HANDBOOK

COURSE STRUCTURE AND DETAILED SYLLABUS

B. Tech Programme

Civil Engineering

Batch: 2019-23

NSTITUTE OF ENGINEERING AND TECHNOLOGY

JK LAKSHMIPAT UNIVERSITY

Near Mahindra SEZ, Mahapura, Ajmer Road, Jaipur 302 026
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Program Education Objectives

The B.Tech program at IET, JKLU is designed to prepare students for continued learning and successful careers. Our alumni are expected to:

PEO1: Apply their technical knowledge, complex problem solving and research skills in professional practice.

PEO2: Continue their intellectual development through critical thinking, self-study, apprenticeship, higher education, professional development courses, as well as participation in research groups and professional networks.

PEO3: Serve as ambassadors for engineering and sustainability by exhibiting high professional standards with a deep sense of civic responsibility.

PEO4: Effectively communicate about technical and related issues.

PEO5: Embrace the roles of team members and leaders in their careers.

Program Outcomes

The graduates of B.Tech. programs at IET, JKLU will have the following competencies:

PO 1: Life-long learning: Demonstrate inquisitiveness, open mindedness, and the ability to engage in independent and life-long learning in the broadest context of technological, organizational, economic, and societal changes.

PO 2: Citizenship, Sustainability, and Professional ethics

PO 2a: Demonstrate knowledge of constitutional values of liberty, equity, justice, and fraternity with an understanding of the impact of the engineering solutions in societal and environmental contexts as well as a sense of responsibility for sustainable development.

PO 2b: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, cultural, and environmental issues and the consequent responsibilities relevant to professional engineering practice.

PO 2c: Demonstrate commitment for professional integrity and excellence and respect for ethics, responsibilities and norms as prescribed for the engineering practice.

PO 3: Engineering knowledge and Modern tool usage

PO 3a: Demonstrate a clear conceptual understanding of the fundamentals of engineering specialization and cognitive flexibility to appropriately ‘transfer’ what has been learned in a context, to different situations.

PO 3b: Apply engineering thinking, computational thinking, and the knowledge of mathematics, natural and social sciences, engineering fundamentals, information technology, engineering specialization, and engineering management to the solution of complex engineering problems.

PO 3c: Create, select, modify, and apply appropriate techniques, best practices, standards, resources, and modern engineering and IT tools including prediction and modeling to engineering and social activities with an understanding of the limitations.

PO 4: Complex problem solving, Design and Research

PO 4a: Identify, formulate, review research literature, and analyze complex engineering problems to arrive at substantiated conclusions using critical thinking along with principles of mathematics, computing, engineering as well as natural and social sciences.

PO 4b: Use systems thinking and reflection to identify and consider underlying structures, patterns, volatility, uncertainties, complexities, ambiguities, complications, and risks to design and develop engineering solutions for complex problems to meet the specified and anticipated needs with appropriate concern for constraints, performance, sustainability, and professional ethics.

PO 4c: Use research-based knowledge and research methods including design of experiments, simulation, analysis and interpretation of data, and synthesis of the information to evaluate and improve the engineering solutions and practice.

PO 5: Individual & teamwork and Engineering management

PO 5a: Ability to work effectively as an individual and as a team member or a leader in diverse and distributed teams, and in multidisciplinary settings.

PO 5b: Ability to apply engineering management principles to one's own and team's work to manage engineering projects and operations and in multidisciplinary environment.

PO 6: Communication: Ability to communicate effectively on complex engineering and technology activities, situations, problems, and solutions using verbal, textual, and pictorial elements with the colleagues, engineering community, users, clients, policy makers, and society at large with intellectual honesty, clarity, empathy, and compassion.

PO 7: Innovation and entrepreneurship:

PO 7a: Demonstrate enthusiasm and understanding to identify opportunities and translate research in engineering and other disciplines to conceive and design innovative engineering solutions for business, industry, and societal problems.

PO 7b: Demonstrate enthusiasm and understanding to conceive and plan technology based new ventures either as independent start-up businesses or within existing corporate structures.

Program Specific Outcomes

B.Tech. (Civil Engineering)

The civil engineering graduates of JKLU will be able to:

CEPSO1: Conceive, design, implement and manage civil infrastructure systems, structures and processes by using principles of structural engineering, transportation engineering, water management, geotechnical engineering, project management, computing, automation, sustainability, and contemporary materials and tools.

CEPSO2: Serve in fields of construction industry, infrastructure management or consultancy services.

JK Lakshmipat University, Jaipur
Institute of Engineering and Technology
Department of Civil Engineering
Course Structure for the B. Tech (Batch 2019-2023)

Semester	Courses							Credits
I	Computational Data Analysis	Design and Prototyping	Experimental Science-I	Fundamentals of Communication				
	ES1101	**ES1102**	**AS1101**	**CC1101**				
	(10s 2 0)	**(6s 0 0)**	**(1 0 4)**	**(2 0 1)**				
	10	**6**	**3**	**2**				**21**
II	Calculus and Applied Mechanics	Fundamentals of Automation Engineering	Object Oriented Programming	Energy and Environmental Studies	Critical Thinking and Storytelling	Scientific Perspectives		
	ES1103	**ES1104**	**CS1101**	**ES1105**	**CC1102**	**AS1102**		
	(6s 2 0)	**(6s 2 0)**	**(1 0 4)**	**(1 0 0)**	**(2 0 0)**	**(Science Week)**		
	6	**6**	**3**	**1**	**2**	**2**		**20**
III*	Civil Engineering Materials	Computational Engineering Analysis-I	Engineering Measurements and Machines	Fluid Mechanics and Hydraulic Engineering	Perspectives on Contemporary Issues	Management Perspectives		
	CE1101	**ES1106**	**ES1107**	**CE1103**	**CC1103**	**IL1101**		
	(3 0 2)	**(3 1 2)**	**(3 0 4)**	**(3 0 2)**	**(2 0 1)**	**(Management Week)**		
	4	**5**	**5**	**4**	**2**	**2**		**22**
IV*	Construction Project Management	Computational Engineering Analysis-II	Structural Analysis	Construction Technology	Civil Engineering CAD Lab	Communication and Identity	Introduction to Design	
	CE1112	**ES1109**	**CE1104**	**CE1105**	**CE1106**	**CC1104**	**IL1102**	
	(3 0 2 0)	**(3 1 2 0)**	**(3 0 0 0)**	**(3 0 2 0)**	**(0 0 2 0)**	**(2 0 1 0)**	**(Design Week)**	
	4	**5**	**3**	**4**	**1**	**2**	**2**	**21**
Practice School - I (PS1101) – (4 to 6 Weeks Duration)								**4**
V*	Design of RCC and Steel Structures	Geotechnical Engineering	DE	Open Elective	Understanding and Managing Conflict	Introduction to IoT	Automation Project	
	CE1107	**CE1108**			**CC1105**	**EE1111**	**PR1101**	
	(3 0 2 0)	**(3 0 2 0)**			**(2 0 0 0)**			
	4	**4**	**4**	**4**	**2**	**2**	**2**	**22**
VI*	Transportation Engineering	Digital Surveying and Mapping	DE	DE/OE/Minor Project	Critical Thinking for Decisions at Workplace	Emerging Tech Week		
	CE1113	**CE1102**			**CC1106**			
	(3 0 2)	**(3 0 2)**			**(2 0 0 0)**			
	4	**4**	**4**	**4**	**2**	**2**		**20**
VII*	DE	DE	DE	OE	Minor Project			
					PR1103			
	4	**4**	**4**	**4**	**4**			**20**
VIII*	Practice School - II /Entrepreneurial Project/Research Project/Semester at a Partner University							
	16							**16**
	Total Credits							**166**

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B. Tech (CE) (Batch: 2019-2023)		
Course Code	**Course Name**	**Page No.**

ES1101: Computational Data Analysis

Course Description: This course introduces computational analysis of data based on Linear Algebra Principles and Statistics. The computational analysis will include learning and utilizing Python as a programming language.

Course Outcome

After course completion, the student will be able to

ES1101.1. Write Simple Python programs using various datatypes, control structures, decision statements, libraries, functions (M1)

ES1101.2. Develop Python programs using Objects, Classes and Files (M1, M2)

ES1101.3. Develop Programs for analyzing and interpreting Complex situations in various domains including sustainable development by combining various Linear Algebra, Statistics and Other Problem Solving Techniques (M3)

ES1101.4. Model Complex systems as Linear simultaneous equations and analyze the same using Matrix methods (M1)

ES1101.5. Model Data as matrices and Find Eigen Values and Eigen Vectors and Apply the same for problem solving, e.g., ranking and performance analysis (M1)

ES1101.6. Summarize and Visualize different datasets (M2)

ES1101.7. Analyze and interpret different datasets using Discrete and Continuous Probability Distributions and Apply the same for problem solving, e.g., Goodness of Fit (M2)

ES1101.8. Formulate and validate hypothesis with reference to different datasets (M2)

ES1101.9. Apply correlation, regression, least square method and time series analysis for modeling, analysis, interpretation and forecasting (M2)

Teaching Scheme and Credits

Hrs. per Week		Credits	Duration in Weeks
In Class	Out Class	10	15
10+2	20		

Evaluation Scheme

Sr. No	Specifications	Weightage (in percentage)
01	Attendance	Nil
02	Assignment	15
03	Class Participation	Nil
04	Quiz	15
05	Theory Exam (Mid Term I)	Nil
06	Theory Exam (Mid Term II)	20
07	Theory Exam	Nil

08	Report-1	Nil
09	Report-2	Nil
10	Report-3	Nil
11	Project -1	Nil
12	Project -2	30
13	Project -3	Nil
14	Lab Evaluation 1	10
15	Lab Evaluation 2	10
16	Course portfolio	Nil
	Total (100)	**100**

Syllabus

Introduction to Algorithms, Hardware Overview, Python as a Tool, Installing Python and Writing a Program, Variables & Expressions, Decision Statements, How to Debug?, Control Structures: Loops & Iterations, Linear Data Structure: String, List, Tuple, Data Dictionary and Set, Python Library (Pandas, Numpy, PyPlot), Functions, Classes & Objects, Working with Files

Matrix Operations, Eliminations, Matrix Inversion, Transformation, Solution of Linear, Simultaneous Equation, Eigen Values & Eigen Vectors, Linear Transformation, Linear Combination, Vector Spaces and Subspaces

Probability, Baye's Rule, Sampling, Data Processing and Pre-processing, Random Variable, Discrete & Continuous Distribution, Hypothesis Formulation, Test of Hypothesis, ANOVA, Correlation, Curve Fitting, Regression

Reference Books

1. Allen B. Downey. Think Python. Green Tea Press, Massachusetts, USA.
2. Kenneth Hoffman and Ray Kunze. Linear Algebra. PHI Learning Private Limited, 2nd Edition, 2012.
3. Gilbert Strang. Introduction to Linear Algebra. Wellesley-Cambridge Press, 4th edition, 2009.
4. Allen B. Downey. Think Stats. Green Tea Press, Massachusetts, USA.
5. Douglas C. Montgomery and George C. Runger, Applied Statistics and Probability for Engineers, John Wiley & Sons, Inc., 3rd Edition (2004).
6. Rishard A. Johnson, Miller and Freund's probability and Statistics for Engineers, PHI

Course Title and Course Code	**Design and Prototyping (ES1102)**
Hours per Week	**L T P: 6 0 0**
Credits	**6**
Students who can take	**B. Tech Semester-I (Batch: 2019-2023)**

Objective of the course:

The students will be trained to analyze an unknown situation through critical thinking and formulate it into a known problem so that solutions can be found. Once solution found, student will be able to use engineering tools to convert a conceptual product into a real product.

Course Outcomes:

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

ES1102.1. Approach design challenges from the perspective of the user and offer innovative solutions effectively.
ES1102.2. Communicate and work in team towards a common goal.
ES1102.3. Think creatively towards a fun based, desirable solution.
ES1102.4. Develop the projection views of the products with dimensions and scales.
ES1102.5. Create the schematic diagram and isometric view of the parts using AutoCAD.
ES1102.6. Fabricate prototype by combining the different parts.

