R. Arora
3. Higher Surveying by A. M. Chandra
4. Engineering Survey by W. Schofield

## Course Description

**Title of Course: Geosynthetics and Reinforced Soil**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE543**  
**Course Credits: 3**

**PREREQUISITES:** Basic courses in soil mechanics and foundation engineering

### **OBJECTIVE:**

To introduce the students to the different types of geosynthetics, their manufacturing technique, testing methods and their applications in different types of Civil Engineering projects.

### **LEARNING OUTCOME:**

Students will develop an understanding about the applications of geosynthetics for different geotechnical problems in construction.

### **COURSE CONTENT:**

- Historical background of reinforced soil
- Different types of geosynthetics
- Testing methods for geosynthetics
- Reinforced Soil retaining walls
- Reinforced soil slopes
- Applications in foundations
- Drainage and filtration applications of geosynthetics
- Pavement application
- Construction of landfills using geosynthetics

### **REFERENCE BOOKS:**

1. Designing with Geosynthetics, by Koerner, R.M. Prentice Hall, New Jersey, USA, 4th edition.
2. Soil Reinforcement with Geotextiles, Special Publication No. 123, CIRIA, by Jewell, R.A., Thomas Telford. London, UK, 1996.
3. Geosynthetics New Horizons, Eds. by G.V. Rao, PK Banerjee, J.T. Shahu, G.V. Ramana, Asian Books Private Ltd., New Delhi, 2004.

SEMESTER – VI (B-6)

S. N.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS611- HS644	HSS Elective	Elective	3	0	0	3
	14B14HS641	Project Management					
	14B14HS642	Business Environment					
	14B14HS643	Fundamentals of Financial Market					
	14B14HS644	Marketing Management					
2	14B11CE611	Foundation Engineering	Core	3	1	0	4
3	14B11CE612	Design of Steel Structure	Core	3	1	0	4
4	14B11CE613	Transportation Engineering	Core	3	1	0	4
5	14B11CE614	Estimation and Costing	Core	3	1	0	4
6	14B17CE671	Foundation Engineering Lab	Core	0	0	2	1
7	14B17CE672	Civil Engineering Software Lab	Core	0	0	2	1
8	14B14CE641- CE644	Department Elective - 2	Elective	3	0	0	3
	14B14CE641	Environmental Legislation & Auditing					
	14B14CE642	Disaster Management and Mitigation					
	14B14CE643	Selected Concrete Structures					
	14B14CE644	Traffic Engineering					
			<b>Sub Total</b>				<b>24</b>

**After completion of 6<sup>th</sup> Semester, Industrial Training of Six Weeks is Compulsory for All Students.**

# Course Description

**Title of Course: Project Management**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS641**  
**Course Credits: 3**

## Objectives

1. To address the basic nature of managing general projects, not specially focusing on one type of project.
2. The course uses the project life cycle as the organizational guideline.
3. The contents will cover the whole process of project management, including project initiation, project planning, project implementation and project termination.

## Learning Outcome: Student will be able to-

1. To understand the concepts of project definition, life cycle, and systems approach;
2. To develop competency in project scoping, work definition, and work breakdown structure (WBS);
3. To handle the complex tasks of time estimation and project scheduling, including PERT and CPM
4. To be skilled in expediting projects by prudently crashing certain activities, conducting Risk analysis, Resource allocation,
5. To develop competencies in project costing, budgeting, and financial appraisal;
6. To gain exposure to project control and management, using standard tools of cost and schedule variance analysis;

## Course Contents:

### Unit-I: Introduction to Project Management

Defining project management, Project life cycle, Project management maturity model, Project selection and criteria of choice, Types of project selection models, the management of risks, Project portfolio process. Project management and the project manager, Special demands on the project manager. Project as a part of functional organization, pure project organization, matrix organization & mixed organization.

### Unit-II: Project Planning

Initial project coordination, Sorting out the project, Work break down structure, linear responsibility chart. Estimating project budgets, improving the process of cost estimation.

### Unit-III: Project Scheduling

Discussion of scheduling techniques - PERT & CPM, Resource allocation problems, crashing of project, Resource loading, Resource leveling, Multiproject scheduling and resource allocation.

### Unit-IV: Project Monitoring & Control



Planning-monitoring –controlling cycle, Information needs and reporting process, Earned value analysis, Project management information system, three types of control processes, Control of change and scope creep, Project auditing, Project audit life cycle.

### **Unit-V: Project Termination**

Varieties of project termination, when to terminate a project, the termination process, Final report.

### **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

### **Text Books**

1. Project Management by Meridith and Mantel
2. Projects by Prasanna Chandra
3. Total Project Management: Indian Context by P. K. Joy
4. Effective Project Planning & Management by Randolph & Posmer

### **References**

1. Parameshwar P. Iyer. Engineering Project Management with Case Studies, Vikas Publishing House Pvt. Ltd. New Delhi, 2005.
2. Project Management Institute (PMI). A Guide to the Project Management of Knowledge (PMBok). Newton Square, PA. 1996.

## Course Description

**Title of Course: Business Environment**

**Course Code: 14B14HS642**

**L-T Scheme: 3-0**

**Course Credits: 3**

**Objectives:** This course is intended to make students understand various social, political, legal and economic and other factors that influence business in India so as to enable them appreciate associated Opportunities, risks and challenges and their relevance for managerial decisions.

### Learning Outcome

- Develop an understanding of various Social, Political, Legal, Economic & other factors that influence business in India.
- Develop capability to identify core issues of related to all such factors mentioned above.
- Make the students enable to appreciate the associated opportunities, risks & challenges.
- Develop confidence & capability to take managerial decisions in light of such opportunities, risks & challenges while doing day-to-day business activities.

### Course Contents:

**Unit-1:** Introduction to Business, Meaning of Business Environment : Economic and non economic factors influencing Business, Environmental Scanning, Process of environmental scanning, Economic systems: basic philosophies of Capitalism and Socialism with their variants, Concepts of Mixed Economy.

**Unit-2:** Constitutional Framework of state control of Business : The relationship between Business and Government in India, Definition of Security, Securities Exchange Board of India-Composition Stock Exchange-BSE-NSE, Securities Exchange Board of India-Powers and Functions, Competition Act 2002: Objective, Anti Competitive Agreements : Competition Commission of India- Composition, Powers and Functions, MRTP Act: Abuse of Dominant Position, Regulation, The Foreign Exchange Management Act, 1999- Objective and Applicability of the Act FEMA Vs FERA, Fiscal Policy Instruments- taxation, Monetary Policy: Types of Monetary Policy Instruments.

**Unit-3:** Philosophy and strategy of planning in India, Industrial Policy in recent years, Indian Financial System Financial Sector reforms-1, Indian Financial System Financial Sector reforms-2, Policy with regard to small scale industries-1, Policy with regard to small scale industries-2.

**Unit-4:** e-business - objectives, trends and practical uses, Corporate Social responsibility, FDI Policy, EXIM Policy.

**Unit-5:** New Economic policy (LPG), WTO & GATT, Make in India, Digital India campaigns.

### Teaching Methodology

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

**Text Books**

1. Business Environment by Vivek Mittal
2. Business Environment – Managing in a Strategic Context by John Kew & John Stredwick
3. Business Environment- Francis Cherunilam
4. Business Environment – Misra & Puri
5. Essentials of Business Environment – K. Aswathappa

# Course Description

**Title of Course: Fundamentals of Financial Market**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS643**  
**Course Credits: 3**

## Objectives

1. To provide general understanding of the different functions performed by financial markets and their role in the economic system.
2. To provide understanding of the fundamental principles that govern financial markets, the instruments that trade on them, and the financial and governmental institutions that use or support these markets.
3. To discuss various financial markets including money markets, bond markets, stock markets, derivatives markets and foreign exchange market in Indian context.

**Learning Outcome:** After the completion of the course the student will be able to-

1. Understand the importance of financial markets and financial system in the development and growth of any country.
2. Understand and analyze different financial markets processes and related financial instruments features and factors related to trading.
3. Make sound and intelligent financial decisions both on the individual as well as company level.

## Course Contents:

**Unit-I:** Introduction to Financial Markets: Financial system structure and functions, Financial markets and their economic functions, Financial intermediaries and their functions, Financial markets structure & regulation; Determination of interest rates, Valuation of cash flows.

**Unit-II:** Money & Capital Markets: Money market purpose and structure, Money market instruments, Money market interest rates and yields, Capital market structure and instruments.

**Unit-III:** Debt Market: Debt market instrument characteristics, Bond market, Bond valuation, Bond Analysis.

**Unit-IV:** Equity Market: Equity instruments, Primary equity market, Secondary equity market, Equity market characteristics, Stock valuation.

**Unit-V:** Derivatives Market: Description of derivatives markets, Forward and futures contracts, Swaps, Options.

**Unit-VI:** Foreign Exchange Market: Balance of trade and balance of payments, Determination and fluctuation of exchange rate, Exchange control, Foreign exchange market – Feature, Functions, Structure and Participants.

## Teaching Methodology

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

**Text Books**

1. Fabozzi, Modigliani, Jones Foundations of Financial Market & Institutions Prentice Hall.
2. Mishkin and Eakins Financial Market & Institutions, Prentice Hall.
3. Jeff Madura Financial Market & Institutions, Cengage.
4. Bharati V. Pathak, The Indian Financial System – Markets, Institution & Services, Pearson.
5. Clifford Gomez, Financial Markets, Institutions & Financial Services, PHI Learning.

# Course Description

**Title of Course: Marketing Management**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS644**  
**Course Credits: 3**

**Objectives:** The objective of this course is to train students to apply concepts and techniques in marketing so that they become acquainted with the duties of a marketing manager. More specifically, you will be exposed to the development, evaluation, and implementation of marketing management in a variety of business environments. Marketing management is the art of optimal manipulation of the marketing mix to achieve business goals. It encompasses activities such as demand creation and stimulation, positioning, product differentiation, product and brand management among others. All these activities involve planning, analysis, and decision-making.

**Learning Outcome:** The objectives of this course are to-

1. To develop a clear understanding of the marketing system, marketing environment, marketing mix and functions.
2. To understand evolution of marketing and the emphasis on each stage
3. To scan the environment for new business opportunities.
4. To devise a plan based on a sound conceptual framework to implement the marketing decision.
5. To make strategic marketing decisions based on analytical techniques.

## Course Contents:

**Unit-I:** Understanding Marketing Management, Defining Marketing for the 21st Century, Developing Marketing Strategies and Plans

**Unit-II:** Capturing Marketing Insights, Gathering Information and Scanning the Environment, Conducting Marketing Research and Forecasting Demand

**Unit-III:** Connecting with Customers, Creating Customer Value, Satisfaction, and Loyalty, Analyzing Consumer Markets, Analyzing Business Markets, Identifying Market Segments and Targets

**Unit-IV:** Building Strong Brands, Dealing with Competition, Creating Brand Equity, Crafting the Brand Positioning

**Unit-V:** Shaping the Market Offerings, Setting Product Strategy, Designing and Managing Services, Developing Pricing Strategies and Programs

## Teaching Methodology

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

## Text Book

1. Marketing Management, 13th edition, by Kotler/Keller/Koshi/Jha, Prentice-Hall 2009, ISBN 0-13-600998-0.

## **Reference Books**

1. Marketing. 3<sup>rd</sup> Edition, Lamb, C., Hair, J., McDaniel, C., Faria, A. and Wellington, W. (2006), Nelson, a division of Thomson Canada Limited, Ontario.
2. Principles of Marketing. 7<sup>th</sup> Edition, Kotler, P., Armstrong, G. and Cunningham, P. (2008). Pearson Prentice Hall, Ontario.
3. Marketing Management: Analysis, Planning, Implementation, and Control, 6<sup>th</sup> Edition, Kotler, P. and Turner, R. (1989). Prentice-Hall Canada Inc., Ontario.

## Course Description

**Title of Course: Foundation Engineering**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE611**  
**Course Credits: 4**

**PREREQUISITE:** Geotechnical Engineering

**OBJECTIVE:** The objective of the course is to familiarize the students with different types of foundations with their considerations in design and construction.

### **LEARNING OUTCOMES:**

In the end of the course, the students will be able to analyze the bearing capacity of soils, to design shallow and deep foundations, to estimate the settlements, to design the rigid and flexible retaining structures, to design cuts and excavations. Students will learn various sub surface exploration techniques and methods of ground improvement, learn the preliminary design of machine foundations.

### **COURSE OUTLINE:**

- Foundation requirement, types and selection, terminology
- Soil exploration techniques
- Bearing capacity of the soil
- Shallow foundations
- Raft foundation
- Pile foundation
- Well and Cassion foundation
- Arching in soils and braced cuts
- Ground improvement techniques

### **TEXT BOOKS:**

1. Geotechnical Engineering by C. Venkatramaiah, New Age International, 2006
2. Foundation Analysis and Design by Joseph E. Bowles, 5th Edition, McGraw-Hill
3. Basic and Applied Soil Mechanics by Gopal Ranjan and A. S. R. Rao, New age international publishers
4. Foundation Engineering Handbook by Winterkorn and Fang
5. Relevant BIS Codes

### **REFERENCE BOOKS:**

1. Principles of Foundation Engineering by Braja M. Das, Cengage Learning, 2010
2. Soil Mechanics by Lambe and Whitman, Wiley edition
3. Foundation Engineering by Leonards
4. Geotechnical and Foundation Engineering: Design and Construction by Robert W. Day, McGraw -Hills
5. Design Aids in Soil Mechanics and Foundation Engineering by Shenbaga R. Kaniraj - 1988





# Course Description

**Title of Course: Design of Steel Structures**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE612**  
**Course Credits: 4**

**PREREQUISITES:** Structural Analysis

**OBJECTIVE:** To provide a basic understanding of the mechanical properties and types of steels used in civil structures, and to develop technical competence in the design of tension and compression members, beams, and simple bolted and welded connections.

**LEARNING OUTCOME:**

Students understand the design a steel structural system (usually a steel truss) as part of a project.

**COURSE OUTLINE:**

- Structural steel and their properties
- Simple connections (Riveted, bolted and welded)
- Design of tension members
- Design of axially loaded compression members and built-up columns
- Design of beams, plate girders
- Estimation of Wind & Earthquake forces for towers

**TEXT BOOKS:**

1. Design of Steel Structure by L S Negi, TMH
2. Design of Steel Structure by S K Duggal, TMH

**REFERENCE BOOKS:**

1. Design of Steel Structure (Vol-I, II) by Ramchandra
2. BIS Code of Practice for General Construction in Steel - IS 800
3. BIS Code of Practice for Design Loads (Other than EQ) For Buildings & Structures IS875: Part I-V
4. Criteria for Earthquake Resistant Design of Structures - IS 1893

## Course Description

**Title of Course: Transportation Engineering**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE613**  
**Course Credits: 4**

**PRE REQUISITE:** Highway Engineering

**OBJECTIVE:** To learn the fundamentals of railways, airways, water ways & other minor modes of transportation modes.

### **LEARNING OUTCOME:**

At the end of course, the students shall be able to know about significance, fundamental knowledge of all the types of transportation modes.

### **COURSE CONTENT:**

- Railways:
- Air ports:
- Docks, harbours & inland water ways:
- Minor modes of transportation

### **TEXT BOOKS:**

1. Railway Engineering, Subhash.C.Saxena & Satyapal Arora, Dhanpat Rai & Sons,(1995)
2. Railways, Bridges & Tunnels, Vazirani. V.N, Chandola.S.P, Khanna Publications, New Delhi (1997)
3. Airport Planning & Design, .Khanna.S.K, Neem Chand Publications, Roorkee, (1999)
4. Docks & Harbors, Levison Francis, Clarendon Press,(2006)

## Course Description

**Title of Course: Estimation and Costing**  
**L-T Scheme: 3-1**

**Course Code: 14B11CE614**  
**Course Credits: 4**

**PREREQUISITE:** Engineering Drawing

**OBJECTIVE:** To learn the fundamentals of planning, designing and estimation of different types of civil engineering structures.

### **LEARNING OUTCOME:**

At the end of course, the students shall be able to know about planning, Drawing and estimating of different types of civil engineering structures manually and by using computer assistance.

### **COURSE OUTLINE:**

- Planning of buildings
- Estimating of buildings
- Estimating of road works
- Estimating of Culverts
- Estimating of Bridges
- Estimating of Wells
- Estimating of Irrigation works,
- Types of estimates
- Estimating of quantities for materials and transport,
- Specifications, rules and methods of measurement.

### **TEXT BOOKS:**

1. 'Planning and Designing of Residential Building' by Raj Rao, Standard Book Publisher
2. 'Estimation and Costing in Civil Engineering', by B.N.Dutta,
3. 'Text Book of Estimating and Costing' by G.S.Birdie
4. 'Estimating Costing and Specifications in Civil Engg.' By M .Chakraborty
5. 'Civil Engineering Building Drawing' by Gurucharan Singh

## Course Description

**Title of Course: Foundation Engineering Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 14B17CE671**  
**Course Credit: 1**

**PREREQUISITE:** Geotechnical Engineering

**OBJECTIVE:** To familiarize the students with different soil tests related to foundation engineering.

### **LEARNING OUTCOMES:**

Students will learn to determine the parameters related to the compressibility characteristics of soils, and parameters for estimation of shear strength, CBR tests, swelling pressure test and SPT test.

### **LABORATORY EXPERIMENTS:**

1. Consolidation test
2. Triaxial compression test
3. Unconfined compression test
4. Direct shear test
5. Vane shear test
6. Swelling pressure test by swelling pressure apparatus and consolidometer
7. CBR test (Soaked and Unsoaked)
8. SPT test (Demonstration)
9. Plate load test (model)

### **REFERENCE BOOKS:**

1. BIS Manuals
2. Geotechnical Engineering by R Agor
3. Geotechnical Engineering by BC Punmia

## Course Description

**Title of Course: Civil Engineering Software Lab**  
**L-T-P Scheme: 0-0-2**

**Course Code: 14B17CE671**  
**Course Credit: 1**

### **OBJECTIVE:**

To develop knowledge of Civil engineering software tools.

### **LEARNING OUTCOME:**

At the end of the course students will be able to utilize the civil engg. Software available and also able to understand and draw the drawings

### **COURSE OUTLINE:**

- Spreadsheet for calculating and drawing shear force and bending moment diagrams of determinate beams.
- Spreadsheet for designing a singly reinforced beam.
- Spreadsheet for designing a doubly reinforced beam.
- Primavera – Creating and analyzing a project – Project 1 part 1
- Primavera – Creating and analyzing a project – Project 1 part 2
- Primavera – Creating and analyzing a project – Project 2 part 1
- Primavera – Creating and analyzing a project – Project 2 part 2
- STAAD.Pro – Analysis of beams and plane frames
- STAAD.Pro – Analysis of Trusses
- STAAD.Pro – Analysis of a building for Gravity loads
- STAAD.Pro – Analysis of a building for Wind loads
- STAAD.Pro – Analysis of building for Earthquake load

## Course Description

**Title of Course: Environmental Legislation & Auditing**      **Course Code: 14B11CE641**  
**L-T Scheme: 3-0**      **Course Credits: 3**

**OBJECTIVE:** To educate the students about the existing environmental legislation in India and auditing procedures.

### **LEARNING OUTCOME:**

At the end of course, students will have awareness about the pollution control laws and their importance.

### **COURSE CONTENT:**

- Environmental pollution
- Indian Constitution and Environmental Protection
- Environmental agreements and Protocols
- Power & functions of regulatory agencies
- Water (Prevention & Control of Pollution) Act, 1974
- Air (Prevention & Control of Pollution) Act, 1981
- Environment (Protection) Act, 1986
- Environmental Audit

### **TEXT BOOKS:**

1. Pollution Control Acts, Rules and Notifications issued there under 'Pollution Control Series- PCL/2/1992 Central Pollution Control Board, Delhi, 1997.
2. Environmental Law And Policy In India, Shyam Divan and Armin Roseneranz, Oxford University Press, New Delhi.
3. Environmental Audit-REM 1994, Young S.S, cahner publishing co.

## Course Description

**Title of Course: Disaster Management and Mitigation**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE642**  
**Course Credits: 3**

### **OBJECTIVE:**

This course is intended for an introductory-level understanding of the concepts underpinning, and practical processes involved in, the management of disasters.

### **LEARNING OUTCOMES:**

Upon completion of Introduction to Disaster Management students will be able to: (i) Define and describe disaster management, hazard, emergency, disaster, vulnerability, and risk; (ii) Identify and describe the types of natural and non- natural disasters and the implications of disasters on your region and environment; (iii) List and describe the main hazards to which your region is, or may be, vulnerable; (iv) Define the various phases of the disaster management cycle; (v) Explain the importance of disaster mitigation and disaster preparedness.

### **COURSE CONTENTS:**

- Overview of Disaster Management
- The Role of Technology in Disaster Management
- Earthquake
- Tsunami
- Cyclone
- Flood
- Drought
- Landslide.

### **REFERENCE BOOKS:**

1. A Manual on Disaster Management. By Parag Diwan (2010). Pentagon press ISBN: 978-81-8274 438-7 Disaster Management & Rehabilitation, by Rajdeep Dasgupta (2007): Mittal Publication. ISBN 81-8324-201-4
2. S. Disaster management by K. Singh & Shobha Singh (1998). Mittal publication. ISBN 81-7099-679-8 (Vol. 5)



## Course Description

**Title of Course: Selected Concrete Structures**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE643**  
**Course Credits: 3**

**PREREQUISITES:** Design of Concrete Structures

**OBJECTIVE:** To familiarize students with special RC structures other than beam, column and slabs. Students will also learn about design of different solid and water retaining structures.

**LEARNING OUTCOME:**

Student will learn to design different special RC elements, Bunker silos and different water tanks.

**COURSE CONTENT:**

- Introduction
- Slender Columns
- Grid Floors
- Curved Beams
- Deep Beams
- Plain & Reinforced Concrete Walls
- Corbels & Edge ( Spandrel) Beams.
- Circular & Flat Slabs
- Bunker and silos

**TEXT BOOKS:**

1. Advanced Reinforced Concrete Design, by N.Krishna Raju (CBS Publishers & Distributors),
2. Advanced Reinforced Concrete Design, by P.C.Varghese( Prentice Hall of India)
3. IS3370 (Part I to IV) “Code of Practice for the storage of Liquids” , Bureau of Indian Standards.

## Course Description

**Title of Course: Traffic Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B11CE644**  
**Course Credits: 3**

**PREREQUISITE:** Highway Engineering

**OBJECTIVE:** To learn the fundamentals of traffic engineering and to implement them for developing a computer based system for fast and efficient design.

### **LEARNING OUTCOME:**

At the end of course, the students shall be able to solve problems related to traffic in the existing or new highway areas

### **COURSE OUTLINE:**

- Administration and functions
- Road user and vehicle characteristics
- Surveys
- Photographic techniques in traffic survey
- Statistical methods for traffic engineering
- Geometric design

### **TEXT BOOKS:**

1. **Traffic engineering & transportation planning, L.R.Kadiyali, Khanna Publishers, Delhi (1997).**
2. **Highway Engineering by 'A.K.Justo & S.K.Khanna' Nemchand Publ. Roorkee.**

### **REFERENCE BOOKS:**

1. IRC codes and Manuals
2. Traffic and Transportation Engineering by 'Animesh Das and P. Chakraborty', PHI
3. Principles of Urban Transportation System Engineering, by B.G.Hutchinson', TMG, Publication
3. Principles and Practices of Highway Engg, by L.R.Kadyali & N.B.Lal, , Khanna Publishers, Delhi (2006)
4. Transportation Engineering, an Introduction by 'C.Jotin Khisty & B.Kent Lall; PHI,
5. Highway Traffic Analysis and Design N.B. Hounsell, Allbooks.tv (West Sussex, United Kingdom)

SEMESTER – VII (B-7)

S. N.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS743- HS746	HSS Elective	Elective	3	0	0	3
	14B14HS743	Entrepreneurship and Small Business					
	14B14HS744	Marketing Management					
	14B14HS745	Human Resource Management					
	14B14HS746	Total Quality Management					
2	14B14CE741- CE746	Department Elective – 3	Elective	3	0	0	3
	14B14CE741	Ground Improvement Techniques					
	14B14CE742	Risk & Reliability in Geotechnical Engineering					
	14B14CE743	Soil Dynamics & Machine Foundations					
	14B14CE744	Rock Mechanics					
	14B14CE745	Under Ground Technology					
	14B14CE746	Advanced Foundation Engineering					
3	14B14CE747- CE752	Department Elective – 4	Elective	3	0	0	3
	14B14CE747	Metal Structures					
	14B14CE748	Pre-stressed Concrete Structure					
	14B14CE749	Earthquake Engineering					
	14B14CE750	Bridge Engineering					
	14B14CE751	FEM and its Applications to Civil Engineering					
	14B14CE752	Advanced Concrete Technology					
4	14B14*****	<b>Outside</b> Department Elective – 5	Elective	3	0	0	3
	14B14PH731	Nanotechnology & its Application					
	14B14MA733	Optimization Technique					
	14B14CL844	Computational Fluid Dynamics					
	14B14CI853	Artificial Neural Network					
	14B14WE753	Wind Resistant Design of Structures					
5	14B11CE711	Construction Technology & Management	Core	3	1	0	4
6	14B19CE791	Project Part-I	Core	0	0	14	7



contemporary perspectives on Infrastructure Development, Product and Procurement Reservation, Marketing Assistance, Subsidies and other Fiscal and Monetary Incentives. National state level and grass-root level financial and non-financial institutions in support of small business development.