Prerequisites		**Basics of Physics**
Sr. No	**Specifications**	**Marks**
1	Attendance	NIL
2	Assignment	30
3	Class Participation	NIL
4	Quiz	10
5	Theory Exam-I	NIL
6	Theory Exam-II	NIL
7	Theory Exam-III	NIL
8	Report-I	NIL
9	Report-II	NIL
10	Report-III	NIL
11	Project-I	50
12	Project-II	NIL
13	Project-III	NIL
14	Lab Evaluation-I	10
15	Lab Evaluation-II	NIL
16	Course Portfolio	NIL
Total (100)		**100**

LTP: 6s 0 0, Credits 6

Contact hours 78 (18+60)

Syllabus of Design & Prototyping 18hrs

1. Empathy

   Design thinking is a user-centered design process, and the empathy that comes from observing users enables design thinkers to uncover deep and meaningful needs (both overt & latent). Empathy, by definition, is the intellectual identification with or vicarious experiencing of the feelings, thoughts or attitudes of another. Three main techniques are used to gain empathy: interviewing, observation, immersion. The goal of the empathy mode is to discover gaps in between what people do and what people say they do. These gaps are the design opportunities.

   a. User Experience (On ground experience)
   b. Market Research
   c. Benchmarking, Competitor or Comparative Study
   d. Personal Experience (of the Designer)
   e. Analysis
   f. Revisiting the brief, make amendments (if brief is given by the client)

2. Define

   The Define mode is seen as a 'narrowing' part of the process. After collecting volumes of user information, it is time to distill down to one specific user group, their need and the insight behind that need so as to unify and inspire a team. The goal of this mode is to come up with at least one actionable problem statement (often referred to as Point of View (POV)) that focuses on the insights that you uncovered from real users**.**

   a. How to create a brief
   b. Setting parameters

3. Ideate

Ideation is the process of idea generation. Mentally it represents a process of "going broad" in terms of concepts and outcomes. Ideation provides the fuel for building prototypes and driving innovative solutions.

   a. Brain storming
   b. Mood Board and Theme Development
   c. Concept Sketches(doodling) and Design Proposals
   d. Final Sketches and Blueprints
   e. Logistics, Material and Production feasibility check

4. Prototyping or Mock-up models

Prototyping is the iterative development of artifacts – digital, physical, or experiential – intended to elicit qualitative or quantitative feedback. The act of prototyping implies "building", testing, and iterating and is, itself, both a flaring and a narrowing process. The flaring represents the proliferation of low-resolution prototypes developed as different aspects of the prototype are evaluated. The narrowing represents the refinement of the lower resolution models into increasingly complex and resolved models based on feedback, which leads to an even better understanding of the user's needs.

   a. Small and quick working models
   b. Scale 1:1 working prototypes

5. Product Testing , User Testing & Iterations and Changes

The test mode is another iterative mode in which we place our low-resolution artifacts in the appropriate context of the user's life. In regards to a team's solution, we should always prototype as if we know we're right, but test as if we know we're wrong— testing is the chance to refine our solutions and make them better.

a. Testing the product on field
b. Making relevant changes

Course Title and Code Experimental Science-I: AS1101	
Hours per Week	**L-T-P: 1-0-4**
Credits	**3**

Course Objectives:

This course is designed to familiarize the student with the fundamental concepts of different phenomenon related with optics, electrical & electronics, modern physics, properties of water and lubricants. This course will expose the students with experimental methods of physics, chemistry and integrates theoretical knowledge and concepts to practical experience.

Course Outcomes:

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

AS1101.1. analyze ferromagnetic properties of any magnetic material and differentiate Soft and hard materials.

AS1101.2. analyze thermoelectric effect of metal junctions due to temperature differences.

AS1101.3. analyze nuclear radiation with respect to distance and thickness of absorbing media.

AS1101.4. measure electrical properties e.g. specific resistance, time constant of various electrical components.

AS1101.5. use Schroedinger equation and quantum mechanical approach to analyze behavior of the quantum particle under different potentials.

AS1101.6. differentiate hard and soft water by determining it's hardness of different water samples.

AS1101.7. analyze conductivity of samples by different techniques such as volumetric titrations and conductometric.

AS1101.8. determine properties of the lubricant/oil samples by Pensky-Martens and Red Viscometer.

Prerequisites		**Knowledge of Basic Science**
Sr. No	**Specifications**	**Marks**
01	Attendance	Nil
02	Assignment	5
03	Class Participation	5
04	Quiz	10
05	Theory Exam	Nil
06	Theory Exam	Nil
07	Theory Exam	20
08	Report-1	Nil
09	Report-2	Nil
10	Report-3	10
11	Project -1	Nil
12	Project -2	Nil
13	Project -3	Nil
14	Lab Evaluation-1 (Continuous)	20
15	Lab Evaluation-2 (Exam)	30
16	Course portfolio	Nil
	Total (100)	**100**

Syllabus:

Electromagnetism, B-H Curve, Thermo-emf, Nuclear radiation detection, Linear air track, charging discharging of capacitors, Conversion of galvanometer into ammeter/voltmeter, Specific and high resistance determination, Concept of quantum mechanics, Schrodinger equation and quantum mechanical approach to analyze behavior of the quantum particle under different potentials, Water analysis for hardness, PH, Alkalinity, oxygen & chloride content, conductometric titrations, Viscosity of lubricant oil, Science of solids.

Text Books:

1. Dattu R Joshi, "Engineering Physics", Tata McGraw Hill Education Pvt. Ltd. New Delhi, I edn. 2010.
2. Neeraj Mehta, "Applied Physics for Engineers", PHI, I edn. 2011.
3. Jain & Jain, "Engineering chemistry", Dhanpat Rai Publication, Delhi, 16 edn. 2014.
4. Lab Manuals

Reference Books:

1. Arther Beiser, "Concept of Modern Physics" Tata McGrawHill, New Delhi, 5thedn. 1997.
2. Eyvind H Wichman, "Quantum Physics" Tata McGraw Hill, Volume 4.
3. B.K. Pandey, S. Chaturvedi, "Engineering Physics", Cengage Learning, 2012.
4. D.K. Bhattacharya, Poonam Tondon, "Engineering Physics", Oxford University Press, 2015.
5. O.G. Palana, "Engineering Chemistry", Tata McGraw Hill, 2009.

Course Title –Fundamentals of Communication- 2 credits (2-0-1)
Course Code- CC1101
Semester- I
Course Instructor: Dr. Vijaylakshmi

Course Description

This course provides an introduction to the importance of effective communication, the consequences of poor communication, and the different elements of verbal and non-verbal communication. Students learn about, and enhance, the components of communication: kinesics, paralanguage (voice) and language.

Course Outcomes

The students will be able to:

CC1101.1. Identify different cultural differences and their impact on communication.
CC1101.2. Compose grammatically correct sentences and paragraphs.
CC1101.3. Deliver effective oral presentations following appropriate kinesics and paralinguistic features.
CC1101.4. Identify impact of cultural differences on communication.
CC1101.5. Apply appropriate communication skills across settings, purposes, and audiences.

Topics to be Covered

1. Nature and importance of communication
2. Mehrabian's Communication Theory
3. Ethos, Pathos, Logos: The three pillars of persuasive communication
4. English as a Foreign Language
5. Consequences of poor communication
6. Writing Strategy
7. Basic of Effective Presentation
8. Influence of culture on communication
9. Formats of Public speaking (oral narration, conversational skills)
10. Common Errors in English

Evaluation Scheme:

Fundamentals of Communication		
Prerequisites		
Hours per Week: 2 hours		**L-T-P: 2-0-1**
Credits		**2**
Course Code		**CC1101**
Sr. No	**Specifications**	**Weightage (in percentage)**

1	Attendance	Nil
2	**Assignments**	**30**
3	**Class Participation**	**10**
4	**Quiz**	**20**
5	Theory Exam I	Nil
6	**Theory Exam II**	**20**
7	**Theory Exam III**	**20**
8	Report-1	Nil
9	Report-2	Nil
10	Report-3	Nil
11	Project -1	Nil
12	Project -2	Nil
13	Project -3	Nil
14	Lab Evaluation	Nil
15	Lab Evaluation	Nil
16	Course portfolio	Nil
	Total (100)	**100**

SUGGESTED READINGS:

(i) Raman, Meenakshi and Sangeeta Sharma, 2011. Technical Communication: Principles and Practice. Second Edition. New Delhi: Oxford University Press.

(ii) Mohan, Krishna and Meenakshi Raman. 2010. Advanced Communicative English. New Delhi: Tata McGraw Hill.

Course Title and Code	Calculus and Applied Mechanics ES1103
Hours per Week	**L-T-P: 6-2-0**
Credits	**6**
Students who can take	**B. Tech Semester-II (Compulsory)**

Course Objective:

This course introduces the basic elements of calculus and mechanics through some engineering projects. The application of multivariable calculus in civil and mechanical engineering is also highlighted. This course will equip students with essential domain knowledge of calculus and applied mechanics in solving basic engineering problems.

On successful completion of the this course, the student should be able to:

ES1103.1. apply analytical techniques to determine forces in structures

ES1103.2. use commercial software (STAAD Pro.) to simulate a structure/frame and determine force in the members

ES1103.3. model physical phenomena using calculus and solve using appropriate method

ES1103.4. apply Newton's laws of motion and understand the concepts of dynamics concepts (force, momentum, work and energy)

ES1103.5. interpret the geometrical significance of differential and integral calculus

ES1103.6. solve problems of vector differentiation and integration

ES1103.7. calculate the buoyant forces of objects with various shape and carryout the stability analysis

ES1103.8. apply the concept of partial differentiation to solve optimization problems

Sr. No	Specifications	Old Scheme Marks
1	Attendance	--
2	Assignment	10
3	Class Participation	5
4	Quiz	5
5	Theory Exam-I	10
6	Theory Exam-II	10
7	Theory Exam-III	30
8	Report-I	--
9	Report-II	--

10	Report-III	--
11	Project-I	15
12	Project-II	15
13	Project-III	--
14	Lab Evaluation-I	--
15	Lab Evaluation-II	--
16	Course Portfolio	--
	Total (100)	**100**
Provision of re test		
1	Theory Exam-III	**30**

ES1103.9.

Syllabus:

Vectors Algebra: basics of vector algebra, resultant vector, Application of vector equilibrium on structures.

Force systems basic concepts, equilibrium of system of forces, free body diagrams, equations of equilibrium of coplanar systems, structures (trusses), analysis of structures, method of joints, method of section, friction, virtual work, work energy principle, impulse-momentum (linear, angular).

Function of several variables, functions of one and several variables, partial differentiation, maxima-minima.

Vector Differentiation: Vector functions and derivatives, Arc length and unit tangent vector, Curvature and unit normal vector, Directional derivative and gradient vectors, Tangent plane, Divergence and curl of a vector field

Integral Calculus, area under curve, arc length, double integral, change of order and triple integrals, surface and volume integrals, solids of revolution, moment of inertia, floatation, buoyancy, centroid

Vector Integration: Line integral, flux, work done, circulation, path independence, potential function and conservative fields, Surface area and surface integral, Green's theorem in the plane, Stoke's theorem, Divergence theorem

Text Books:

1. M.D. Weir and J. Hass, Thomas, Calculus, Pearson, India, 2016.
2. R.C Hibbeler, Engineering Mechanics, Pearson India, 2010.

Reference Books:

1. Goldstein et. al., Calculus and Its Applications, Pearson, India, 2018.
2. SS Bhavikatti, Engineering Mechanics, New Age International Publishers, 2019.

3. Beer and Johnston, Vector mechanics for engineers, McGraw Hill Education, 2009.
4. S Timoshenko, Engineering Mechanics, McGraw Hill Education, 2017.
5. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley, India, 2013.
6. Srimanta Pal and Subodh C. Bhunia, Engineering Mathematics, Oxford University Press, New Delhi, India, 2015.