### **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

### **Text Books**

1. Brandt, Steven C., The 10 Commandments for Building a Growth Company, Third Edition, Macmillan Business Books, Delhi, 1977
2. Bhide, Amar V., The Origin and Evolution of New Business, Oxford University Press, New York, 2000.
3. Dollinger M.J., 'Entrepreneurship strategies and Resources', 3rd edition, Pearson Education, New Delhi 2006.
4. Desai, Vasant Dr. (2004) Management of small scale enterprises New Delhi: Himalaya Publishing House,
5. Taneja, Gupta, Entrepreneur Development New Venture Creation,: 2nd ed. Galgotia Publishing Company
6. Holt, David H., Entrepreneurship: Strategies and Resources, Illinois, Irwin, 1955.
7. Panda, Shiba Charan, Entrepreneurship Development, New Delhi, Anmol Publications.
8. Patel, V.G., The Seven Business Crises and How to Beat Them, Tata-Mcgraw, New Delhi, 1995.
9. SIDBI Report n Small Scale Industries Sector[latest edition]
10. Verma, J.C., and Gurpal Singh, Small Business and Industry-A Handbook for Entrepreneurs, Sage, New Delhi, 2002
11. Vesper, Karl H., New Venture Strategies, [Revised Edition], New Jersey, Prentice Hall, 1990
11. Thomas Zimmerer, Essentials of Entrepreneurship and Small Business Management, Fifth edition, PHI publishers.

## Course Description

**Title of Course: Marketing Management**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS744**  
**Course Credits: 3**

**OBJECTIVES:** The objectives of this course are to:

1. To develop a clear understanding of the marketing system, marketing environment, marketing mix and functions.
2. To understand evolution of marketing and the emphasis on each stage
3. To scan the environment for new business opportunities.
4. To devise a plan based on a sound conceptual framework to implement the marketing decision.
5. To make strategic marketing decisions based on analytical techniques.

### **LEARNING OUTCOMES :**

On successful completion of the course, students will be able to:

- State the role and functions of marketing within a range of organizations.
- Describe key marketing concepts, theories and techniques for analyzing a variety of marketing situations.
- Identify and demonstrate the dynamic nature of the environment in which marketing decisions are taken and appreciate the implications for marketing strategy determination and implementation.
- Use written formats to communicate marketing outcomes.
- Apply the introduced conceptual frameworks, theory and techniques to various marketing contexts.
- Analyze the relevance of marketing concepts and theories in evaluating the impacts of environmental changes on marketing planning, strategies and practices.
- Demonstrate the ability to carry out a research project that explores marketing planning and strategies for a specific marketing situation.
- Synthesize ideas into a marketing plan.
- Demonstrate the ability to justify marketing strategies and advocate a strategically informed position when considering marketing plan implementation.

### **COURSE CONTENTS:**

- Understanding Marketing Management, Defining Marketing for the 21st Century, Developing Marketing Strategies and Plans
- Capturing Marketing Insights, Gathering Information and Scanning the Environment, Conducting Marketing Research and Forecasting Demand
- Connecting with Customers, Creating Customer Value, Satisfaction, and Loyalty, Analyzing Consumer Markets, Analyzing Business Markets, Identifying Market Segments and Targets
- Building Strong Brands, Dealing with Competition, Creating Brand Equity, Crafting the Brand Positioning

- Shaping the Market Offerings, Setting Product Strategy, Designing and Managing Services, Developing Pricing Strategies and Programs

**Text Book:**

- **Marketing Management**, 13th edition, by Kotler/Keller/Koshi/Jha, Prentice-Hall 2009, ISBN 0-13-600998-0.

**Reference books:**

- Marketing. 3<sup>rd</sup> Edition, Lamb, C., Hair, J., McDaniel, C., Faria, A. and Wellington, W. (2006), Nelson, a division of Thomson Canada Limited, Ontario.
- Principles of Marketing. 7<sup>th</sup> Edition, Kotler, P., Armstrong, G. and Cunningham, P. (2008). Pearson Prentice Hall, Ontario.
- Marketing Management: Analysis, Planning, Implementation, and Control, 6<sup>th</sup> Edition, Kotler, P. and Turner, R. (1989). Prentice-Hall Canada Inc., Ontario.

## Course Description

**Title of Course: Human Resource Management**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS745**  
**Course Credits: 3**

**OBJECTIVES:** To develop an understanding and awareness of HRM and the policies, principles and the role of HRM in Effective, efficient utilization of other resources.

**Learning Outcome:** After successfully completing this program, the student will be able to-

- Effectively manage and plan key human resource functions within organizations
- Examine current issues, trends, practices, and processes in HRM
- Contribute to employee performance management and organizational effectiveness
- Problem-solve human resource challenges
- Develop employability skills for the Canadian workplace
- Develop effective written and oral communication skills

### Course Contents:

**Unit-1:** Human Resource Management: Meaning, Nature and Scope, HRM functions and objectives, evolution of HRM environment.

**Unit-2:** Human resource development in India: evolution and principles of HRD Vs personnel functions, Role of HR managers.

**Unit-3:** Strategic Human Resource Management: Nature of strategies and strategic management, strategic management process, Environment scanning, strategy formulation, implementation and evaluation.

**Unit-4:** Human Resource Planning: Definition, purposes, processes and limiting factors; Human resources information system (HRIS): HR Accounting and audit, Job analysis- job description, job specification.

**Unit-5:** Training and Development: purpose, methods and issues of training and management development programs. Performance Appraisal: definition, purpose of appraisal, procedures and techniques including 360 degree performance appraisal.

**Unit-6:** Job evaluation and Compensation administration: nature and objectives of compensation, components of pay structure in India, Wage policy in India.

**Unit-7:** Discipline and Grievance Procedures: definition, disciplinary procedure, grievance handling procedures, Industrial relations: nature, importance and approaches to industrial relations.

### Text Books

1. Human Resource Management – Stephen P. Robbins.
2. Human Resource & Personnel Management- K. Aswathappa.
3. Human Resource Management- Rao V. S. P.
4. Human Resource Management- Ivansevich.



## Course Description

**Title of Course: Total Quality Management**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS746**  
**Course Credits: 3**

**Objectives:** This course will equip the students with the skills and knowledge necessary to implement a successful TQM program in a company, an understanding of the history, purpose and fundamentals of TQM, the tools and techniques that can improve operations, product quality, process quality, customer satisfaction and employee involvement and the various methods to assess progress of the TQM journey.

### **Course Contents:**

#### **Unit-1: Introduction**

Basics of Total Quality, Total Quality Management, TQM- Thinkers and Thoughts, Quality Awards.

#### **Unit-2: Features of TQM**

Cost of Quality, Team work for Quality, Total Employee Involvement, Customer Satisfaction.

#### **Unit-3: Continuous Improvement**

Quality Circles, Kaizen, Six Sigma, People CMM, Benchmarking.

#### **Unit-4: Basic Statistical Concepts**

Control of Accuracy and Precision, Process Capability, Statistical Process Control, Quality Function Deployment, Quality Management Systems, Design of Experiments (Taguchi Technique), FMEA, Total Productivity Maintenance.

#### **Unit-5: Quality Standards & Certifications**

ISO: 9000 series, ISO: 14000 series.

### **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

### **Text Book**

1. Besterfield Dale H., Carol Besterfield-Michna, Glen Besterfield, Sacre Mary Besterfield, Total Quality Management, Third Edition, Pearson Education.

### **References:**

1. Montgomery Douglas C., Introduction to Statistical Quality Control, Fourth Edition, John Wiley & Sons Inc.
2. Wadsworth, Modern Methods Quality and Improvement, 2<sup>nd</sup> edition, CBS Publications.
3. Eckes, Six Sigma for Everyone, CBS Publications.
4. Oakland, TQM: Text With Cases, 3<sup>rd</sup> edition, Elsevier Publications.
5. Hubert K Rampersad , Managing Total Quality, Tata McGraw Hill.

## **Course Description**

**Title of Course: Ground Improvement Techniques**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE741**  
**Course Credits: 3**

**PREREQUISITES:** Basic courses in soil mechanics and foundation engineering

### **OBJECTIVE:**

To addresses various ground improvement techniques along with principles, design issues and construction procedures.

### **COURSE OUTLINE:**

- Introduction
- Mechanical stabilization
- Hydraulic modification
- Modification by admixtures
- Grouting
- In situ soil treatment methods

### **REFERENCE BOOKS:**

1. Engineering Principles of Ground Modification,by Manfred R. Hausmann, McGraw-Hill, 1990.
2. Ground Improvement Geosystems by M C. R. Davies, F.Schlosser
3. Designing with Geosynthetics, by Koerner, R. M., Prentice Hall Inc. 1998.
4. Ground Improvement: Case Histories, Elsevier by v B. Indraratna, Jian J Chu (2005):

## Course Description

**Title of Course: Risk and Reliability in Geotechnical Engineering**

**Course Code:14B14CE742**

**L-T Scheme: 3-0**

**Course Credits: 3**

**PREREQUISITE:** Basic courses in soil mechanics and foundation engineering and probability course in mathematics

**OBJECTIVE:** To introduce the concept of risk and reliability in geotechnical engineering to handle soil variability influencing the geotechnical responses such as stress mobilization, failure mechanisms, flow patterns and variations of stresses and deformations and assessing the performance of geotechnical system in probabilistic framework.

### **COURSE OUTLINE:**

- Reliability based Methods in Civil Engineering
- Statistics and Probability
- Random Field Theory
- Reliability Analysis
- Simulation Methods
- Fault Tree Analysis
- System reliability

### **REFERENCE BOOKS:**

- 1 Probability Concepts in Engineering Planning & Design, Vol. 1, Basic Principles, by Ang, A.H.S. and Tang, W.H. (1975). John Wiley, New York.
2. Probability Concepts in Engineering Planning And Design Volume II - Decision, Risk And Reliability, by Ang, A.H.S. and Tang, W.H. (1984). John Wiley & Sons, Inc., New York.
3. Reliability and Statistics in Geotechnical Engineering, by Baecher, G.B. and Christian, J.T. (2003) John Wiley and Sons, London and New York.



## Course Description

**Title of Course: Rock Mechanics**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE744**  
**Course Credits: 3**

**PREREQUISITES:** Basic courses in soil mechanics and foundation engineering

### **OBJECTIVES:**

To introduce laboratory testing of rocks, strength, modulus and stress-strain responses of rocks, classification system and ground characterization, stability of rock masses and foundation consideration

### **COURSE OUTLINE:**

- Historical development of rock mechanics
- Basic equations from solid mechanics
- Distribution of rocks on Indian mainland
- Stereographic presentation of geological data
- Laboratory testing of rocks
- Engineering classification of rock and rock masses
- Estimation of stresses in rock mass
- Stability of rock slopes
- Rock foundations
- Methods to improve rock mass responses.