Course Name: Fundamentals of Automation Engineering (ES 1104)
Credit: 6;

Course Description: This course aims at building key technical competencies needed by automation engineers. It is focused on basic knowledge and critical understanding of different technologies in the design and maintenance of automation systems.

Course Outcomes

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

Unit 1 Introduction to Electrical Engineering – U1

1) Analyze electrical circuits using network theorems
2) Measure electrical parameters of passive as well as active electrical components
3) Design rectifier circuit using semiconductor devices.
4) Design filters for power conditioning.
5) Design and test a linear power supply for given specifications
6) Design and build Printed Circuit Boards.
7) Use electrical safety practices while working on electrical projects.

Unit 2 Introduction to Automation Engineering and Control Systems – U2

1) Formulate mathematical models for basic mechanical, electro-mechanical and fluid systems.
2) Design and simulate open-loop control system.

Unit 3 Introduction to Digital Circuits and Embedded Systems – U3

1) Evaluate and simplify Boolean functions and design the minimized logic using logic gates.
2) Design basic combinational and sequential circuits with minimum complexity
3) Implement combinational circuit using simulation tools.

Professional Skills

Collaboration, Leadership, Teamwork, Self-directed Learning.

Evaluation Scheme

Sr. No	Specifications	Marks
01	Attendance	Nil
02	Assignment	10
03	Class Participation & Attendance	Nil
04	Quizzes	10
05	Theory Exam I (completed)	10
06	Theory Exam II	Nil
07	Theory Exam III	20
08	Report -I	Included with Project 1
09	Report-II	Included with Project 2
10	Report-III	Included with Project 3
11	Project -I	10
12	Project -II	10
13	Project -III & Viva	10
14	Lab Evaluation I (continuous based on module 3 only)	10
15	Lab Evaluation II	10
16	Course portfolio	Nil
	Total (100)	**100**
Evaluation scheme for retest		
1	Theory Exam III	20
2	Lab Evaluation (End Term)	10
	Total (30)	**30**

Syllabus: Element of DC network and circuits, Application of network Theorems, Concept of Phasors and power factor calculations. Semiconductor devices and Rectifier circuit, Transformers and power supply. Safety in handling Electrical equipment.
Introduction to control system: open and closed loops. Block diagrams, Electro-Mechanical models. Simulation for dynamic model of a control system.
Digital circuits for automation: Digital circuits for automation: Boolean Algebra, Karnaugh map, Logic gates, Combinational and Sequential Circuits, Displays. Design and implementation of decoders and counters.

Projects: The course involves three modules which ultimately lead to common goal of developing a dynamic model for cycles developed in course Design and Prototype.
Project 1: Power supply (Specifications:)
Domain Knowledge: AC and DC current, circuit theory, semiconductor pn junction, regulators, filters.
Project 2: Dynamic system modelling for cycle
Domain Knowledge: Control Systems, Dynamic models, Simulation.
Project 3: Design & Implementation of BCD Decoder
Domain Knowledge: K-Maps for minimization of Boolean Functions, Implementation of Logic functions using Logic Gates

Text Books:
1. WH Hayt, J E Kemmerly, SM Durbin, Engineering Circuit Analysis, Eight Edition, 2013, Mc. Graw Hill, ISBN 978-0-07-352957-8.

2. M. Morris Mano, Digital Logic and Computer Design, 1st Edition, 2016, Pearson India Publication, ISBN: 9789332542525.
3. S Palani, Control Systems Engineering, 2nd edition,2 August, Mc. Graw Hill Education, ISBN-10: 0070671931.

Reference Books:

1 C. L. Wadhwa, "Basic Electrical Engineering", New Age Int. (P) Limited, Publishers, ISBN: 9788122421521.
2 Dhananjay Gadre and Nehul Malhotra, Tiny AVR Microcontroller Projects for the Evil Genius, Tata Mc Graw Hill Edition, ISBN: 9780071744546.

Course Name: Object Oriented Programming
Course Code: CS1101 **L-T-P: 1-0-4**
Credits: 3

Course Description: This course teaches object oriented programming to those who have learnt basic programming concepts and are ready to learn in-depth programming. It focuses on object-oriented programming using JAVA. The main concepts are: Classes, Objects, Data Abstraction, Data Encapsulation, Overloading, Overriding, Polymorphism, Inheritance, Interfaces, Exception Handling, and Database Connectivity. This course also covers basic concepts for software design and reuse.

Course Outcome:

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

CS1101.1.	Develop Java Programs with the concepts of primitive data types, strings and arrays.
CS1101.2.	Develop Java Programs using Object Oriented Programming Principles such as Classes, Objects, Data Abstraction, Data Encapsulation, Overloading, Overriding, Polymorphism, Inheritance, and Interfaces.
CS1101.3.	Design, develop and debug programs in Core Java using coding and documentation standards.
CS1101.4.	Incorporate exception handling in Java Programs.
CS1101.5.	Use JDBC API connectivity in between Java Programs and database.

***NOTE:* Integrated Development Environments (IDEs) to be used in this Course are Eclipse or NetBeans – Both are compatible for Object Oriented Programming using Java.**

Basics of Java & Decision Statements - Introduction to Java**:** Features of Java, Byte Code and JVM, JDK, JRE; Data types and Operators: Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Datatypes, ADT, Operator types and precedence, Statements and Flow Control: Conditional statements, looping, return, etc., Abstract data types and their specification. How to implement an ADT. Concrete state space, concrete invariant, abstraction function.

Control Structures, Methods & Constructors - Object Oriented Programming in Java: Object Life time & Garbage Collection.

Methods & Constructors - Constructor & initialization code block, Parameterized Constructor, Loops, Methods.
Array & String - Defining an Array, Initializing & Accessing Array, Multi –Dimensional Array, Operation on String, Mutable & Immutable String, Collection Bases Loop for String, tokenizing a String, Creating Strings using StringBuffer.

OOP's Concept I - Class Fundamentals, Object & Object reference, Access Control, Modifiers, Methods in Java: Method Declarations, Method Signatures, Invoking Methods,

OOP's Concept II - Static vs. Instance Data Fields, Static vs. Instance Methods, Method Overloading, Encapsulation.
Inheritance, Composition, and Aggregation, Invoking Base Class Constructors, Overriding vs. Overloading, Polymorphism Overloading.
Interfaces - Inner Class & Anonymous Classes, Abstract Class, Interface**s.**

Exception Handling - Introduction to Exception handling.

JDBC Programming - The JDBC Connectivity Model, Database Programming: Connecting to the Database, Creating a SQL Query, Getting the Results, and Updating Database Data.

Prerequisites		**Object Oriented Programming**
Teaching Scheme (Hours per Week)		1-0-4
Credits		3
Sr. No.	**Evaluation Component**	**Marks**
1	Attendance	NIL
2	Assignment	10
3	Class Participation	5
4	Quiz	10
5	Theory Exam-I	10
6	Theory Exam-II	10
7	Theory Exam-III	25
8	Report-I	NIL
9	Report-II	NIL
10	Report-III	NIL
11	Project-I	NIL
12	Project-II	NIL
13	Project-III	10
14	Lab Evaluation-I	10
15	Lab Evaluation-II	10
16	Course Portfolio	NIL
	Total (100)	**100**
Evaluation Scheme for Retest		
	Theory Exam-III	25
	Lab Evaluation-II	10
	Total	**35**

References

1. Liang, Y. Daniel. Introduction to Java programming: comprehensive version. Pearson Education, 2018.

2. Horstmann, Cay S., and Gary Cornell. Core Java 2: Volume I, Fundamentals. Pearson Education, 2016.
3. Schildt Herbert. The Complete Reference, Java 2, Fourth Edition. TMH, 2017.

Course Title and Code: Energy and Environmental Studies ES1105		
Hours per Week :	**L-T-P: 1-0-0**	
Credits	**01**	
Students who can take	**B. Tech all branches (First Year)**	
Course Objective: To enhance the understanding of conventional and non-conventional energy sources and its relationship with the ecology and environment.		
On successful completion of this course students should be able to: ES1105.1 Relate renewable energy with ecology & environment ES1105.2 Explain the climate change and threat to biodiversity ES1105.3 Describe the various pollution sources and their impacts on Environment		
	Prerequisites	Basic science
Sr. No	**Specifications**	**Marks**
1	Attendance	NIL
2	Assignment	20
3	Class Participation	10
4	Quiz	10
5	Theory Exam-I	NIL
6	Theory Exam-II	25
7	Theory Exam-III	35
8	Report-I	NIL
9	Report-II	NIL
10	Report-III	NIL
11	Project-I	NIL
12	Project-II	NIL
13	Project-III	NIL
14	Lab Evaluation-I (Continuous Evaluation)	NIL
15	Lab Evaluation-II (Lab Examination)	NIL
16	Course Portfolio	NIL
	Total	**100**

Evaluation Scheme for Retest		
Sr. No	**Specifications**	**Marks**
1	Theory Exam-III	35

Course Syllabi (Theory):

Unit-1: Present Energy resources in India and its sustainability, Energy Demand Scenario in India- Advantage and Disadvantage of conventional Power Plants – Conventional vs Non-conventional power generation.

Unit-2: Basics of Solar Energy, Wind energy- Environmental benefits and impacts, Biomass resources-Bioenergy, Geothermal Energy.

Unit-3: Understanding environment, global crisis, Basic Concepts Forest and Grassland ecosystems, Desert Ecosystems, Aquatic Ecosystems Introduction to Biodiversity, Biodiversity Conservation.

Unit-4: Air pollution- Sources, effects, control, air quality standards, air pollution act, air pollution measurement. Greenhouse gases – effect, Global Warming, Acid Rain, and Ozone Depletion, Water pollution-Sources and impacts, Noise pollution, Soil pollution, Pollution aspects of various power plants.

Reference:

1) Rajagopalan, R., "Environmental Studies: From Crisis to Cure", Oxford **University Press, New Delhi, 2e, 2011**
2) Ranjit Daniels & J. Krishnaswamy "Environmental Studies", Wiley India
3) Davis & Cornwell "Environmental Engineering", McGraw Hill
4) Gilbert M. Masters and Wendell P. ELA – Introduction to Environmental Engineering And Science
5) W. Cunningham – Principles of Environmental Science, TMH
6) P. Venugoplan Rao – Principles of Environmental Science and Engineering, PHI.
7) Meenakshi – Environmental Science and Engineering, Prentice Hall India.
8) Martin – Ethics in Engineering, TMH

Video Lectures:

1) http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html
2) http://www.nptelvideos.in/2012/11/energy-resources-and-technology.html
3) https://nptel.ac.in/courses/122/102/122102006/
4) https://nptel.ac.in/courses/127106004/

Websites (related to the course)

1) http://www.cpcb.nic.in/
2) http://www.rpcb.rajasthan.gov.in
3) http://www.bis.org.in/
4) http://www.who.int/en/
5) http://www.moef.gov.in/

Course Title and Code: Critical Thinking & Storytelling | CC1102

Course Objective:

The modern world offers confounding opinions and choices that need to be navigated judiciously. This course explores frameworks and processes to critically examine narratives, reconstruct them, and craft well-reasoned stories that can be told using impactful communication.

Course Outcomes:

The students will be able to:

CC1102.1 Formulate intelligent questions to investigate.
CC1102.2 Evaluate information and argument for correctness, consistency, relevance and validity.
CC1102.3 Compose well-structured and well-reasoned arguments.
CC1102.4 Articulate and evaluate the impact of narratives.
CC1102.5 Distinguish between facts, assumptions and opinion.

Prerequisites	**N/A**
Hours per Week	**L-T-P: 2-0-1**
Credits	**2**

Sr. No	**Specifications**	**Weightage**
01	Attendance	Nil
02	**Assignment**	**20**
03	**Class Participation**	**20**
04	Quiz	Nil
05	Theory Exam	Nil
06	Theory Exam	Nil
07	**Theory Exam**	**40**
08	**Report-1**	**20**
09	Report-2	Nil
10	Report-3	Nil
11	Project -1	Nil
12	Project -2	Nil
13	Project -3	Nil
14	Lab Evaluation	Nil
15	Lab Evaluation	Nil
16	Course portfolio	Nil
	Total (100)	**100**

Evaluation scheme for re-test

1	Theory Exam	40

Syllabus of Critical Thinking and Storytelling

I. Introduction to Critical Thinking- Definitions of Critical Thinking, its applications and the methods to think critically. Paul & Elder model will be used.

II. **Importance of questioning**-The key to critical thinking is the ability to formulate intelligent questions. Students will be able to create, improve and prioritize their questions. They will be able to use different types of question by using Bloom's taxonomy to understand the root of any situation, problem or subject.

III. **Examine data Critically-**Students will be able to filter information, separate fact from opinion, identify cognitive biases and become aware of the ladder of inference. They will also be taught to conduct responsible research and basics of bibliography and citation.

IV. **Construct and reconstruct argument-** Students will be taught to construct arguments with sound reasoning. They will be able to support their claims and opinions with compelling data and facts, and present well-informed arguments. Evaluate argument using logical fallacies.

V. **Building a compelling Narrative-** Stories that we create and narrate influence how we see ourselves and our association with others. The students will be able to observe, think, create and narrate their stories in an effective manner.

Text Books and Reference Books

Critical thinking: an introduction
Alec Fisher - Cambridge University Press - 2011

Critical thinking its definition and assessment
Alec Fisher-Michael Scriven - Centre for Research in Critical Thinking - 1997

Art of thinking clearly
Rolf Dobelli - Harper Collins Usa – 2014

Critical thinking skills: developing effective analysis and argument
Stella Cottrell - Palgrave Macmillan – 2017

Thinking, fast and slow
Daniel Kahneman - Farrar, Straus and Giroux – 2015

Course Title and Code : Scientific Perspectives AS1102	
Hours per Week	**L-T-P: One week**
Credits	**2**

Course Objective: This course aims to develop scientific temper in students and also improve their understanding of basic science fundamentals and their applications in industry and research.

After course completion, the student will be able to:

AS1102.1 Distinguish between science, pseudo-science and other forms of knowledge.

AS1102.2 Distinguish between science, engineering, technology and mathematics and also identify the opportunities for integrating these disciplines.

AS1102.3 Use the scientific approach to identify and understand the societal problems

AS1102.4 Explain, Design and carry out Scientific studies

	Prerequisites	
Sr. No	**Specifications**	**Marks**
1	Attendance	Nil
2	Assignment	Nil
3	Class Participation	10
4	Quiz	20
5	Theory Exam-I	Nil
6	Theory Exam-II	30
7	Theory Exam-III	Nil
8	Report-I (poster)	25
9	Report-II	Nil
10	Report-III	Nil
11	Project-I	Nil
12	Project-II	Nil
13	Project-III	Nil
14	Lab Evaluation-I (Contus.)	Nil
15	Lab Evaluation-II (exam)	15
16	Course Portfolio	Nil
	Total (100)	**100**

Evaluation Scheme for Retest

Sr. No	Specifications	Marks
1	Theory Exam-II	30

Syllabus

The philosophical aspects of scientific activity, Introduction to the Philosophy of Science, What is a "scientific theory"? ; The structure of a scientific theory, the methodology used to obtain scientific knowledge, Requirements to achieve scientific results, Methodology of experiment in engineering studies, the purpose and structure of the experiment, Planning, Analysis of the results, some selected seminal scientific studies.

Reference Books:

1) The Scientific Approach: Basic Principles of the Scientific Method by Carlo L. Lastrucci, Schenkman Publishing, 1963
2) Trends in Bibliometrics and Scientometrics Studies by Praveen Kumar Jain, Jean-Charles Lamirel, Parveen Babbar, Athena Academic, 2017
3) The Evaluation of Research by Scientometric Indicators by Peter Vinkler, Chandos Publishing
4) John Stuart Mill's Philosophy of Scientific Method by John Stuart Mill; Ernest Nagel Hafner Press, 1950
5) Logic, Inductive and Deductive: An Introduction to Scientific Method by Adam Leroy Jones Henry Holt, 1909
6) The Path of Science by C. E. Kenneth Mees; John R. Baker John Wiley & Sons, 1946
7) The Logic of Scientific Discovery by Karl R. Popper Basic Books, 1959
8) Failure: Why Science Is So Successful by Stuart Firestein Oxford University Press, 2016

Course Title and Course Code	Civil Engineering Materials, CE1101
Hours per week	L T P: 3 0 2
Credits	4
Students who can take	B.Tech, Semester III

Course Objective:

To introduce students to the basic concepts of construction materials, tests on materials, stress-strain relations, shear force and bending moment diagrams, deflection of beams and theories of columns for the analysis of structures.

Course Outcomes:

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

CE1101.1 characterize the construction materials.

CE1101.2 determine the basic material properties and establish relationship between various elastic constants.

CE1101.3 draw shear force and bending moment diagrams of beams.

CE1101.4 determine the bending and shear stresses generated at various structural components.

CE1101.5 carry out analysis of beams and columns and determine deflection.

Sr. No	Specifications	Marks
1.	Attendance	-
2.	**Assignment (05 Nos.)**	**20**
3.	**Class Participation**	**10**
4.	**Quiz (5 Nos.)**	**20**
5.	Theory Exam-I	-
6.	**Theory Exam-II**	**10**
7.	**Theory Exam-III**	**25**
8.	**Report-I (Case Study)**	**5**
9.	Report-II	-
10.	Report-III	-
11.	Project-I	-
12.	Project-II	-
13.	Project-III	-
14.	Lab Evaluation-I	-
15.	**Lab Evaluation-II**	**10**
16.	Course Portfolio	-
Total		**100**

Retest:

Sr. No	Specifications	Marks

1.	Theory Exam-III	25

Syllabus (Theory):

Unit I **Building Construction Units:** Masonry construction units such as clay bricks, fly-ash bricks, autoclaved aerated concrete (AAC) blocks, hollow concrete block, stones: Specifications, properties and tests. Mortar: proportion, water cement ratio, properties and tests, Flooring and roofing tiles.

Cement: Manufacture and type of cement, hydration of cement, chemical reaction, structure of cement paste, consistency and setting of cement, test on cement, lime and supplementary cementations materials.

Unit II **Basic Materials Properties:** Ductility, brittleness, hardness, toughness, plasticity, malleability, elasticity, isotropic, homogeneous, stiffness, flexibility.

Stress-Strain relations: Uniaxial tensile test, elastic constant, generalized Hooke's law, modulus of rigidity, bulk modulus, relation between the elastic constants, thermal effects in prismatic sections.

Unit III **Moment of Inertia**: Centroid and centre of gravity, polar and product moment of inertia, principal axes and principal moment of inertia.

Shear Force and Bending Moment Diagrams: Types of beams, bending moment and shear force diagrams for statically determinate and indeterminate beams.

Unit IV **Bending Stress and Shearing Stress:** Stresses due to bending, stresses due to shear in symmetrical elastic beams.

Unit V **Deflection of Beams:** Bernoulli-Euler beam equation, Slope and Deflection by Moment- Area and Conjugate Beam methods.

Theories of Columns: Stable and unstable equilibrium, Euler's formula for long columns with different boundary conditions, Rankine's formula.

Laboratory Experiments:

Sl. No.	List of Experiments
1.	To determine water absorption and compressive strength of bricks
2.	To determine water absorption and compressive strength of masonry blocks /paving blocks
3.	To determine fineness of cement by sieving
4.	To determine fineness of cement by Blaine air permeability apparatus
5.	To determine Normal consistency of cement using Vicat's Apparatus
6	To determine initial setting and final setting time of cement using Vicat's Apparatus
7	To determine soundness of cement by Le-Chatelier mould
8.	To determine fineness modulus of fine aggregates by sieve analysis
9.	To determine fineness modulus of coarse aggregates by sieve analysis
10.	To determine compressive strength of cement

Reference Books:

1. Building Materials by P.C. Varghese, Prentice-Hall of India,2006.
2. Engineering Materials by S.C. Rangwala, Charotar Publishing House Pvt Ltd, 43rd Edition 2019.
3. Construction Materials: Their nature & behaviour by J.M. Illston; E&FN Spon.
4. Building Materials: Products, Properties and Systems by Ghambir, Tata Mc Graw Hill, Delhi.
5. Building Materials by P. Singh, S.K. Kataria & Sons.
6. Building Materials by S. Duggal, New Age International Publishers.
7. Strength of Material by Singer and Pytel, Harper Collins Publishers.
8. Elements of Strength of Materials by Timoshenko & Young, Mc Graw Hill Book Company.
9. Mechanics of Structures by Timoshenko & Gere, CBS Publishers and Distributers.
10. Mechanics of Structures Vol. I by S.B Junarkar, Charotar Publishing House, Anand.
11. Strength of Materials & Mechanics of Structures: Vol. I by Dr. B.C. Punmia, Laxmi Publications (P) Ltd., New Delhi.

Online References:

1. https://nptel.ac.in/courses/105/102/105102088/
2. https://sites.google.com/a/mitr.iitm.ac.in/iitmcivil/ce2330
3. https://nptel.ac.in/courses/105/105/105105108/
4. https://nptel.ac.in/content/storage2/courses/112106141/Pdfs/4_2.pdf
5. https://nptel.ac.in/courses/105/104/105104160/

Course Description:

Course Title and Code **Computational Engineering Analysis – I: ES1106**	
Teaching Scheme	**L-T-P: 3-1-2**
Credits	**5**

Course Objective

The course will cover the basic components of Ordinary Differential Equations (ODE), Complex analysis and Laplace transforms and modelling & simulation of various problems in engineering discipline. Few numerical methods will be introduced to find the numerical solutions of various problems. Various domain specific Engineering problems will be discussed and appropriate simulation tools will be used for solving them.

Course Outcomes:

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

ES1106.1	Solve ordinary differential equations through various techniques.
ES1106.2	Determine the structural behavior of the body by determining the stresses, strains produced by the application of load.
ES1106.3	Analyze the concept of buckling and be able to solve the problems related to column and struts.
ES1106.4	Model the problems of column and struts mathematically in terms of ordinary differential equations and solve them using the appropriate method.
ES1106.5	Simulate the solutions of the above mentioned models of columns and struts.
ES1106.6	Analyze a function of complex variables in terms of analyticity, poles and zeroes.
ES1106.7	Find Laplace and inverse Laplace transforms of given function and use Laplace transform to solve ordinary differential equations.
ES1106.8	Design and Evaluate the LC, RC & RL Networks using Foster'sand Cauer Forms
ES1106.9	Analyze stability criteria for electrical network using pole zero plot and routh-hurwitz polynomials
ES1106.10	Model and simulate electrical networks using Proteus simulator/ Virtual lab.

Prerequisites		**Nil**
Sr. No	**Specifications**	**Marks**
01	Attendance	NA
02	Assignment	NA
03	Class Participation	10
04	Quiz	20
05	Theory Exam I	20
06	Theory Exam II	NA
07	Theory Exam III	30
08	Report-1	NA
09	Report-2	NA
10	Report-3	NA
11	Project -1	NA

12	Project -2	NA
13	Project -3	NA
14	Lab Evaluation-1	10
15	Lab Evaluation-2	10
16	Course portfolio	NA
	Total (100)	100
Evaluation Scheme for Re-Test		
1	Theory Exam-III	30
	Total	30

Syllabus

ODE : Ordinary differential equations of first order and first degree, higher order ODEs with constant coefficients, Differential equation of second order with variable coefficients, Numerical solution of ODEs.