### **REFERENCE BOOKS:**

1. Engineering in Rock Masses, by Bell FG (1992): Butterworth-Heinemann Ltd, Oxford
2. Introduction to Rock Mechanics, 2<sup>nd</sup> Edition, by Goodman RE (1989): Chapman and Hall, London
3. Rock Slope Engineering, Institution of Mining and Metallurgy, by Hoek E. and Bray JW (1977): London
4. Engineering Rock Mechanics, Part-2 (Illustrative Worked Examples), by Harrison JP and Hudson JA (2000): Elsevier, oxford.
5. Engineering In Rocks For Slopes, Foundations and Tunnels, by T. Ramamurthy (2010): PHI learning private limited.

## Course Description

**Title of Course: Underground Technology**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE745**  
**Course Credits: 3**

**PREREQUISITE:** Geotechnical Engineering

### **LEARNING OUTCOMES:**

Students will learn about the soil support system for horizontal and vertical excavations, and will learn about dewatering methods, various methods of tunneling and tunneling machines, underground conduits, methods of grouting and ground improvement techniques.

### **COURSE OUTLINE:**

- Introduction to various underground structures
- Underground construction methodology & equipments
- Excavations
- Management of groundwater
- Methods of Basement construction
- In-situ Densification
- Tunnels
- Ditch Conduits
- Tunneled Conduits

### **TEXT BOOKS:**

1. Geotechnical Engineering by Gulati & Dutta (TMH)
2. Foundation Engineering Handbook, Edited by winterkorn & Fang
3. Construction Technology by Roy Chudley & Roger Green
4. Advanced Construction Technology by Roy Chudley & Roger Green
5. Tunnel Engineering Handbook edited by Bickel, Kuesel and King (624.193 BIC)
6. Railway Bridges and Tunnels by Vazirani and Chandola (625.1 VAZ)

## Course Description

**Title of Course: Advanced Foundation Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE746**  
**Course Credits: 3**

### LEARNING OUTCOMES:

In the end of the course, the students will be able to analyze the bearing capacity of soils using field test data, footings on layered soils, and footings near slopes, and other foundations resting on difficult soils, to design foundations for different machines.

### COURSE OUTLINE:

- Bearing capacity from field tests data
- Bearing capacity for footings
- Stresses and displacements in layered and anisotropic soils;
- Foundations on difficult soils
- Special footings and beams on elastic foundation
- Design of raft foundation by flexible methods
- Design of Piles
- Design of foundations for vibration control
- Computational methods in Geomechanics
- Introduction to forensic geotechnical engineering

### TEXT BOOKS:

1. Foundation analysis and design by Joseph E. Bowles, 5th Edition, McGraw-Hill
2. Foundation engineering handbook by Winter and Fang
3. Geotechnical Engineering by Coduto
4. Foundation Engineering by Tang
5. Forensic geotechnical and foundation engineering by Robert W. Day - 1999

### REFERENCE BOOKS:

1. Soil Mechanics by Lambe and Whitman, Wiley edition
2. Foundation Engineering by Leonards
3. Geotechnical and Foundation Engineering: Design and Construction by Robert W. Day, McGraw - Hills
4. Design Aids in Soil Mechanics and Foundation Engineering by Kaniraj, Shenbaga R. Kaniraj - 1988
5. Foundation Engineering In Difficult Ground by Frederic Gladstone Bell - 1978
6. Foundation Engineering For Difficult Subsoil Conditions by Leonardo Zeevaert - 1983
7. Principles of Foundation Engineering by Braja M. Das.

## Course Description

**Title of Course: Metal Structures**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE747**  
**Course Credits: 3**

**PREREQUISITE:** Design of Steel Structures

**OBJECTIVE:** To familiarize the student with the design of different structures built with steel.

### **LEARNING OUTCOMES:**

Student learns about design of different connections used in steel, industrial buildings and multi-storeyed buildings.

### **COURSE OUTLINE:**

- **Moment connections:** Simple, Semi-rigid and Rigid Connections; Connection Configurations; Angle Cleat Connections; End-plate Connections; Semi-rigid Connections; Moment-rotation Characteristics
- **Industrial buildings:** Structural Configurations; Functional and Serviceability Requirements; Industrial Floors; Roof Systems; Plastic Analysis and Design of Portal Frames; Crane Gantry Girders; Design for Wind Actions; Design for Earthquake Actions
- **Multi-storied buildings:** Structural Configurations; Steel-Concrete Composite Floor Systems; Loading; Analysis for Gravity Loads; Lateral Load Resisting Systems; Analysis for Lateral Loads; Dual Systems; Advanced Structural Forms
- **Towers & tanks**

### **TEXT BOOKS:**

1. Design of Steel Structures, by Subramanian, N. (2008). Oxford University Press.
2. Design of Steel Structures (by Limit State Method as Per IS: 800—2007), by Bhavikatti, S. S.(2010). IK International.

### **REFERENCE BOOKS:**

1. IS 800: 2007 “Code of practice for general construction in steel”, Bureau of Indian Standards
2. IS: 875(Part3): 2007 “Wind Loads on Buildings and Structures “, Bureau of Indian Standards.



## Course Description

**Title of Course: Pre-stressed Concrete Structure**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE748**  
**Course Credits: 3**

**OBJECTIVE:** Develop professional level competence in the design of commonly used prestressed concrete structures.

### **LEARNING OUTCOMES:**

Students have the ability to carry out design of commonly used prestressed concrete systems using fundamental principles as well as design aids.

### **COURSE OUTLINE:**

Introduction to basic concept of pre-stressing, System of pre-stressing , Loss of pre-stress, Analysis for flexure, Design for flexure shear and torsion, Deflection and cracking consideration, Transmission of pre-stress, Precast elements: poles, railway sleepers, beams, slab, use of relevant codes of practice.

### **TEXT BOOKS:**

1. Pre-Stressed Concrete by Krishna Raju, TMH

### **REFERENCE BOOKS:**

1. Pre-Stressed Concrete, by Pandit & Gupta, CBS
2. Design of Pre-stressed Concrete Structures, by T.Y. Lin, Asia Publishing House, 1955.
3. Pre-Stressed Concrete: A Fundamental Approach, by Edward Nawy, prentice hall, New Jersey

# Course Description

**Title of Course: Earthquake Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE749**  
**Course Credits: 3**

**OBJECTIVES:** Introduce the basic concepts in dynamic as well as probabilistic modeling of earthquake loading and dynamic analyses/simulation with uncertainty in earthquake engineering. Introduce the basics of structural dynamic analyses with emphasis on earthquake engineering applications. Introduce the basics of probabilistic assessment of seismic hazard and structural reliability.

**LEARNING OUTCOMES:** By the end of the course students will have knowledge of basic aspects of earthquake engineering and will be capable to take higher courses.

- Determine the natural frequency of a single degree of freedom dynamic system for given mass, structural properties, and damping.
- Determine the maximum dynamic response of an elastic vibrating structure to a given forcing function.
- An understanding of earthquakes as they interpreted in the context of engineering
- An understanding of response spectra and how they form the basis of the design process
- An understanding primarily from a structural engineers perspective of the soil structure interaction An inspiration to consider employing seismic isolation in the next possible design project

## **COURSE OUTLINE:**

- Nature of earthquakes
- Response of simple structures to earthquake ground motions
- Response of multi degree of freedom systems (mdof) to earthquake ground motions
- Seismic design principles
- Seismic code procedures

## **TEXT BOOKS:**

1. Earthquake Resistant Design of Structures by Pankaj Agarwal & Manish Shrikhande, Prentice Hall India.
2. Earthquakes by B. Bolt. Freeman, 1993.
3. Dynamics of Structures by A. Chopra. Prentice-Hall, 1995.
4. Seismic Design of Reinforced Concrete and Masonry Buildings by T. Paulay and M.J.N. Priestley, J. Wiley, 1992
6. B. I.S. Codes No. IS:1893-2002, IS:4326-1993, IS:13920-1993
7. Dynamics of Structures by Clough R.W. and Penzien J., McGraw-Hill, 2nd edition, 1992
8. Fundamentals of Earthquake Engineering by Newmark N.M. and Rosenblueth E., Prentice Hall, 1971.

## Course Description

**Title of Course: Bridge Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE750**  
**Course Credits: 3**

**OBJECTIVE:** To familiarize students with different components of bridges and their design.

**LEARNING OUTCOMES:**

Students will be able to design different types of reinforced concrete bridges.

**COURSE OUTLINE:**

- Planning of bridges
- Design of RCC bridges
- Design of girder bridges
- Bearings  
Construction methods

**TEXT BOOKS:**

1. “Concrete Bridge Practice- Analysis, Design & Economics”, by Raina V.K (1991), Tata Mc-GrawHill, Publishing Company, New Delhi.
- 2.“Concrete Bridge Practice- Construction Maintenance & Rehabilitation”,by Raina V.K (1988), Tata Mc - GrawHill, Publishing Company, New Delhi.
- 3 “Essentials of Bridge Engineering” by.Victor D.J , Oxford & IBH Publishing Company, New Delhi
- 4 “Bridge Engineering”, by. Ponnuswami S. (1993), Tata Mc-GrawHill, Publishing Company, New Delhi.
5. “Design of Bridges”, by Krishna Raju N (1996), TataMcGrawHill, Publishing Company, New Delhi.
6. Relevant IS Codes, and IRC Codes

## Course Description

**Title of Course: Fem and its Applications to Civil Engineering**

**Course Code: 14B14CE751**

**L-T Scheme: 3-0**

**Course Credits: 3**

**PREREQUISITE:** Mechanics of Solids and Structural Analysis

**OBJECTIVE:** To develop the knowledge of FEM and its applications.

### **LEARNING OUTCOMES:**

At the end of the course students will have knowledge of Finite Element Method and application of FEM in Civil Engineering Problems, Use of software.

### **COURSE OUTLINE:**

- Introduction
- Matrix-Displacement Formulation
- Applications of FEM in Civil Engineering
- 1-D Static Problems
- One-dimensional Formulations
- 2-D Static Problems
- Two-dimensional Formulations

### **TEXT BOOKS:**

1. Finite Element Analysis, by S. S. Bhavikati, New Age International (P) Limited Publishers, 1st Ed.2005
2. The finite element Method, by O. C. Zienkiewicz, McGraw-Hill, 3rd Ed., 2003

### **REFERENCE BOOKS:**

1. Finite Element Analysis - Theory and Programming, by C. S. Krishnamoorthy, Tata McGraw-Hill, 2<sup>nd</sup> Ed., 1994
2. An Introduction to the Finite Element Method, by J. N. Reddy, McGraw-Hill, 2nd Ed., 1996
3. Software: STAAD Pro, ANSYS, Spreadsheets.

## Course Description

**Title of Course: Advanced Concrete Technology**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE752**  
**Course Credits: 3**

**OBJECTIVE:** To develop the knowledge in new & advance concrete technology used in the construction field.

### **LEARNING OUTCOMES:**

At the end of the course students will have knowledge of different types of concrete and its use including the quality control and assessment of the concrete structure.

### **COURSE OUTLINE:**

- Basic concrete
- Approach to design for durability
- High Performance concrete
- Special concrete
- Quality control
- Assessment of concrete and structures
- Repair Techniques

### **TEXT BOOKS**

1. Neville, A.M. Properties of Concrete. ELBS Edition (4th ed.) Longman Ltd., London

### **REFERENCE BOOKS:**

1. Concrete, Prentice Hall, by P. K. Mehta, P J M Monteiro, New Jersey
2. Handbook of Concrete Mixes, Special Publications No 24 BIS New Delhi
3. EFNAARC Guidelines on SCC
4. ACI Special Publications
5. IS Specifications

## Course Description

**Title of Course: Nanotechnology & its Application**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE731**  
**Course Credits: 3**

**PREREQUISITES:** Physics

**SCOPE & OBJECTIVES:** The course aims to provide students an understanding of materials and their properties at the atomic level. Understanding of the intimate relationship between scale and size and possible use of these changes in properties at nanoscale in Engineering applications will also be emphasized.

### **LEARNING OUTCOME:**

Students will be able to understand properties of materials at nanoscale and apply modern scientific principles and techniques for their preparation and characterization.

### **COURSE OUTLINE:**

- Introduction and classification of nano-structured materials
- Conceptual background
- Size effects and properties of nano-structured materials
- Techniques for synthesis of Nanostructures
- Basic characterization and microscopy of Nanostructure materials
- Nanotechnology Applications

### **TEXT BOOKS:**

1. Nano Structures & Nano Materials, Synthesis, Properties & Applications by Guozhong Cao, Imperial College Press.
2. Concept of modern Physics by Arthur Beiser, 6<sup>th</sup> Edition, McGraw-Hill.

### **REFERENCE BOOKS:**

1. Introduction to Solid State Physics by C.Kittel 7th ed. Wiley
2. Nanoscale Energy Transport and Conversion: A Parallel Treatment of Electrons, Molecules, Phonons, and Photons by Gang Chen, Oxford University Press
3. Nano/Micro scale heat transfer by Zhuomin M. Zhang, Mc Graw-Hill Nanoscience and Technology series
4. Nanoscale materials in chemistry, 2<sup>nd</sup> edition, by Kenneth J. Klabunde and Ryan M. Richards, John Wiley & Sons.

## Course Description

**Title of Course: Optimization Technique**  
**L-T Scheme: 3-0**

**Course Code: 14B14MA733**  
**Course Credits: 3**

**OBJECTIVE:** To make students aware of the basic mathematical concepts and optimization techniques which will help them in learning courses in Engineering and Technology.

### **LEARNING OUTCOMES:**

After learning this course the students will be able to solve optimization problems of engineering and allied sciences.

### **COURSE CONTENTS:**

**Unit 1:** Formulation of Linear Programming(LP) and Non- Linear Programming Problems(NLPP) and their Graphical Solutions

**Unit 2:** Simplex Method, Duality

**Unit 3:** Dual Simplex Method, Integer Linear Programming Problems

**Unit 4:** Transportation Problems, Assignment Problems

**Unit 5:** Introduction to NLPs, Kuhn- Tucker Conditions

**Unit 6:** Quadratic Programming Problems and their solutions

### **Teaching Methodology**

Lectures would be interactive and it would cover the core concepts that are explained in the text and reference materials with adequate examples. Tutorials will have conceptual and numerical questions. Assignments and quizzes will be given to test their comprehensibility.

### **Text Books**

1. G .Hadley. (1962) Linear Programming, Massachusetts : Addison Wesley, 1962.
2. H.A. Taha. (1992) Operations Research- An Introduction, New York : Macmillan.
3. F.s. Hiller and G.J Liberman. Introduction to Operations Research, San Francisco : Holden-Day.
4. Harvey M. Wagner (1975) Principles of Operations Research with Applications to Managerial Decisions, Prentice Hall of India Pvt.Ltd.
5. S.D. Sharma. Operations Research by S. Chand & Sons.

## Course Description

**Title of Course: Introduction to Computational Fluid Dynamics**

**Course Code: 14B14CL844**

**L-T Scheme: 3-0**

**Course Credits: 3**

**PREREQUISITE:** Numerical Methods, Fluid Mechanics

**OBJECTIVES:** To introduce students to applied computational fluid dynamics (CFD) and to teach them how to solve a fluid flow problem using commercially available CFD software.

### **LEARNING OUTCOMES:**

At the end of the course, the student will have understood the principles of computational fluid dynamics, the various softwares applicable and be in a position to intelligently use the commercially available CFD softwares for simulation of practical problems in fluid flow / heat transfer.

### **COURSE OUTLINE:**

- Introduction
- Problem formulation
- Methods of discretisation
- Numerical solution of heat conduction problems
- Numerical solution of fluid flow problems

### **TEXT/REFERENCE BOOKS:**

1. Computational Fluid Dynamics: The Basics with Applications, By Anderson. J. Mc-Graw Hill, 1995.
2. Numerical Heat Transfer And Fluid Flow, By Patankar S. V., Hemisphere Publishing Corporation, 1980.
- 3 An Introduction to Computational Fluid Dynamics: Finite Volume Method, 2nd edition, By Versteeg, H.K. & Malalasekara, W. Prentice Hall, 1996.



## Course Description

**Title of Course: Artificial Neural Network**  
**L-T Scheme: 3-0**

**Course Code: 14B14CI853**  
**Course Credits: 3**

**OBJECTIVES:** To introduce students about concept of artificial neural network for problem solving in their stream.

### **LEARNING OUTCOMES:**

At the end of the course, the student will understand the principles of artificial neural network and be in a position to use them for practical problem solving.

### **COURSE CONTENTS:**

- Introduction to AI
- Introduction of Intelligent Systems
- Problems Solving, Search and Control Strategies
- Beyond Classical Search
- Actions
- Adversarial Search and Constraint Satisfaction
- Knowledge Representations Issues, Predicate Logic, Rules
- Reasoning System - Symbolic, Statistical
- Fundamentals of Neural Networks

### **TEXT BOOKS:**

1. Rich, Elaine Knight, Kevin , Artificial Intelligence, Tata McGraw Hill.
2. Luger, George F, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education.

### **REFERENCES:**

1. Nilsson, Nils J , Artificial Intelligence, Morgan Kaufmann
2. Russell, Stuart J. Norvig, Peter , Artificial Intelligence: A Modern Approach, Pearson Education
3. Negnevitsky, Michael, Artificial Intelligence: A Guide to Intelligent Systems, Addison - Wesley.

## Course Description

**Title of Course: Wind Resistant Design of Structures**  
**L-T Scheme: 3-0**

**Course Code: 14B14WE753**  
**Course Credits: 3**

**OBJECTIVES:** Introduce the basic concepts of wind engineering and design of wind resistant structures.

**LEARNING OUTCOMES:** By the end of the course students will have knowledge of aspects of wind engineering applicable for structural design.

### **COURSE OUTLINE:**

**Basic wind characteristics:** Atmospheric boundary layer- nature of wind- normal and extreme wind-deterministic and probabilistic description- mean return period-mean velocity profile-power law and logarithmic law—average time-turbulence-terrain types-correlation –spectrum of wind-topography

**Basic bluff body aerodynamics:** Flow around bluff bodies-Governing equations-Important aerodynamic parameters-pressure and force coefficients-mean and fluctuating pressures- -drag and lift- flow over prisms and circular cylinders- role of Reynolds number and turbulence intensity-effects of aspect ratio.

**IS code on wind loads:** Basic wind speed-Modification factors- $k_1$ ,  $k_2$ ,  $k_3$  and  $k_4$ -design wind speed-design wind pressures- external and internal pressures-pressure coefficients-Force coefficients-static and dynamic wind loads and effects

**Introduction to boundary layer wind tunnel testing:** Types of wind tunnels- principle of wind tunnel testing-similarity laws-simulation techniques - important flow and response parameters-case studies

**Structural dynamics as applied to wind engineering:** Static and dynamic loads- wind sensitive structures-single degree and multiple degrees of freedom Dynamic properties of a structure-Mechanical admittance function- Response of structures to dynamic wind loading

**Wind resistant design of structures:** Structural design philosophy- various loads-gravity and lateral loads-Design considerations-low-rise and high-rise buildings –Wind-sensitive structures - Case studies

### **REFERENCE BOOKS:**

- 1.Wind Loading of Structures By Holmes J.D., 2001, Spon Press, New York.
- 2.Wind Loads on Structures By Dyrbye,C. And Hansen,S.O., John Wiley & Sons, 1996,.
- 3.Wind Effects on Structures, By Simiu E. And Scanlan RH. 3rd Ed., 1996; Wiley-Interscience, New York.
- 4.Reinforced Concrete Design Of Tall Buildings By Taranath, B.S., First Indian Reprint 2011,Taylor And Francis Group, New York

5. The Designer's Guide To Wind Loadings Of Buildings And Structures, Parts 1 And 2., By Cook, N.J., (1985) Butterworth Publishers, London.
6. Wind Effects On Buildings, Vol. 1 And 2. By Lawson., T.V., (1980), Applied Science Publishers, Essex, London.
7. Indian Standard, IS:875( Part 3)-1987, "Code Of Practice For Design Loads (Other Than Earthquake) For Buildings And Structures, Part 3, Wind Loads, Bureau Of Indian Standards, New Delhi.
8. Fluid Mechanics – Fundamentals And Applications, By Yunus A. Cengel, And John M. Cimbala, 2006, Tata Mcgraw Hill Publishers, New Delhi.
9. Fluid Mechanics Through Problems, By R.J. Garde, 1997, 2nd Edition, New Age International Publishers, New Delhi.

## **Course Description**

**Title of Course: Project Part (I & II)**

**Course Code: 14B19CE791 (Part-I) & 14B19CE891 (Part-II)**

**L-T Scheme: 3-0**

**Course Credits: 7 + 8 = 15**

### **COURSE CONTENTS:**

Project is a course requirement wherein under the guidance of a faculty member, a final year student is required to do an innovative work with application of knowledge earned while undergoing various courses and laboratories in the course of study. The student is expected to do literature survey and carry out development and/or experimentation. Through project work the student has to exhibit both analytical and practical skills. The project is done in two semesters, i.e. 7<sup>th</sup> and 8<sup>th</sup>, on a continuous problem.

SEMESTER – VIII (B-8)

S. N.	Course Code	Course Title	Type	Hrs / Week			Credits
				L	T	P	
1	14B14HS841- HS845	HSS Elective	Elective	3	0	0	3
	14B14HS841	Knowledge Management					
	14B14HS842	Industrial Psychology					
	14B14HS843	Business Environment					
	14B14HS844	Management of Technology					
	14B14HS845	Strategic Management					
2	14B14CE841- CE844	Department Elective – 6	Elective	3	0	0	3
	14B14CE841	Hydropower Engineering					
	14B14CE842	Dams and Reservoir Design					
	14B14CE843	River Engineering					
	14B14CE844	Design of Hydraulic Structures					
3	14B14CE845- CE849	Department Elective – 7	Elective	3	0	0	3
	14B14CE845	Advanced Pavement Design					
	14B14CE846	Airport Engineering					
	14B14CE847	Urban Transportation Planning & Design					
	14B14CE848	Highway Construction, Maintenance and Management					
	14B14CE849	Docks and Harbor Engineering					
4	14B14CE850- CE854	Department Elective – 8	Elective	3	0	0	3
	14B14CE850	Environmental Management & Impact Assessment					
	14B14CE851	Geoenvironmental Engineering					
	14B14CE852	Energy Resources & Conservation					
	14B14CE853	Industrial Waste Treatment					
	14B14CE854	Design of Water & Wastewater Treatment Plants					
5	14B14CE855- CE858	Department Elective – 9	Elective	3	0	0	3
	14B14CE855	Remote Sensing and GIS Applications					
	14B14CE856	Sustainable Design & Construction					
	14B14CE857	Repair, Retrofitting & Rehabilitation of Structures					
	14B14CE858	Forensic Geotechnical Engineering					
6	14B19CE891	Project Part-II	Core	0	0	16	8

			<b>Sub Total</b>	<b>23</b>
			<b>TOTAL CREDITS</b>	<b>195</b>

# Course Description

**Title of Course: Knowledge Management**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS841**  
**Course Credits: 3**

## Objectives

1. To strengthen the understanding of different methods for work with knowledge management.
2. To understand the theoretical foundation for knowledge and to build capabilities to manage knowledge within and across organizational boundaries.

**Learning Outcome:** Student will be able to-

1. Define the nature and topology of knowledge and knowledge management within a business context
2. Identify technologies that are most useful for capturing/acquiring, organizing, distributing, and sharing knowledge within an enterprise
3. Explain how to formulate a knowledge management strategy, identify major requirements and issues for designing enterprise knowledge architecture and implementing knowledge management projects

## Course Contents:

**Unit-1:** Working Smarter, Not Harder: What is KM? Why KM? KM myths, KM Life cycle, Implications for KM.

Practice-Based perspectives on Knowledge: Definitions, Cognitions and KM, Data, Information and Knowledge, Types of Knowledge, Expert Knowledge, Human thinking and Learning, Innovation Dynamics and knowledge processes.

**Unit-2:** KM System Life Cycle (KMSLC): Challenges in building KM Systems, Conventional V/S KM System Lifecycle, KMSLC, system Justification, role of rapid prototyping, selecting an expert, Role of K developer.

Knowledge Creation and Capture: K- Creation, Nonaka's Model of Knowledge Creation and Transformation, K-Architecture, The people Core, identifying K- centers, and the technical core.

**Unit-3:** Capturing Tacit Knowledge: What is K capture?, Evaluating the expert, Developing a Relationship with expert, fuzzy reasoning and the quality of Knowledge, the Interview as a tool, guide to Successful Interview.