Applications of ODE in structural analysis : column and struts - Definitions, Classifications, Assumptions made in the Euler's Column Theory, Expressions for crippling load of different cases like both the ends are hinged or pinned, one end is fixed and other is free, both ends are fixed, one end is fixed other is hinged, Effective length of column, Slenderness ratio, Crippling stress in terms of Effective length and radius of gyration, limitations of Euler's Formula, Rankine's Formula, Eccentric loading, Johnson's Formula for Columns, both straight line and parabolic formula for columns.

Functions of Complex variables : Complex numbers, complex conjugates, functions of complex variables, real and imaginary parts of a complex function, analytic functions, C-R equations, Poles and zeros of a complex function, Taylor's theorem and Taylor's expansion.

Laplace transform: Basic Laplace transform and inverse Laplace Transforms, solution of ODEs using Laplace transform, solution of system of ODEs using Laplace transform.

Network Functions : Concept of complex frequency, transform independence, network functions of one and two port network, concepts of poles and zeros, properties of driving point and transfer functions, time response stability from pole zero plot, Routh-Hurwitz polynomials.

Network Synthesis: Positive real functions, Basic syntheses procedure, method of syntheses, driving point syntheses of one port network (R-L and R-C and R-L-C).

Transient Analysis: Modeling of Resistors, Inductors, capacitors, operating temperature, transient sources and transient output variables. Complete response of RL, RC, and RLC circuits to step, sinusoidal, exponential, ramp, impulses and the combinations of excitations. Initial value and final value theorem.

Textbook:

1. Advanced Engineering Mathematics, Erwin Kreysig, Wiley, India.
2. Hibbeler, R.C., "Mechanics of Materials", 6th SI edition, Prentice Hall

References :

1. Thomas' Calculus, M.D. Weir and J. Hass, Pearson.
2. Engineering Mathematics, Srimanta Pal and Subodh C. Bhunia, Oxford University Press, New Delhi, India.
3. Higher Engineering Mathematics, B.V. Ramana, Mc Graw Hill Education.
4. T.K.Nagsarkar,M.S. Sukhija,"Basic Electrical Engineering", Oxford University press, 2nd edition, 2011.
5. Roy Choudhary, "Network Theory", TMH, 3rd Edition, 2004.
6. Edminister Joseph A., "Electrical Circuits, Schaum's Outline Series", Tata McGraw Hill, 3rd edition, 2012.
7. Hayt W.H., Kemmerly J. E., Durbin S. M., "Engineering Circuit Analysis", Tata Mcgraw Hill, 6th edition, 2006.
8. Beer, F.P., Johnston, E.R., DeWolf, J.T., "Mechanics of Materials", 4th edition, McGraw Hill.

Craig, R.R., "Mechanics of Materials", 2nd edition, John Wiley and Sons.

Course Title and Course Code	**Engineering Measurements and Machines (ES1107)**
Hours per Week	**L T P: 3 0 4**
Credits	**5**
Students who can take	**B. Tech Semester-III**

Course Objectives:

The aim of this course is to impart the knowledge of mechanical and electrical machine used in industries. Students will learn the fundamental of engineering principles governing the engineering process and its use in real-world. Students will get the knowledge of sensors, actuators and its selection process for any industrial application.

Course Outcomes:

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

ES1107.1 Evaluate suitable electrical and non-electrical instruments for measuring physical quantities.

ES1107.2 Analyze the construction, characteristics and applications of various types of rotating machines.

ES1107.3 Analyze the working of any mechanical and electrical machine using mathematical model.

ES1107.4 Integrate the sensors for monitoring and automation of electrical and mechanical systems.

ES1107.5 Design electro-mechanical machines as per Indian standards.

Prerequisites	**Basics of Physics**

Evaluation Scheme

Sr. No	**Specifications**	**Marks**
1	Attendance	NIL
2	Assignment	10
3	Class Participation	5
4	Quiz	5
5	Theory Exam-I	10
6	Theory Exam-II	10
7	Theory Exam-III	20
8	Report-I	NIL
9	Report-II	NIL
10	Report-III	NIL
11	Project-I	10
12	Project-II	NIL
13	Project-III	NIL
14	Lab Evaluation-I	10
15	Lab Evaluation-II	10
16	Course Portfolio (MOOC Course)	10
Total (100)		**100**

Evaluation scheme for Retest	**Marks**

1	Theory Exam	20
2	Lab Evaluation (Exam)	10
Total		**30**

Syllabus (Theory):

Unit-I: Measurement, Instrumentation and Calibration

Introduction, types of applications of measurement instrumentation, performance characteristics, error in measurements, calibration and standards, static and dynamic characteristics of instrument, Measuring Instruments, Digital meters, Function Generators, AC Bridges, Electronic Instruments for Measuring Basic Parameters.

Unit-II: Transducers

Classification of transducers, Selection of transducers, measurement of physical quantities, Elements of data acquisition system, Smart sensors.

Unit-III: Transformers

Construction, principle of operation, equivalent circuit, losses, testing, efficiency and voltage regulation, auto transformer, three phase connections, parallel operation of transformers, tap changing.

Unit-IV: Rotating Machines

DC Machines

Construction, EMF and torque equation, circuit model, armature reaction, methods of excitation, characteristics of generators, characteristics of motors, starting and speed control, testing and efficiency.

Induction Motors: Construction, working principle, classification and applications, equivalent circuit, Torque - slip characteristics, starting and Speed control of induction motors.

Unit-V: Mechanical Machines

Turbines: Introduction to steam turbines, Impulse and Reaction turbines, turbine power and related calculations.

Pumps: Introduction of pumps, centrifugal pumps, working of centrifugal pumps, Cavitation and its effect on pump, working of reciprocating pumps, Application of pumps in industries.

Power Transmission Systems: Mechanical drives and their performance analysis.

List of Experiments:

Measurement

1. To Determine Output characteristics of LVDT and Measure of Displacement Using LVDT.
2. Measurement of Inductance using Maxwell's bridge.
3. Measurement of earth resistance by earth tester and measurement of Insulation resistance by Megger.

Electrical Machines

1. To perform Ratio, Polarity and Load test on a single-phase transformer.

2. To perform open circuit and Short circuit test on a single-phase transformer and hence determine its equivalent circuit parameters.
3. To find the relation between open circuit voltage and field current of:

   (i) Separately excited DC generator, (ii) Self excited DC shunt generator
4. Speed control of DC shunt motor: (i) By varying field current with armature voltage constant. (ii) By varying armature voltage with field current kept constant.
5. To perform No load and blocked rotor test on a three-phase Induction Motor, and hence determine its equivalent circuit parameters.

Mechanical Machines

1. To study the performance of turbines used in steam power plant
2. To study the performance of belt drive system used for power transmission.

Text Books:

1. H S Kalsi, Electronic Instrumentation, McGraw Hill Education (India) Private Limited.
2. Nagrath I. J and Kothari D. P. 'Electric Machines', Tata McGraw Hill Publishing Company Ltd.
3. B. L. Theraja, and A. K. Theraja, Text of Electrical Technology, Vol -2; S. Chand Publication.
4. J B Gupta, Theory and Performance of Electrical Machines, S.K. Kataria and Sons.
5. Ashfaq Hussain, Electrical machines, Dhanpat Rai and Co.
6. P S Bimbhra, Generalised theory of rotating machines, Khanna Publishers.
7. R K Bansal, A Textbook of Fluid mechanics and Hydraulic machines, Laxmi Publication (P) ltd.
8. S S Ratan, Theory of Machines, Tata McGraw-Hill.

Reference Books:

1. Fitzgerald and C. Kingsley Jr., Electric Machinery, McGraw-Hill Book Co.
2. Chapman, Electric Machinery Fundamentals, The McGraw-Hill Companies, Inc.

Online sources:

Electrical Measurement and Electronic Instruments
https://nptel.ac.in/courses/108/105/108105153/

Sensors and Sensor Circuit Design
https://www.coursera.org/programs/j-k-lakshmipat-university-on-coursera-kzogk/browse?index=prod_enterprise_products&productId=487N_QqXEeeqsQo32tjRBA&productType=course&query=Sensor&showMiniModal=true

Electrical Machines
https://nptel.ac.in/courses/108/102/108102146/

Motors and Motor Control Circuits
https://www.coursera.org/programs/j-k-lakshmipat-university-on-coursera-kzogk/browse?index=prod_enterprise_products&page=3&productId=-i5RF2jdEeecwwoEvbWpsg&productType=course&query=Electrical+Machines&showMiniModal=true

Turbines and Pumps
https://nptel.ac.in/courses/112/103/112103249/

Power Transmission Systems
https://www.youtube.com/watch?v=3UaFeNm_ZF8

Course Title and Code: CE1103 **Fluid Mechanics and Hydraulic Engineering**	
Hours per Week	**L-T-P: 3-0-2**
Credits	**4**
Students who can take	B. Tech Sem III sem (CE)
Prerequisites	Concepts of Engineering mechanics, basic physics
Course Objective: This course aims to develop understanding about the properties of fluid, flow in pipes & open channels and hydro energy produced by turbines.	

Course Outcomes

On completion of the course, the student should be able to:

CE1103.1 Identify, measure, and compute fluid properties and establish relationship between them.

CE1103.2 Compute force of buoyancy on a partially or fully submerged body and Analyze the stability of a floating body.

CE1103.3 Evaluate pressure drop in pipe flow using Hagen-Poiseuille's equation for laminar flow in a pipe.

CE1103.4 Apply fundamental principles of fluid mechanics for the solution of practical civil engineering problems of water conveyance in pipes, pipe networks, and open channels.

Evaluation Scheme:

Teaching Scheme (Hours per Week)		3 0 2
Credits		4
Sr. No.	**Evaluation Component**	**Marks**
1	Attendance	Nil
2	Assignment (3)	15
3	Class Participation	05
4	Quiz (3)	15
5	Theory Exam-I	10
6	Theory Exam-II	nil
7	Theory Exam-III	20
8	Report-I	Nil
9	Report-II	Nil
10	Report-III	Nil
11	Project-I	10

12	Project-II	Nil
13	Project-III	Nil
14	Lab Evaluation-I	10
15	Lab Evaluation-II	15
16	Course Portfolio	Nil
	Total (100)	
	Evaluation scheme for retest	
	Theory Exam III	20
	Lab Evaluation II	15

Syllabus (Theory)

Unit 1

Fluid Properties, ideal fluids & real fluids, Newtonian and non-Newtonian fluids, Pressure at a point in a static fluid, pressure variation in an incompressible static fluid, different types of pressure, manometers Bourdon pressure gauge. Hydrostatic forces on plane, inclined and curved surfaces, buoyancy, Centre of buoyancy and metacenter.

Unit 2

Types of flows, streamline and velocity potential lines, free and forced vortex flow. Fluid mass subjected to horizontal and vertical acceleration and uniform rotation, Bernoulli’s equation for incompressible Fluids, Applications of Bernoulli's equation: Pitot tube, venturimeter, orifice meter, orifices & mouthpieces, time of emptying of tanks by orifices. Different types of notches and weirs. Moment equation and its application.

Unit 3

Losses in pipes. Hydraulic gradient and total energy line, flow through parallel pipes and pipes in series, flow along by-pass. Relation between shear and pressure gradient. Flow between plates and pipes. Equations for velocity distribution and pressure difference. Energy correction factor and momentum correction factor.

Nikuradse’s Experiments. Hydro-dynamically smooth and rough boundaries, Laminar Sub-layer. Equations of velocity distribution and friction coefficient.

Unit 4

Uniform and non-uniform flow, resistance equations of Chezy and Manning. Most Efficient rectangular, triangular and trapezoidal sections.

Specific energy and specific energy curve. Critical depth in prismatic channels, alternate depths, rapid, critical and sub critical flow mild, steep and critical slopes and flow profile. Classification of surface curves in prismatic channels and elementary computation.

Equations of gradually varied flow in prismatic channels. Rapidly varied flow (Hydraulic jump or standing wave) in rectangular channels. Conjugate or sequent depths, losses in jump, location of jump.