Other Knowledge Capture Techniques: On-site observation, Brainstorming, Protocol Analysis, Consensus Decision Making, the repertory grid, Nominal-Group Technique, The Delphi Method, concept Mapping, black boarding.

**Unit-4:** Information and Communication Technologies and Knowledge Management: Linking KM and ICTs, Epistemological assumptions and practice based perspectives on ICTs.

Power, politics, conflict and knowledge processes: Power as a resource and the critical discourse on KM, two perspectives on power /knowledge relationship.

**Unit-5:** Communities of Practice: CoP and Organizational dynamics, Study of intra-community knowledge processes, Emergence of CoPs, inward looking communities, Business Online communities. Cross community, Boundary spanning knowledge processes, Facilitating/managing knowledge between communities, using communities for relationship management and marketing.

**Unit-6:** Knowledge Discovery from Databases (Concepts): Overview of Nearest Neighbor approaches, Market Basket Analysis and Association rules, Cluster analysis. Facilitating KM via Culture management: Organizational Culture and KM, Strategic roles of business functions.

**Unit-7:** Managing Knowledge Workers: What is a K worker?, Business Roles in the Learning Organizations, Work adjustment and the Knowledge Worker, Technology and the Knowledge worker, Role of the CKO, Managing Considerations, Managing Knowledge Projects.

### **Text Books**

1. E. M. Awad and H. M. Ghaziri, Knowledge Management , 2<sup>nd</sup> ed., Pearson Education, 2004.

### **References**

1. Hislop, D., Knowledge Management in Organisations, 2nd Ed, Oxford, 2009.
2. R. Maier, Knowledge Management Systems. Information and Communication Technologies for Knowledge Management. 2nd ed., Springer, Berlin et al., 2004.
3. A. Tiwana, The Knowledge Management Tool Kit, Prentice Hall, 2000.



# Course Description

**Title of Course: Industrial Psychology**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS842**  
**Course Credits: 3**

**PREREQUISITES: Organization Behavior/Group & Cooperative Processes**

## **Objectives:**

1. To introduce major topics and subspecialties including critical theory and research findings those have served to define the field of I/O psychology.
2. To increase understanding of the complicated systems of individual and group psychological processes involved in the world of work.
3. To connect the basic principles of Industrial / Organizational Psychology to Personnel and Human Resources management within organizations.
4. To allow participants to explore ways in which individual career choices and work-life success can be improved through the benefits of I/O Psychology.

## **Learning Outcome:**

Student will be able to learn the theories and application of I/O Psychology including individual, group, and organizational issues resulting in enhanced understanding of the world of business and related career.

## **Course Contents**

### **Unit 1. Introduction to Industrial Psychology**

Definitions & Scope of Industrial Psychology, Major influences on industrial Psychology-Scientific management and human relations schools Hawthorne Experiments

### **Unit 2. Individual in Workplace**

Motivation : Theories of Motivation: Early and Contemporary views, Three level Work Motivation Model, Motivating a Diverse Workforce, Stress management: Understanding Stress and Its Consequences, Causes of Stress, Managing Stress, Leadership: Style and Theories of Leadership-Trait, Behavioral and Situational Theories,

### **Unit 3. Work Environment & Engineering Psychology**

Fatigue, Boredom, Accidents and safety, Job Analysis, Job Satisfaction, Recruitment and Selection – Different types of recruitment and selection tests, Reliability & Validity of recruitment tests.

### **Unit 4. Analysis of Interpersonal Relationship**

Group Dynamics: Definition, Stages of Group Development, Group Cohesiveness, Formal and Informal Groups, Group Processes and Decision Making, Dysfunctional Groups, Organizational culture : Organisational Culture : Concept, Characteristics, Elements of Culture, Implications of Organisation culture, Process of Organisational Culture.

## **REFERENCE BOOKS :**

1. Industrial/Organizational Psychology by J.B Miner, McGraw Hill.
2. Industrial Psychology. Its Theoretical & Social Foundations by Blum & Naylor, CBS Publication.
3. Human Resource Management by K. Aswathappa, Tata McGraw Hill

## Course Description

**Title of Course: Business Environment**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS843**  
**Course Credits: 3**

### OBJECTIVES

This course is intended to make students understand various social, political, legal and economic and other factors that influence business in India so as to enable them appreciate associated Opportunities, risks and challenges and their relevance for managerial decisions.

### LEARNING OUTCOME:

- Develop an understanding of various Social, Political, Legal, Economic & other factors that influence business in India.
- Develop capability to identify core issues of related to all such factors mentioned above.
- Make the students enable to appreciate the associated opportunities, risks & challenges.
- Develop confidence & capability to take managerial decisions in light of such opportunities, risks & challenges while doing day-to-day business activities.

### COURSE OUTLINE

Lecture No	Description	Pedagogy	Planned Week No.	Unit
1.	Introduction to Business	Lecture	1	1
2.	Meaning of Business Environment : Economic and non economic factors influencing Business	Lecture	1	1
3.	Environmental Scanning	Lecture,	2	1
4.	Process of environmental scanning	Lecture	2	1
5.	Economic systems: basic philosophies of Capitalism and Socialism with their variants.	Lecture	3	1
6.	Concepts of Mixed Economy	Lecture	3	1
7.	Constitutional Framework of state control of Business : The relationship between Business and Government in India	Lecture	4	2
8.	Definition of Security, Securities Exchange Board of India-Composition Stock Exchange-	Lecture,	4	2

	BSE-NSE			
9.	Securities Exchange Board of India-Powers and Functions	Lecture	5	2
10.	Competition Act 2002: Objective, Anti Competitive Agreements : Competition Commission of India – Composition, Powers and Functions.	Lecture	5	2
11.	MRTP Act : Abuse of Dominant Position, Regulation	Lecture	6	2
12.	The Foreign Exchange Management Act, 1999- Objective and Applicability of the Act FEMA Vs FERA	Lecture	6	2
<b>T1</b>				
13.	Fiscal Policy Instruments - taxation	Lecture	7	2
14.	Monetary Policy: Types of Monetary Policy Instruments	Lecture	7	2
15.	Philosophy and strategy of planning in India	Lecture	8	3
16.	Industrial Policy in recent years	Lecture	8	3
17.	Indian Financial System Financial Sector reforms - 1	Lecture	9	3
18.	Indian Financial System Financial Sector reforms - 2	Lecture	9	3
19.	Policy with regard to small scale industries -1	Lecture	10	3
20.	Policy with regard to small scale industries -2	Lecture	10	3
<b>T2</b>				
21.	e-business - objectives, trends and practical uses	Lecture	11	4
22.	Corporate Social responsibility	Lecture	11	4
23.	FDI Policy	Lecture	12	4
24.	EXIM Policy	Lecture	12	4

25.	New Economic policy (LPG)	Lecture	13	5
26.	WTO & GATT	Lecture	14	5
27.	Make in India , Digital India campaigns	Lecture	14	5
<b>T3</b>				

**TEXT BOOK:**

1. Business Environment by Vivek Mittal
2. Business Environment – Managing in a Strategic Context by John Kew & John Stredwick
3. Business Environment- Francis Cherunilam
4. Business Environment – Misra & Puri
5. Essentials of Business Environment – K. Aswathappa

# Course Description

**Title of Course: Management of Technology**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS844**  
**Course Credits: 3**

**Objectives:** In the Management of Technology programme the students learn to explore and understand technology as a corporate resource - a resource that allows a firm to keep many different balls in the air. It shows how firms can use technology to design and develop products and services that maximize customer satisfaction on the one hand, while maximizing corporate productivity, profitability and competitiveness on the other.

**Learning Outcome:** The programme addresses challenging questions most companies face such as:

- What technologies do we need and when?
- Do we procure the technology we need with our own research capabilities, in collaboration with outside parties, or by acquiring it or licensing it from others?
- How can we use the abundant technological opportunities to affect our mission, objectives and strategies?

Students that have completed the programme are well-versed to analyse technologies and their commercial impact and implement these in the organizational context of the firm. More specific, this involves that engineers investigate and understand, both internal to their own organisation and external in relation with business partners, what the current and future technological, economic and social environments require technological firms to do. They will be able to analyse and anticipate wider societal trends in which new technological production takes shape and in which market the resulting products and services are to be sold.

## **Course Contents:**

### **Unit-1: Introduction to Technology Management**

Definition, Concept of creativity, Components, Features, Classification of Technology, Concept and Nature of Technology Management, Drivers of MOT, Significance and Scope of MOT, Role of Chief Technology Officer, Responding to Technology challenges.

### **Unit-2: The Role of Technology in the Creation of Wealth**

The creation of wealth, Long-wave cycle, Evolution of production technology, Critical Factors in Managing Technology: The creativity factor, Types of innovation, Technology, price relationship, Managing change.

### **Unit-3: Management of Technology**

The New Paradigms Essential issues in technology management, Project planning and management, Management paradigm and the technology factor

### **Unit-4: Technology Life Cycles**

S-curve of technological progress, Multiple generation technologies ,Diffusion of technology

### **Unit-5: The Process of Technological Innovation**

Innovation and creative transformation in the knowledge age: critical trajectories, Case-Xerox, A model for technological innovation in biomedical devices.

## **Unit-6: Strategic planning**

Competitiveness, Business Strategy and Technology Strategy, Technology Planning. The Acquisition and Exploitation of Technology: Acquisition of technology. Exploitation of technology, Stages of technology development, Technology Transfer

## **Unit-7: Technology Diffusion**

Concept of Diffusion, Integrated Diffusion Strategy, Influencing factors, Innovation adoption, Diffusion strategies, Community effects and network externalities, Distribution of Adopters, Crossing the Chasm, Market dynamics.

Technology Absorption and Deployment, Technology Absorption, Influencing factors, Deployment strategies, Corporate Venturing, Benefits and Drawbacks of Corporate Venturing, Spin-off Companies.

### **Text Book**

1. Management of Technology by Tarek Khalil.

### **Reference Books**

1. Rastogi P.N: "Management of Technology and Innovation", Sage Publications,
2. New Delhi, 2009.
3. Scott Shane: "Technology Strategy for Managers and Entrepreneurs", Pearson
4. Education, New Delhi, 2009.
5. CSG Krishnamacharyulu, Lalitha Ramakrishnan, "Management of Technology", Himalaya Publishing House Private Limited, New Delhi, 2008.
6. White and Bruton: "The Management of Technology and Innovation", Cengage Learning India, New Delhi, 2009.
7. Tarek Khalil, "Management of Technology—The Key to Competitiveness and
8. Wealth Creation", McGraw Hill, Boston, 2000.
9. P.N.Rastogi, "Managing Creativity", Macmillan India Ltd, 2003.
10. William L Miller and Longdon, Morris, "Fourth Generation R & D", John Wiley & Sons Inc.
11. Pradip N Khandwalla: "Lifelong Creativity—An Unending Fest", TMH, 2004.
12. Pradip N Khandwalla: "Corporate Creativity", TMH, 2003.

# Course Description

**Title of Course: Strategic Management**  
**L-T Scheme: 3-0**

**Course Code: 14B14HS845**  
**Course Credits: 3**

**Objectives:** This course introduces the key concepts, tools, and principles of strategy formulation and competitive analysis. It is concerned with managerial decisions and actions that affect the performance and survival of business enterprises. The course is focused on the information, analyses, organizational processes, and skills and business judgment managers must use to devise strategies, position their businesses, define firm boundaries and maximize long-term profits in the face of uncertainty and competition. Strategic Management is an integrative and interdisciplinary course. It assumes a broad view of the environment that includes buyers, suppliers, competitors, technology, the economy, capital markets, government, and global forces and views the external environment as dynamic and characterized by uncertainty. In studying strategy, the course draws together and builds on all the ideas, concepts, and theories from functional courses such as Accounting, Economics, Finance, Marketing, Organizational Behavior, and Statistics.

**Learning Outcome:** By the end of semester, students will be able to-

1. Analyze the main structural features of an industry and develop strategies that position the firm most favorably in relation to competition and influence industry structure to enhance industry attractiveness.
  2. Appraise the resources and capabilities of the firm in terms of their ability to confer sustainable competitive advantage and formulate strategies that leverage a firm's core competencies.
  3. Demonstrate understanding of the concept of competitive advantage and its sources and the ability to recognize it in real-world scenarios.
  4. Formulate strategies for exploiting international business opportunities including foreign entry strategies and international location of production.
  5. Demonstrate the ability to think critically in relation to a particular problem, situation or strategic decision through real-world scenarios.
1. Recognize strategic decisions that present ethical challenges and make appropriate recommendations for ethical decision-making.