Unit 5

Impact of a jet on a flat or a curved vane, moving and stationary vane, flow over radial vanes. Force exerted in runner when flow strikes tangentially or radially.

Reaction and Impulse turbines, classification of turbines, tangential flow turbine, pelton wheel turbine, specific speed, governing of turbine and different type of efficiencies in turbine.

Mixed flow turbines, efficiency of Francis turbine, Propeller turbine and Kaplan turbine, characteristics of turbines. Basic principles of governing of turbines, draft-tube, selection of turbines, model tests, characteristic curves in turbines.

Syllabus (Practical)

1. Determination of viscosity of oil.
2. Establish relationship between pressure and height.
3. Determination of metacentre of a floating body.
4. Calibration of venturi meter, orificemeter, pitot tube and rotameter.
5. Determination of coefficient of friction in close conduit as major losses.
6. Determination of minor losses from bend, elbow, sudden contraction, enlargement.
7. Calibration of triangular notch for field installation.
8. Study phenomena of hydraulic jump.
9. To study the operation of a Pelton Wheel Turbine and also determine its output power, efficiency.
10. Simulation of flow pattern in Rivers with software.

Textbooks:

1) Fluids mechanics and hydraulic mechanics: Problems and solutions by Subramanya, K.
2) A textbook on fluid mechanics and hydraulic machines by Pati, Sukumar.

Reference books

1) Fluid Mechanics: Fundamentals and applications, YA Cengel, JM Cimbala, McGraw Hill Publication

2) Fluid flow in pipes and channels, GL Asawa, CBS Publishers.
3) Introduction to Fluid Mechanics Fox and McDonald Wiley International Publication.

Video Lectures

1) https://nptel.ac.in/courses/112/105/112105171/

Courseera course:

1) https://www.coursera.org/learn/fluid-power#about(Fundamentals of Fluid Power)

Virtual lab:

1) http://fm-nitk.vlabs.ac.in/#
2) https://eerc03-iiith.vlabs.ac.in/List%20of%20experiments.html?domain=Civil%20Engineering
3) http://vlab.co.in/ba-nptel-labs-civil-engineering

Course Title – Perspectives on Contemporary Issues
Semester- III
Credit- 2
Course code-CC1103
Faculty: Shraddha Bharatiya

Course Description

In an era of globalization, there is an increasing need for the youth to be able to empathize with others, value diverse perspectives and cultures and understand how events around the world are intertwined. Global issues revolve around social, economic and environmental factors which ultimately add to the interconnectedness of countries. In this course, students will employ key critical thinking concepts to analyze contemporary issues from multiple perspectives. They will explore the impact at micro and macro levels.

Course Outcomes

The students will be able to:

CC1103.1 Identify different perspectives objectively.
CC1103.2 Explain interconnectedness of the issues and their impact at micro and macro levels.
CC1103.3 Recognize their own beliefs, biases, claims and assumptions.
CC1103.4 Evaluate sources, argue and defend effectively.

Methodology

This course will be an amalgamation of brief lectures and activity based learning i.e. films, group discussions, debates, and case studies. The objective behind utilizing activity based learning is for the learners to have a more hands on experience. This will encourage and ensure active participation and longer retention. The idea is for learners to feel engaged and also express their views in a conducive environment. The takeaway from this course will not only be awareness about certain issues but equipping learners with skills of decision making and reasoning in alignment with certain global contexts.

Evaluation Scheme

Prerequisites		**N/A**
Hours per Week		**L-T-P: 2-0-1**
Credits		**2**
Sr. No	**Specifications**	**Weightage**
01	Attendance	Nil
02	**Assignment**	**20**
03	**Class Participation**	**20**
04	**Quiz**	**20**
05	Theory Exam	Nil

06	Theory Exam	Nil
07	**Theory Exam**	**20**
08	**Report-1**	**20**
09	Report-2	Nil
10	Report-3	Nil
11	Project -1	nil
12	Project -2	Nil
13	Project -3	Nil
14	Lab Evaluation	Nil
15	Lab Evaluation	Nil
16	Course portfolio	Nil
	Total (100)	**100**

Course Content	
Introduction to contemporary perspective	Introduction to the course, skills and the topics. Revision of critical thinking.
Research, analysis & evaluation of a topic from local, national and global perspectives	**<u>Climate Change and Sustainability</u>** *Understanding the magnitude of the issue, its impact and future challenges. How we can meet our current needs without diminishing the quality of the environment or reducing the capacity of future generations to meet their own needs.*
	<u>Globalization</u> *With increasing development throughout the world, the focus of this theme will be on the impact of globalization in India.*

	Nationalist Movement *There is a sense that excesses of globalization have created an identity crisis across the world, facilitating the rise of nationalist movements. Rising nationalism is seen everywhere, from the election of Donald Trump to Brexit, the success of far-right parties in Italian, German and Austrian elections in 2017 and 2018, nationalism appears to be on rise globally. We will look at its reasons and implication.*
	Technology *Impact of unprecedented technological growth, challenges and opportunities.*
	Social justice and human rights *An understanding of the impact of inequality and discrimination, the importance of standing up for our own rights and our responsibility to respect the rights of others.*

Readings:

Books

1. *Harari, Y. N. (2019). 21 Lessons for the 21st century. Toronto: CELA.*
2. *GUHA, R. (2019). India After Gandhi: the history of the world's largest democracy. NEW YORK: ECCO.*
3. *Rosling, H., Rosling, O., & Rönnlund Anna Rosling. (2019). Factfulness: ten reasons were wrong about the world - and why things are better than you think. London: Sceptre.*
4. *Kolbert, E.(2015). The Sixth Extinction: An unnatural History. Bloomsbury*

Articles
https://www.theguardian.com/environment/2015/mar/08/how-water-shortages-lead-food-crises-conflicts
The Cultural Challenges of Meeting Climate Change Goals: Montreal Weighs an Emissions Ban on Iconic Wood-Fire Bagel Shops Andrew Hoffman Pub Date: Apr 11, 2019 Source: WDI Publishing at the University of Michigan
Prototyping a Scalable Smart Village to Simultaneously Create Sustainable Development and Enterprise Growth Opportunities Solomon Darwin; Henry W. Chesbrough Pub Date: Jan 1, 2017 Source: UC Berkeley - Haas School of Business
bKash: Financial Technology Innovation for Emerging Markets Ishtiaq Mahmood; Marleen Dieleman; Narmin Tartila Pub Date: Jun 28, 2017 Source: Ivey Publishing
The Panic of 2008 and Brexit: Regional Integration versus Nationalism Robert F. Bruner; Kevin Hare Pub Date: Oct 9, 2017 Source: University of Virginia Darden School Foundation
Biblio Credit Union: Social Inequality and the Living Wage Kent Walker; Curtis Labutte Pub Date: Jan 30, 2017 Source: Ivey Publishing

MANAGEMENT PERSPECTIVES (IL1101)

COURSE CREDITS: 2
SESSION DURATION: 60 MINUTES

COURSE DESCRIPTION:

The present course is an introductory and integrative action encapsulated course designed for the engineering students to introduce them to management discipline and the core functional areas contributing to it. This course adopts the integrated problem oriented approach via the use of cases and simulation. It implies that complex business problems, in the form of cases and simulations require students to understand different dimensions of the problem and come up with holistic solutions. The course will help students to be familiar with trending management issues and at the same time apply the knowledge gained.

COURSE OUTCOMES

After completion of this course, the students will able to:

IL1101.1	Comprehend the importance of management and its functional areas in businesses and also its interaction with technology.
IL1101.2	Highlight specific external and internal issues impacting businesses.
IL1101.3	Integrate and analyze multiple dimensions of management aspects to solve business problems.
IL1101.4	Evaluate the aspects that management might consider when evaluating technical and engineering projects such as planning and scheduling, personnel management, cost control etc. from a management perspective

TOPICS TO BE COVERED:

HR

1. Business organization- Current challenges
2. HR and its growing importance.
3. Overview of people management systems
4. Recent trends shaping HR.

Economics:

1. Introduction of important concepts of Micro and Macro Economics
2. Key Features of Indian Economy

3. Understanding of economic environment of business

Marketing:

1. Marketing Process
2. Elements of Marketing Mix
3. Segmentation, Targeting and Positioning

Finance and Accounts:

1. Understanding Accounting Terms
2. Overview of Financial Reports, viz., Balance Sheet, Income Statement, Cash Flow Statement
3. Interface of Balance Sheet and Income Statements
4. Types of Costs and assessing and ascertaining Costs

BOOKS FOR REFERENCE

- Aswathappa, K. (2008) - Human Resource Management Text and Cases,Tata McGraw Hill New Delhi.
- Rao VSP (2002)– Human Resource Management, Text and Cases,Excel Book, New Delhi
- Armstrong, G. and Kotler, P. (2017). Marketing: An Introduction. New Delhi: Pearson Education.
- Ramaswamy, V. S., & Namakumari, S. (2013). Marketing Management: Global Perspective, Indian Context. New Delhi: Macmillan (India) Limited.
- T. R. Jain (Latest Edition). Economics for Engineers. New Delhi: V K Publications.
- Ramachandran N & Kakani K.Ram.(2017). How to Read a Balance Sheet,2/e. New Dehi: Mc Graw Hill Publications.
- Mott Graham. (2008). Accounting for Non-Accountants: A Manual for Managers and Students. Kogan Publication.
- Goyal, V.K. & Goyal, Ruchi. (2016). Financial Accounting, 4/e, New Delhi: PHI Learning Pvt. Ltd.[ISBN.-978-81-203-4626-0]

Optional MOOC

- Operations Management: Analysis and Improvement Methods by University of Illinois (Coursera): https://www.coursera.org/programs/j-k-lakshmipat-university-on-coursera-kzogk?collectionId=&productId=schck0kuEealsQ4S5bCf-Q&productType=course&showMiniModal=true

ASSESSMENT MATRIX

The criteria for assess the learning outcomes of this course are as follows:

S.No.	Specification	Marks
1	Attendance	Nil
2	Assignment	**10**
3	Class Participation	**10**
4	Quiz	Nil
5	Theory Exam-I	Nil
6	Theory Exam-II	**40**
7	Theory Exam-III	Nil
8	Report-I	Nil
9	Report-II	Nil
10	Report-III	Nil
11	Project-I	**40**
12	Project-II	Nil
13	Project-III	Nil
14	Lab Evaluation-I	Nil
15	Lab Evaluation-II	Nil
16	Course Portfolio	Nil
	Total	**100**

Course Title and Code **Construction Project Management:** CE1112	
Hours per Week	**L-T-P: 3-0-2**
Credits	**4**
Students who can take	B. Tech Sem (2019-2023) (CE)
Course Objective: This course aims to develop understanding for importance of estimation, costing and evaluation, construction project management, project planning, cash flow and time management and safety measures at the project site. Topics include estimation, costing, evaluation, management, role of civil engineer, project scheduling with PERT, methods to reduce the project cost, contract management and safety measures at excavation, demolition, roads and other construction sites.	

Course Outcomes

On completion of the course, the student should be able to:

CE1113.1 Calculate the estimated cost of the project
CE1113.2 Compute the Benefit cost ratio of various type of projects.
CE1113.3 Asses the risks in various Civil Engineering projects.
CE1113.4 Analyze the project schedule by CPM and PERT.
CE1113.5 Evaluate various types of contracts.
CE1113.6 Develop various methods of safety in various construction projects.
CE1113.7 Incorporate sustainability in project planning and execution.
CE1113.8 Develop project scheduling using MS project.