## **Course Contents:**

### **Unit -1 : Introduction & Strategic Management Concepts**

- Introduction-Strategic Management, Business Policy, Corporate Strategy, Basic Concept of Strategic Management, Mission, Vision, Objectives.
- Basic Model of Strategic Management.
- Strategic Decision Making.
- Impact of globalization, Impact of Internet and E-Commerce.
- Role of Strategic Management in Marketing, Finance, HR and Global Competitiveness.

### **Unit-2 : Environmental Scanning and Industry Analysis**

- Environmental Scanning, Industry Analysis, Competitive Intelligence ETOP Study, OCP, SAP Scanning,
- Corporate Analysis, Resource based approach,
- Value-Chain Approach,



- Scanning Functional Resources,
- Strategic Budget and Audit

### **Unit 3 : Strategy Formulation**

- SWOT Analysis, TOWS Matrix,
- Various Corporate Strategies: Growth/ Expansion, Diversification, Stability, Retrenchment & Combination Strategy.
- Process of Strategic Planning,
- Stages of corporate development, Corporate Restructuring, Mergers & Acquisitions, Strategic Alliances, Portfolio Analysis, Corporate Parenting, Functional Strategy,
- BCG Model, GE 9 Cell, Porters Model: 5 Force and Porters Diamond Model, Strategic Choice.

### **Unit 4 : Organizing Strategy Implementation**

- Strategy Implementation through structure, through Human Resource Management: through values and ethics.
- Mc Kinsey's 7S Model,
- Organization Life Cycle,
- Management and Control,
- Activity based Costing,
- Strategic Information System

### **Teaching Methodology**

The course is a mix of classroom teaching (power point slides) which includes case studies, quiz, role plays and group presentations based on project.

### **Text Books**

1. Strategic Management by Saroj Datta
2. Strategic Management: The Indian Context by Srinivasan R
3. Strategic Management by Azhar Khazmi

## Course Description

**Title of Course: Hydropower Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE841**  
**Course Credits: 3**

**PRE REQUISITE:** Fluid Mechanics

**LEARNING OUTCOME:** At the end of the course students will have in-depth knowledge of hydropower generation

### **COURSE OUTLINE:**

- Introduction
- Hydropower plants classification
- Load and power studies
- Intake structures
- Surge tanks
- Hydraulic turbines
- Small hydropower development

### **REFERENCE BOOKS:**

1. Water Power Development: Mosony, E., Vol. 1, 2 (A, B), Third Ed., Akademiai Kiado, Budapest, 1987.
2. Hydroelectric Handbook: William P. Creager and Joel D. Justin, 2nd Edition. Published by Wiley, Newyork.
3. Handbook of Applied Hydraulics: Davis, 4th Edition, McGraw-Hill, Newyork.
4. Hydropower Structures: R.S.Varshney, New Chand and Bros. Roorkee
5. Water Power Engineering: M. M. Deshmukh, Dhanpat Rai and Sons.
6. Water Power Engineering: M.M.Dandekar and K.N.Sharma Vikas Pub. House, N. Delhi.

## Course Description

**Title of Course: Dams and Reservoir Design**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE842**  
**Course Credits: 3**

**PREREQUISITE:** Fluid Mechanics, Water Resources Engineering

**LEARNING OUTCOME:** At the end of the course students will have in-depth knowledge of hydropower generation

### **COURSE OUTLINE:**

- Planning of project
- Selection of type of dam
- Foundation and construction materials:
- Earth fill dam
- Rock fill dam
- Concrete gravity dam

### **TEXT BOOKS:**

1. Design Of Small Dams - Bureau of Reclamation USA- Oxford & IBH , New Delhi
2. Water Power Engineering - Dandeker, Vikas Publishing House - New Delhi
3. Water Power Engineering, Bhattacharya, P. K., Khanna Publishers, New Delhi
4. Hydro-Electric and Pumped Storage Plants-M G Jog-John Wiley & Sons- New Delhi
5. Hydro-Electric Engineering Practice Vol 1- 3- J Guthrie, CBS - New Delhi
6. Handbook of Hydro Electric Engineering, P. S. Nigam, Nem Chand and Brothers, Roorkee.
7. Hydropower an Indian Perspective- Naidu, CBS Pub., New Delhi

## Course Description

**Title of Course: River Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE843**  
**Course Credits: 3**

**PREREQUISITE:** Fluid Mechanics

**LEARNING OUTCOME:** At the end of the course students will have in-depth knowledge of river morphological processes.

### **COURSE OUTLINE:**

- Elements of river geomorphology
- Soil Erosion and Sediment Yield
- Hydraulics of Alluvial Streams
- River Geometry and Plan Forms
- Gravel Bed Rivers
- Bed Level Variations in Streams
- Rivers and Environment

### **TEXT BOOKS:**

1. "River Morphology", by Garde R. J. New Age International Publishers, N. Delhi. (2006)
2. "Erosion and Sedimentation", by Julin. P. Y., Cambridge University Press. (1998)
3. "Principles of River Engineering", by Jansen P. P. H. VSSD Publications Neatherlands. (1994)

## Course Description

**Title of Course: Design of Hydraulic Structures**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE844**  
**Course Credits: 3**

**PREREQUISITE:** Fluid Mechanics

**OBJECTIVE:** To develop the in depth knowledge of various hydraulic structures and their design

### **LEARNING OUTCOMES:**

At the end of the course the students will have knowledge of open channel hydraulics and will be able to design various hydraulic structures.

### **COURSE CONTENT:**

- Diversion Head Works; Weirs and Barrages
- Failures of hydraulic structures founded on pervious foundations
- Storage works
- Design of gravity dams
- Types of earthen dams
- Spillways
- Maintenance of Hydraulic structures

### **TEXT BOOKS:**

1. Irrigation Engineering and Hydraulic Structures, by Garg, S.K., Khanna Publishers, 1997.
2. Irrigation Engineering and Hydraulic Structures, by Sahasrabudhe, S.R., Katson Publishers, 1994.

### **REFERENCE BOOKS:**

1. Irrigation and Water Power Engineering, by. Punmia, B.C Lakshmi Publications, Delhi.

## Course Description

**Title of Course: Advanced Pavement Design**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE845**  
**Course Credits: 3**

**PREREQUISITE:** Highway Engineering,

**OBJECTIVE:** To learn the fundamentals for designing of highway and to implement them for developing a computer based system for fast and efficient design.

**LEARNING OUTCOME:**

At the end of course, the students shall be able to design the highways by using latest techniques.

**COURSE OUTLINE:**

- Advanced highway materials
- Special problems in soil stabilization works
- Design of bituminous mixes
- Flexible pavements
- Rigid pavements
- Overlays
- Joint filling & sealing
- Pre stressed concrete pavements,

**TEXT BOOKS:**

1. Principles of pavement design: by Yoder E.J. Published by John Wiley and Sons, USA
2. Highway Engineering by 'A.K. Justo & S.K. Khanna' Nemchand Publ. Roorkee.

**REFERENCE BOOKS:**

1. Highway Design and Construction RJ Salter - 1988 - Basingstoke: Macmillan
2. Highway Design and Construction Bruce, Arthur, International Textbook C
3. Flexibility in Highway Design Garvey, Jane F., Acting Federal Highway Administrator
4. IRC: 37 -2012, Guidelines for the design of flexible pavements.
5. IRC: 58 -2011, Guidelines for the design of plain jointed rigid pavements for highways
6. IRC: 81-1997, Guidelines for strengthening of flexible road pavements using Benkelman beam deflection technique

## Course Description

**Title of Course: Airport Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE846**  
**Course Credits: 3**

**PREREQUISITE:** Highway engineering

**OBJECTIVE:** To learn the fundamentals of airport planning and terminal facilities and design of airports

**LEARNING OUTCOME:**

At the end of course, the students shall be able to know about significance, fundamental knowledge of all the components of airport.

**COURSE CONTENT:**

- The Nature of Civil Aviation and Airport
- Airport Planning
- Components of Airports Runway Design
- Taxiway Design
- Airport Zoning
- Airport Buildings
- Visual Aids
- Air Traffic Control

**TEXT BOOKS:**

1. Airport Planning and Design Khanna, by Arora and Jain. 2002. Nem Chand and Brothers, Roorkee.
2. Airport Planning and Design, by Robert Horenjoff. 2010, McGraw Hill.

**REFERENCE BOOKS:**

1. Airport Planning and Management, Alexander T. Wells. 2001. McGraw- Hill publication

## Course Description

**Title of Course: Urban Transportation Planning & Design**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE847**  
**Course Credits: 3**

**PREREQUISITE:** Highway Engineering and Traffic Engineering

**OBJECTIVE:** To learn the fundamentals of urban transportation planning based on various models. Learning outcome: At the end of course, the students shall be able to understand the urban transportation problems and planning process.

### COURSE OUTLINE

- Introduction
- Urban Transportation System Planning
- Trip Generation Analysis
- Mode Choice Modelling
- Trip Distribution Analysis
- Route Assignment
- Transportation Surveys
- Transport Related Land-Use Models.

### TEXT BOOKS:

1. Principles of Urban Transport Systems Planning, B.G. Hutchinson, McGraw-Hill Book Co., New York, 1974.
2. Traffic Engineering and Transport Planning, L.R. Kadiyali, Khanna Publishers, New Delhi, 2000.

### REFERENCE BOOKS:

1. Modeling Transport by J. de D. Ortuzar and L.G. Willumsen, John Wiley and Sons, 2001.
2. Transportation Engineering and Planning by C. S. Papacostas and P. D. Prevedouros, Prentice Hall of India Pvt. Ltd., 2001



## Course Description

**Title of Course: Highway Construction, Maintenance and Management**

**Course Code: 14B14CE848**

**L-T Scheme: 3-0**

**Course Credits: 3**

**PREREQUISITE:** Highway Engineering

**OBJECTIVE:** To learn the fundamentals, methods of highway construction, its maintenance and management.

**LEARNING OUTCOME:** At the end of course, the students shall be able to know the various types of highway construction methods, their maintenances and management.

### **COURSE OUTLINE:**

- Highway construction
- Earthwork.
- Non bituminous pavement constructions
- Bituminous pavement construction.
- Cement concrete pavement,
- Highway maintenance
- Recycling of pavements
- Hill Roads.
- Quality control of road works

### **TEXT BOOKS:**

1. Highway Engineering By S.K.Khanna and C E Justo
2. Principles and Practices of Highway Engg, L.R.Kadyali & N.B.Lal, , Khanna Publishers, Delhi (2006)

### **REFERENCE BOOKS:**

1. Principles of Transportation Engineering by Partha Chakraborty and A. Das
2. Specification of Road and Bridge Works by Ministry of Shipping, Road Transport & Highways.

## Course Description

**Title of Course: Docks and Harbour Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE849**  
**Course Credits: 3**

**PRE REQUISITE: Highway Engineering**

**OBJECTIVE:** To learn the fundamentals of water way transportation, planning and design of port and harbour structures.

**LEARNING OUTCOME:** At the end of course, the students shall be able to know about significance fundamentals knowledge on planning and design of docks and harbour structures.

### **COURSE OUTLINE:**

- General
- Natural phenomena
- Docks and harbours
- Harbour works
- Navigational Aids
- Docks and repair facilities
- Port facilities
- Dredging
- Coastal protection
- Case studies
- Maintenance and modernization of existing ports

### **TEXT BOOKS:**

1. A Course in Docks and Harbour Engineering, S. P. Bindra, Dhanpat Rai and Sons,
2. A course in Docks & Harbour Engineering, Oza and Oza,

### **REFERENCE BOOKS:**

1. Docks & Harbors by Levison Francis, Clarendon press, (2006)
2. Port Design - Guidelines and Recommendations, by C. A. Thoresen, Tapir Publications.
3. Design of Marine Facilities for the Berthing, Mooring and Repair of Vessels by J. W. Gaythwaite, Van Nostrand.
4. Planning and Design of Ports and Marine Terminals by Agerschou, H., Lundgren, H., A Wiley-Interscience Publication.
5. Port Engineering by Per Brun. Gulf Publishing Co.