Prerequisites		
Teaching Scheme (Hours per Week)		3 0 2
Credits		4
Sr. No.	**Evaluation Component**	**Marks**
1	Attendance	Nil
2	Assignment	Nil
3	Class Participation	5
4	Quiz (2)	10
5	Theory Exam-I	0
6	Theory Exam-II	15
7	Theory Exam-III	25
8	Report-I	5
9	Report-II	Nil
10	Report-III	Nil
11	Project-I	10
12	Project-II	10
13	Project-III	10
14	Lab Evaluation-I	5

15	Lab Evaluation-II	5
16	Course Portfolio	
	Total (100)	
	Evaluation scheme for retest	
	Theory Exam III	25
	Lab Evaluation II	5

Syllabus (Theory)

CONSTRUCTION AND PROJECT MANAGEMENT: Construction Project, Importance of Construction and Construction Industry, Indian Construction Industry, Project Management and Its relevance, Stake holder of a construction Project, Role of Civil Engineer in Project Management, Stages in Construction, Project Organization: Construction Company, Structure of construction Organization, Management levels, Construction Economics: Benefit cost ratio, Average Annual rate of return, Major cause of project failure, Role of arbitrator in project management

PROJECT PLANNING: Importance of project planning, Types of Project Plans, determining activities involved, work breakdown structure, assessing activity duration, duration Estimate procedure, Project work scheduling, Project management techniques – CPM and PERT networks analysis, concept of precedence network analysis.

PROJECT COST AND TIME CONTROL: Monitoring the time progress and cost controlling measures in a construction project, Time cost trade-off process: direct and indirect project costs, Cost slope, Process of crashing of activities, determination of the optimum duration of a project, Updating of project networks, resources allocation.

CONTRACT MANAGEMENT: Elements of tender operation, Types of tenders and contracts, Contract document, Legal aspects of contracts, Contract negotiation & award of work, breach of contract, determination of a contract, arbitration.

SAFETY AND OTHER ASPECTS OF CONSTRUCTION MANAGEMENT: Causes and prevention of accidents at construction sites, Safety measures to be followed in various construction works like excavation, demolition of structures, explosive handling, hot bitumen work. Project Management Information System – Concept, frame work, benefits of computerized information system. Environmental and social aspects of various types of construction projects.

Syllabus (Practical)

Various modes of measurements, measurement sheet and abstract sheet;

Main Item of Work

Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates

Basic schedule of rates. (C.S.R.)

Preparing detailed estimates of various types of buildings, Services for building such as water supply, drainage and electrification.

Various percentages of overhead charges, Contingencies and work charge establishment different services in building.

Various type of valuations**:** sinking fund, scrap value, year's purchase, gross and net income, dual rate interest

Introduction of MS PROJECT/ PRIMVEERA software for project scheduling.

Text /Reference Books:

1. Dutta B. N. Estimating & Costing in Civil Engineering, UBS Publishers, 2016
2. Jha N K. Construction project Management Pearson, 2015.
3. Chitkara K K. Construction Project Management, Mc Graw Hill 2014.
4. Punmia B C and Khandelwal K K. Project Planning and Control with PERT and CPM. Laxmi Publication 2014.

Course code	Course Title	Teaching Scheme				
		L	T	P	S	Credits
ES1109	Computational Engineering Analysis – II	3	1	2	0	5

Course Objectives: The course will develop ability to use Partial Differential Equations (PDE), Fourier transforms and Z-transform for a variety of Engineering applications from fluid dynamics, heat conduction and circuit design. It also aims to develop skills for using common simulation Platforms i.e. Virtual lab /Python/ MATLAB. Few numerical methods will also be introduced to find the numerical solutions of various problems.

Course Outcomes:

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

ES1109.1 Classify various types of partial differential equations and solve them through various analytical and numerical methods.

ES1109.2 Formulate and analyze differential equations especially Navier stokes and energy equations and use numerical methods for solving the same.

ES1109.3 Use Numerical method for solving partial differential equations using finite difference method.

ES1109.4 Find Fourier and inverse Fourier transforms of given function and use Fourier transform to solve partial differential equations.

ES1109.5 Find Z-transform and inverse Z-transforms of given functions and use them to analyze control systems.

ES1109.6 Design and analyse various types of filters and attenuators to minimize power losses and improve signal quality.

ES1109.7 Solve problems involving vertex and edge connectivity, planarity and crossing numbers.

Teaching Scheme (Hours per Week)		L T P 3 1 2
Credits		5
Sr. No	**Specifications**	**Marks**
1	Attendance	-
2	Assignment	10
3	Class Participation	10
4	Quiz	15
5	Theory Exam-I	15
6	Theory Exam-II	-

7	Theory Exam-III	30
8	Report-I	-
9	Report-II	-
10	Report-III	-
11	Project-I	-
12	Project-II	-
13	Project-III	-
14	Lab Evaluation-I	10
15	Lab Evaluation-II	10
16	Course Portfolio	-
	Total (100)	**100**

Evaluation policy for retest	
Theory Exam-III	30
Total	30

Course Syllabi (Theory):

PDE : Partial Differential Equations of First Order, Variable separable technique for solving PDE. Heat equation, wave equation, Laplace equation
Boundary value problems: Solution of boundary value problems using separation of variables technique.
Numerical solution of PDE.

Application of PDE: Momentum and Energy Transport:
The governing equations of fluid dynamics- models of the flow, continuity equation, momentum equation, Energy equation, boundary conditions. Poisouli's flow, Couette flow, steady and unsteady conduction.
Fourier Transforms : Fourier transform and inverse Fourier transform, properties of Fourier transform, Applications in solving Partial differential equations.
Filter Circuits: Types of passive filters, design low-pass, High-pass, Band-pass, Band-reject filters as constant k type, design low-pass, High-pass, Band-pass, Band-reject filters as RC type, Advantages of active filters over passive filters.
Graph Theory : Introduction, Linear graph of a network, Tie-set and cut-set schedule, incidence matrix, cut-set, and tie-set. Graph theory application to a practical radial system.
Z-transform : Introduction, standard z- transform, properties of z – transform, initial and final value theorems, inverse z-transform, applications in control systems.

Textbook:

3. Advanced Engineering Mathematics, Erwin Kreysig, Wiley, India.

4. White F. M., “Fluid Mechanics” Tata McGraw-Hill, New Delhi.
5. Incropera F P “Principles of Heat and Mass Transfer”, John Wiley & Sons.
6. Hayt W.H., Kemmerly J. E., Durbin S. M., “Engineering Circuit Analysis”, Tata Mcgraw Hill, 6th edition, 2006.

Reference Books –

1. Thomas’ Calculus, M.D. Weir and J. Hass, Pearson.
2. Engineering Mathematics, Srimanta Pal and Subodh C. Bhunia, Oxford University Press, New Delhi, India.
3. Higher Engineering Mathematics, B.V. Ramana, Mc Graw Hill Education.
4. Fox and McDonald, “Introduction to fluid dynamics”, John Wiley & Sons.
5. Cengel Y. “Heat and Mass Transfer” Tata McGraw-Hill, New Delhi.
6. J. D. Anderson Jr. “Computational Fluid Dynamics” McGraw-Hill International Edition.
7. Roy Choudhary, “Network Theory”, TMH, 3rd Edition, 2004.
8. Edminister Joseph A., “Electrical Circuits, Schaum’s Outline Series”, Tata McGraw Hill, 3rd edition, 2012.

Course Title and Course Code	Structural Analysis, CE1104
Hours per week	L T P: 3 0 0
Credits	3
Students who can take	B.Tech, Semester IV

Course Objective:

To introduce students to the concepts of analysis of various determinate and indeterminate components of different structures.

Course Outcomes:

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

- CE1104.1 identify statically determinate and indeterminate structures and determine forces in members of trusses.
- CE1104.2 determine the bending moment at any section and reaction at support of arches.
- CE1104.3 determine tension in cables taking into considerations the temperature variation and support slippage.
- CE1104.4 draw influence line diagrams for beams, floor girders, arches and trusses.
- CE1104.5 analyze and determine force and displacement response of any given structure subjected to various loads.

Sr. No	Specifications	Marks
1.	Attendance	-
2.	**Assignment**	**20**
3.	**Class Participation**	**10**
4.	**Quiz**	**20**
5.	Theory Exam-I	-
6.	**Theory Exam-II**	**15**
7.	**Theory Exam-III**	**25**
8.	**Report-I**	**10**
9.	Report-II	-
10.	Report-III	-
11.	Project-I	-
12.	Project-II	-
13.	Project-III	-
14.	Lab Evaluation-I	-
15.	Lab Evaluation-II	-
16.	Course Portfolio	-
Total		**100**

Retest:

Sr. No	Specifications	Marks
1.	Theory Exam-III	25

Syllabus:

Unit I **Introduction & Analysis of Plane Structures**: Introduction and classification of structures degrees of freedoms, static and kinematic indeterminacy of structures. Analysis of determinate and indeterminate trusses.

Unit II **Displacements of Plane Structures:** Introduction, energy methods, Maxwell's reciprocal & Betti's theorem. Deflection of trusses and plane frames by the use of Unit load method.

Analysis of Beams and Frames using Moment Distribution Method and Slope Deflection Method.

Unit III **Cables and Arches:** Cables subjected to concentrated loads and uniformly distributed loads, analysis of two hinged and three hinged arches.

Unit IV **Influence Line Diagrams and Rolling Loads:** Introduction, influence line diagrams for beams & trusses, Muller- Breslau principle and its applications. Rolling loads, maximum stress resultants in a member/section, absolute maximum stress resultant in a structure.

Unit V **Matrix Method of Analysis**: Introduction, Flexibility Method – Application to beams, trusses, frames and grid structures, Stiffness Method – Application to beams, trusses, frames and grid structures including plane and space structures, Computer Oriented Direct Stiffness Method.

Reference Books:

1. Structural Analysis, R. C. Hibbeler, Pearson Education, New Delhi, 2008.
2. Structural Analysis, A. Kassimali, PWS Publishing, USA, 1999.
3. Basic Structural Analysis, C. S. Reddy, Tata McGraw Hill, New Delhi, 1996.
4. Elementary Structural Analysis, S. Utku, C. H. Noris, and J. B. Wilbur, McGraw Hill, N.Y., 1991.
5. Theory of Structures, Timoshenko and Young, McGraw Hill, N.Y., 1965.

Online References:

https://nptel.ac.in/courses/105/105/105105166/

https://nptel.ac.in/courses/105/105/105105109/

Course Title and Course Code	**CE1105: Construction Technology**
Hours per week	**L T P: 3 0 2**
Credits	**4**
Students who can take	**B.Tech, Semester IV**

Course Objective:

To introduce students to the modern methods of building construction incorporating appropriate use of materials to optimize utility and to acquire basic principles as well as current design practices in the construction of buildings.

Course Outcomes:

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

CE1105.1 Develop the basic knowledge of building components, types of foundations, dead and live loads and design of strip footing for buildings.

CE1105.2 Apply knowledge in the selection of appropriate type of masonry, mortar, damp proof course, stair, plumbing, form work and building finishing items

CE1105.3 Design concrete mixes as per guidelines of Indian Standards

CE1105.4 Assess the behavior of concrete at fresh and hardened state

Prerequisites		**None**
Sr. No	**Specifications**	**Marks**
1.	Attendance	Nil
2.	Assignment	Nil
3.	**Class Participation**	**10**
4.	**Quiz (02 Nos)**	**10**
5.	Theory Exam-I	Nil
6.	**Theory Exam-II**	**20**
7.	**Theory Exam-III**	**30**
8.	**Report-I**	**10**
9.	Report-II	Nil
10.	Report-III	Nil
11.	**Project-I**	**10**
12.	Project-II	Nil
13.	Project-III	Nil
14.	**Lab Evaluation-I [Continuous evaluation]**	**10**
15.	**Lab Evaluation-II**	**-**
16.	Course Portfolio	Nil
Total		**100**

COURSE SYLLABUS (Theory):

Unit-1: Buildings and their foundations: Types of buildings, components of a building, design loads, safe bearing capacity of soil, types of foundations, design of strip footing.

Unit-2: Masonry construction: Types of masonry, classification of stone masonry, Brick masonry-introduction and bonds in stone masonry, comparison between stone and brick masonry. Other building components - damp proof course, lintels and stairs.