## Course Description

**Title of Course: Environmental Management & Impact Assessment**

**Course Code: 14B14CE850**

**L-T Scheme: 3-0**

**Course Credits: 3**

**OBJECTIVE:** To learn about environmental management and impact assessment of civil engineering projects.

**LEARNING OUTCOME:**

At the end of course, the students shall be able to know the management of environment and environmental impact assessment of various civil engineering projects.

**COURSE OUTLINE:**

- Introduction
- Components of EIA:
- Methodologies
- Status of EIA in India:
- EIA Regulations in India
- Case studies
- Environmental management:
- EMS and Standardization
- Carbon trading:

**TEXT BOOKS:**

1. Environmental Impact Assessment, Canter, L.W., McGraw Hill, New York.
2. Environmental Management: Text and Cases, Bala Krishnamoorthy, Prentice Hall of India, Private Limited, New Delhi.
3. Handbook of Environmental Impact Assessment Vol. I and II, Petts, J, Blackwell Science, London.
4. The World Bank Group, "Environmental Assessment Sourcebook Vol. I, II and III ", The World Bank, Washington.
5. Pollution Prevention: Fundamentals and Practice, Paul L Bishop, McGraw-Hill International.

## **Course Description**

**Title of Course: Geoenvironmental Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE851**  
**Course Credits: 3**

**PREREQUISITE:** Geotechnical Engineering and Environmental Engineering.

**OBJECTIVE:** To learn about geotechnical applications in environmental pollution control and monitoring.

### **LEARNING OUTCOME:**

At the end of course, the students shall know about solutions to some practical problems related to geoenvironmental field.

### **COURSE CONTENT:**

- Soil- Pollutant Interaction:
- Characterization, Stabilization and Disposal
- Transport of Contaminants:
- Detection and Testing Methods .
- Remediation of Contaminated Soils

### **REFERENCE BOOKS:**

1. Waste Containment Systems, Waste Stabilization and Landfills: Design and Evaluation, by Hari D Sharma and Sangeeta P. Lewis, John Willey & Sons.
2. Geotechnical Engineering by Shashi K Gulhati & Manoj Dutta, Tata McGraw Hill.
3. Hazardous Waste Management by Wentz, C.A, McGraw Hill.
4. Geotechnical Practice for Waste Disposal by Daniel, B.E., Chapman and Hall, London.
5. Introduction to Environmental Geotechnology by Fang, H. Y, CRC Press New York.

## Course Description

**Title of Course: Energy Resources & Conservation**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE852**  
**Course Credits: 3**

**OBJECTIVE:** To learn about importance of energy resources and their conservation.

### **LEARNING OUTCOME:**

At the end of course, the students shall know about various sources of energy and methods for their conservation.

### **COURSE OUTLINE:**

- Introduction.
- Hydropower
- Thermal power
- Nuclear power
- Solar energy
- Biomass energy
- Wind energy
- Geo-thermal energy
- Tidal energy
- Ocean thermal energy
- Energy conservation

### **TEXT BOOKS:**

1. Non-Conventional Energy Sources by Rai, G. D, Khanna publishers.
2. Renewable Energy Technologies: A Practical Guide For Beginners by Prentice Hall of India, Private Limited, New Delhi.
3. Wind and Solar Power Systems- Design, Analysis and Operation by Mukund, R. P., Taylor and Francis publishers.
4. Energy Resources: Occurrence, Production, Conversion, Use, Wendell H. Wisser, springer.

## Course Description

**Title of Course: Industrial Waste Treatment**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE853**  
**Course Credits: 3**

**PREREQUISITE:** Water supply engineering and Sewage treatment and disposal

**OBJECTIVE:** To learn about industrial scenario in country, associated environmental impacts and options for management of wastes.

**LEARNING OUTCOME:**

At the end of course, the students shall be able to understand the affects of industries on environment and options for management.

**COURSE CONTENT:**

- **Introduction**
- **Treatment**

Introduction to treatment of industrial waste water, reactors used for the treatment, equalization neutralization, proportioning, oil separation, flotation, chemical precipitation, air stripping, heavy metal removal, aerobic and anaerobic biological treatment, chemical oxidation, adsorption, photocatalysis, ion Exchange, membrane technologies, miscellaneous pollutants removal: chromium, mercury, ammonia, nutrient, phenolic effluents, organic vapour, low cost treatment systems and their design.

- **Management**

Recent trends in industrial waste management, cradle to grave concept, life cycle analysis, clean technologies, common effluent treatment plant, case studies of various industries, e.g., dairy, fertilizer, tannery, distillery, sugar, pulp and paper, steel, cement, textile industries.

**TEXT BOOKS:**

1. Wastewater Engineering: Treatment, Disposal and Reuse by Metcalf Eddy, McGraw-Hill editions.
2. Waste Water Treatment, by M.N. Rao & A. K. Dutta, Oxford & IBH publishers, New Delhi.
3. Wastewater Treatment for Pollution Control and Reuse by Archievala & Shyam R. Asolekar, Tata Mcgraw Hill
4. Environmental Engineering by Peavy, Rowe and Tchobanoglous, McGraw-Hill international editions
5. Industrial Water Pollution Control by Eckenfelder W.W, Mc-Graw Hill publications.
6. Industrial Waste Water Management Handbook, by Azad, Hardom Singh, McGraw Hill publications.
7. Industrial Waste Water Treatment, by A. D. Patwardhan, Prentice Hall of India, Private Limited, New Delhi.

## Course Description

**Title of Course: Design of Water & Wastewater Treatment Plants**

**Course Code: 14B14CE854**

**L-T Scheme: 3-0**

**Course Credits: 3**

**PREREQUISITE:** Water supply engineering and Sewage treatment and disposal

**OBJECTIVE:** To familiarize the student with the design of each unit that is included in the conventional potable water treatment and wastewater treatment plant.

### **LEARNING OUTCOMES:**

Student learns to design the water and wastewater treatment plants to meet the given quantity and quality requirements based upon the standards.

### **COURSE OUTLINE:**

- Water treatment
- Sedimentation
- Coagulation
- Flocculation
- Filtration
- Wastewater Treatment
- Preliminary and Primary treatment
- Secondary Treatment
- Tertiary Treatment
- Design of complete wastewater treatment plant.

### **TEXT BOOKS:**

1. Water Supply Engineering by S.K. Garg, Khanna publishers.
2. Sewage Disposal and Air Pollution Engineering by S.K. Garg, Khanna Publishers.
3. Water Supply, Waste Disposal and Environmental Pollution Engineering by A.K. Chatterjee, Khanna publishers.
4. Manual on "Water Supply and Treatment ", CPHEEO, Ministry of Urban Development, GOI, New Delhi.
5. Manual on "Sewerage and Sewage Treatment ", CPHEEO, Ministry of Urban Development, GOI, New Delhi.

### **REFERENCE BOOKS:**

1. Design of Wastewater Treatment, by S.R. Quasim, CBS Publications, U.S.A.
2. Environmental Engineering by Peavy, Rowe and Tchobanoglous, McGraw-Hill international editions.
3. Wastewater Engineering- Treatment, Disposal, and Reuse by Metcalf & Eddy, McGraw-Hill Publishing Company Limited.

## Course Description

**Title of Course: Remote Sensing and GIS Applications**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE855**  
**Course Credits: 3**

**OBJECTIVE:** To provide exposure to the students on various techniques of remote sensing.

### **COURSE CONTENT:**

Remote Sensing: System, data acquisition and processing; Applications; Multi concept in remote sensing. Physical basis of remote sensing - Electro-magnetic radiation (EMR) - nature, nomenclature and radiation laws; Interaction in atmosphere - nature, its effects in various wavelength regions.

Atmospheric windows; Interaction at ground surface - soils and rocks, vegetation, water, etc.; Geometric basis of interaction. Platform and sensors - Terrestrial, aerial and space platforms; Orbital characteristics of space platforms, sun & geo-synchronous; Sensor systems radiometers, opto-mechanical and push broom sensor; Resolution - spectral, spatial, radiometric and temporal; Data products from various air and space borne sensors - aerial photographs, LiDAR, Landsat, SPOT, IRS, ERS, IKONOS, etc. Image interpretation- Elements of interpretation; Manual and digital interpretation; Field verification.

Geographical Information Systems: Components of GIS- data acquisition, spatial and attribute data, pre-processing, storage and management; Data structures-raster and vector data; GIS analysis functions; Errors and corrections; Data presentation and generation of thematic maps; GIS applications.

### **TEXT BOOKS:**

1. Advanced Surveying: Total Station, GIS and Remote Sensing by Satheesh Gopi, Gopi Pearson Education India, 2007
2. Advanced Surveying and Mapping by George Dewey Whitmore
3. Advanced Surveying, Vol 2 by William Horace Rayner



## **Course Description**

**Title of Course: Sustainable Design & Construction**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE856**  
**Course Credits: 3**

**OBJECTIVE:** To develop a sense of responsibility towards green aspects in construction

### **COURSE CONTENT:**

Introduction to sustainable design and construction Green Building Assessment

- Ecological Design.
- Sustainable sites and Landscaping.
- Energy and Atmosphere
- Building Hydrologic System
- Green Building Materials and Green Building Products
- Indoor Environmental Quality

### **TEXT BOOKS:**

1. Sustainable Construction: Green Building Design and Delivery by Charles J. Kibert.
2. Green Building Handbook: A Guide to Building Products and Their Impact on the Environment by Tom Woolley, Sam Kimmins
3. Energy-Efficient Building Systems by Lal Jayamaha
4. Sustainable Construction by Ch. Hendriks

## **Course Description**

**Title of Course: Repair, Retrofitting & Rehabilitation of Structures**

**Course Code: 14B14CE857**

**L-T Scheme: 3-0**

**Course Credits: 3**

**OBJECTIVE:** To familiarize students with different techniques and material used in repair and rehabilitation of structures.

### **LEARNING OUTCOMES:**

Student will learn how to repair and retrofit different RC structures. They will also learn about different techniques and materials used to repair and retrofit damaged structures.

### **COURSE CONTENT:**

- Maintenance and repair strategies
- Serviceability and durability of concrete
- Materials for repair
- Techniques for repair and demolition
- Methods of corrosion protection
- Repairs, rehabilitation and retrofitting of structures

### **TEXT BOOKS:**

1. Seismic Evaluation and Retrofit of Concrete Building - Vol. I & II", Applied Technology Council, California, ATC 40.
2. Denison Campbell, Allen and Harold Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1991.
3. Repair of Concrete Structures, by R.T. Allen and S.C.Edwards,Blakie and Sons,UK,1987

### **REFERENCE BOOKS:**

1. Training Course notes on Damage Assessment and Repair in Low Cost Housing by Santhakumar, A.R., "RHDC-NBO" Anna University, July 1992.
2. Learning from Failures - Deficiencies in Design, Construction and Service by Raikar, R.N., - R&D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.

## Course Description

**Title of Course: Forensic Geotechnical Engineering**  
**L-T Scheme: 3-0**

**Course Code: 14B14CE858**  
**Course Credits: 3**

**PREREQUISITES:** Basic courses in soil mechanics and foundation engineering

### **OBJECTIVES:**

To introduce forensic investigations in geotechnical failures for establishing causes and possible remedial measures

### **COURSE OUTLINE**

Introduction to forensic engineering, types of damages; forensic geotechnical and foundation investigations: settlement of structures, expansive soils and related problems, lateral movements, other geotechnical and foundation problems, such as, earthquakes, erosion, deterioration, tree roots, bearing capacity failures, ground water and moisture problems.

**Repairs:** slab-on-grade foundations, foundation repair alternatives, slope failures and landslides repair using pier walls

### **REFERENCE BOOKS:**

1. Forensic Geotechnical and Foundation Engineering by Robert W. Day (1998): McGraw Hill.
2. Guidelines for Forensic Engineering Practice by Gary L. Lewis (2003): ASCE.
3. Beyond Failure: Forensic Case Studies for Civil Engineers by Norbert J. Delatte (2009): ASCE
4. Forensic Engineering by Kenneth L. Carper (2001): Kenneth L. Carper Ltd.
5. From Research to Practice in Geotechnical Engineering by John H. Schmertmann, James E and Laier, David K. Crapps (2008): Geo-Institute, ASCE.
6. Forensic Engineering Fundamentals by Harold Franck, Darren Franck (2012): CRC Press