Unit-3: Walls and wall finishing: Types of walls, design of load bearing walls, Mortar for masonry, partition walls, cavity walls, plastering and pointing, form work, plumbing for buildings.

Unit-4: Concrete: Proportioning of ingredients, aggregates, tests on aggregates, mineral and chemical admixtures, quality of water, water/cement ratio, classification of concrete, manufacturing of concrete, properties of concrete, tests on fresh and hardened concrete, Non-destructive Tests (NDT) on concrete.

Unit-5: Concrete Mix Design: Grade of concrete, Characteristic strength, modulus of elasticity and Poisson's Ratio, creep & shrinkage of concrete, concrete mix design, special concrete.

LABORATORY EXPERIMENTS:

Sl. No.	Name of the experiment
1.	Water absorption & specific gravity tests of fine aggregate
2.	Water absorption & specific gravity tests of coarse aggregate
3.	To determine workability of concrete using slump test
4.	To determine workability of concrete using compaction factor test
5.	Flow table test for mortar
6.	To determine compressive strength of concrete
7.	To determine flexural strength of concrete
8.	Non Destructive Testing on concrete: Rebound hammer test
9.	Non Destructive Testing on concrete: Ultrasonic Pulse Velocity test

Textbooks:

1. Punmia, B. C. & Jain, A. K. (2003). *Building Construction*. Laxmi Publications (P) Ltd.
2. Arora S. P. & Bindra S. P. (2015). Building Construction. Dhanpat Rai Publications.
3. Rangwala, S.C. (2016). *Engineering Materials*. Charotar Publishing House.
4. Kandya, A. (2015). *Elements of Civil Engineering.* Charotar Publishing House.
5. Shetty M. S. (2015). Concrete Technology. S. Chand & Company Pvt. Ltd.
6. Properties of concrete, A.M. Neville (2004) ,Pearson, India.

Other Important Links:

1. Video lectures:
   (*https://nptel.ac.in/courses/105/102/105102088/*)
2. Video lectures:

   https://nptel.ac.in/courses/105/102/105102012/

Course Title and Code: Civil Engineering CAD Lab **CE1106**	
Hours per week	**L-T-P: 0-0-2**
Credits	**1**
Students who can take	**B.Tech Semester-III (Batch: 2019 civil Engg)**

Course Objective: The objective of this lab is to teach the student usage of Auto cad and basic drawing fundamentals in various civil engineering applications, especially in building drawing.

On successful completion of this course students will be able to:

CE1106.1 Interpret conventional sign, symbols and working drawings of various civil engineering structures.

CE1106.2 Develops basic drawing skills; create multilayer architectural and working drawings.

CE1106.3 Plan and draw Civil Engineering Buildings as per aspect and orientation.

CE1106.4 Use the AutoCAD commands for drawing 2D & 3D building drawings required for different Civil engineering applications.

CE1106.5 Use software (AutoCAD) to prepare detailed drawing of residential and public buildings.

Prerequisites		Engineering Graphics/ Drawing
Sr. No.	**Evaluation Component**	**Marks**
1.	Attendance	NIL
2.	Assignment	20
3.	Class Participation	10
4.	Quiz	10
5.	Theory Exam-I	NIL
6.	Theory Exam-II	NIL
7.	Theory Exam-III	NIL
8.	Report-I	NIL
9.	Report-II	NIL
10.	Report-III	NIL
11.	Project-I	20
12.	Project-II	NIL
13.	Project-III	NIL
14.	Lab Evaluation-I (Continuous Evaluation)	15
15.	Lab Evaluation-II (Lab Examination)	25
16.	Course Portfolio	NIL
Total		100

Evaluation scheme for Re-test:

Lab Evaluation-II	25
Total	**25**

LIST OF EXPERIMENTS

1. Introduction to Traditional Drawing Tools.
2. Standard Engineering Lettering and Dimensioning.
3. Types of Lines and scales use in engineering drawing
4. Perspective Projections.
5. Symbols used in Civil Engineering drawing, Masonry Bonds.

Drafting of following Using Auto CAD software

6. Doors, Windows, and staircases(Structural drawing – Slab and Stair reinforcement detailing.)
7. Plumbing & Electrical fitting drawing.
8. Comprehensive Drawing of Residential building (Layout, plan, elevation & sectional elevation).
9. Prepare civil engineering drawings effectively and efficiently using 2D & 3D projection CAD software.
10. Preparation of Layout planning of different civil engineering Projects.

REFERENCES

1. Shah, Kale &Patki; Building Design and Drawing, TMH New delhi 2002 ISBN: 9780074638767.
2. Malik & Mayo, Civil engineering Drawing, Computech Publication Ltd New Asian Publishers, 2009, New Delhi.
3. M.G.Shah &C.M. Kale, Principle of perspective Drawing, TMH New delhi 2002
4. Swamy Kumara & Rao,N , Building Planning and Drawing, Charotar publication,Anand ISBN:978-93-85039-12-6(Ed.2015)
5. BlS,National Building Code 2005,New Delhi,2005.
6. O.H. Koenisberger : “Manual of tropical housing and building” Orient Longman

Course Title and Code: Communication and Identity: CC1104

Course Description:

This course enables students to explore their personal and professional identities, to create their distinctive presence. It intends to help them gain an understanding of the basic purpose, benefits, and responsibilities of self-presence, and to begin the process of defining their values, strengths, and goals, which helps them enhancing their employability skills through exposing themselves through various activities.

Course Outcomes

CC1104.1 Analyse their personal identities, both private and social
CC1104.2 Identify their different values, strengths and areas of professional interest
CC1104.3 Articulate their personal statement and use it to craft an influential pitch
CC1104.4 Express themselves through various communication formats on different platforms

Prerequisites		**N/A**
Hours per Week		**L-T-P: 2-1-0**
Credits		**2**
Sr. No	**Specifications**	**Weightage**
01	Attendance	**NIL**
02	Assignment	**30**
03	Class Participation	**30**
04	Viva	**20**
05	Theory Exam	Nil
06	Theory Exam	Nil
07	Theory Exam	**20**
08	Report-1	Nil
09	Report-2	Nil
10	Report-3	Nil
11	Project -1	Nil
12	Project -2	Nil
13	Project -3	Nil

14	Lab Evaluation	Nil
15	Lab Evaluation	Nil
16	Course portfolio	Nil
	Total (100)	**100**

Module	Topics/ Session no.	Topics to be Covered
Identifying Self	Factor that shape our identity	The 3 Types of Diversity That Shape Our Identities. Three things: demographic diversity (our gender, race, sexual orientation, and so on), experiential diversity (our affinities, hobbies, and abilities), and cognitive diversity (how we approach problems and think about things).
	Internal confidence or "principle-centred living"	Living a principle-centred life is the key to excelling in all other areas of our living. A principle is based on the fundamental idea that there is learned behavior that governs human effectiveness.
	Personal Statement	Use of story map to create a personal statement.
Persuasive Communication	Steps to build a Personal Brand	Personal branding: meaning, importance and how to create and use it; the three Cs' of personal branding and
	Online presence	Creating an online presence for professional and personal branding through social media.(LinkedIn, Facebook etc.)
	Elevator Pitch, Cover Letter	Elevator Pitch: Meaning and use of an elevator pitch in interview and workplace; techniques to craft and improve their pitch Purpose of a cover letter, types of the cover letter, the structure of a cover letter and tips on the cover letter, to craft their cover letter to be used for placements
	Presence in Group Discussion and Personal Interviews	Practice different types of group discussions, dos and don'ts of group discussions and use of techniques to perform well in GDs
Assessments		

1. Self- identity

1. *When Your Job Is Your Identity, Professional Failure Hurts More*
   Timothy O'Brien
   Pub Date: Jun 18, 2019

Source: Harvard Business School Publishing - HBD
Product #: H050HO-PDF-ENG
Discipline: General Management
Length: 1106 words

2. *The 3 Types of Diversity That Shape Our Identities*
Celia de Anca; Salvador Aragón
Pub Date: May 24, 2018
Source: Harvard Business School Publishing – HBD
Product #: H04BSY-PDF-ENG
Discipline: Human Resource Management
Length: 1004 words

3. *Coaching Makena Lane*
Ethan S. Bernstein; Om Lala
Pub Date: Oct 1, 2017
Source: HBS
Product #: 418031-PDF-ENG
Discipline: Organizational Behavior
Length: 24 p

4. *The Talent Curse*
Jennifer Petriglieri; Gianpiero Petriglieri
Pub Date: May 1, 2017
Source: Harvard Business School Publishing - HBD
Product #: R1703E-PDF-ENG
Discipline: General Management
Length: 8 p

2. Personal Statement

1 *From Purpose to Impact*
Nick Craig; Scott A. Snook
Pub Date: May 1, 2014
Source: Harvard Business School Publishing - HBD
Product #: R1405H-PDF-ENG
Discipline: General Management
Length: 9 p

3. Internal confidence or "principle centered living"

1 *Cultivating Everyday Courage*
James R. Detert
Pub Date: Nov 1, 2018
Harvard Business School Publishing - HBD
Product #: R1806K-PDF-ENG
Discipline: General Management
Length: 9 p

4. Steps to build Personal Brand

1 *A Strategic Marketing Plan to Successfully Deliver Your Professional Brand*
Kimberly A Whitler
Pub Date: Oct 20, 2015
Source: University of Virginia Darden School Foundation
Product #: UV7572-PDF-ENG
Discipline: Marketing
Length: 7 p

2 *Sadiq Gillani's Airline Career Takes Off: Strategy in Action*
Jeffrey Pfeffer
Pub Date: Nov 30, 2018
Source: Stanford University
Product #: OB95-PDF-ENG
Discipline: Organizational Behavior
Length: 17 p

3 *How Women Can Develop - and Promote - Their Personal Brand*
Dorie Clark
Pub Date: Mar 2, 2018
Source: Harvard Business School Publishing - HBD
Product #: H046PA-PDF-ENG
Discipline: Human Resource Management
Length: 1419 words

5. Online presence

1 *What's Your Personal Social Media Strategy?*
Soumitra Dutta
Pub Date: Nov 1, 2010
Source: Harvard Business School Publishing - HBD
Product #: R1011L-PDF-ENG
Discipline: Organizational Behavior
Length: 6 p

6. Resume, Elevator Pitch, Cover Letter

1 *The Art of the Elevator Pitch*
Carmine Gallo
Pub Date: Oct 3, 2018
Source: Harvard Business School Publishing - HBD
Product #: H04KFL-PDF-ENG
Discipline: General Management
Length: 992 words

2 *Writing Your Résumé When Your Job Title Doesn't Reflect Your Responsibilities*
Jane Heifetz
Pub Date: May 16, 2017
Source: Harvard Business School Publishing - HBD
Product #: H03NAN-PDF-ENG
Discipline: Human Resource Management
Length: 1243 words

3 *Improve Your Résumé by Turning Bullet Points into Stories*
Jane Heifetz
Pub Date: May 4, 2016
Source: Harvard Business School Publishing - HBD
Product #: H02UR4-PDF-ENG
Discipline: Human Resource Management
Length: 1481 words

7. Presence in Personal Interviews

1. *15 Rules for Negotiating a Job Offer*
Deepak Malhotra
Pub Date: Apr 1, 2014
Source: Harvard Business School Publishing - HBD
Product #: R1404K-PDF-ENG
Discipline: General Management
Length: 5 p

2. *How to Show You're Passionate in a Job Interview*
Sabina Nawaz
Pub Date: Apr 24, 2019
Source: Harvard Busines School Publishing - HBD
Product #: H04WSV-PDF-ENG
Discipline: Human Resource Management
Length: 724 words

How to Highlight Your Talents in a Job Interview Without Showing Off
Tomas Chamorro-Premuzic PhD.
Pub Date: Dec 28, 2017
Source: Harvard Business School Publishing - HBD
Product #: H0436N-PDF-ENG
Discipline: Human Resource Management
Length: 1139 words

Course Title: **Introduction to Design**

Course Code: IL1102

Year: 2021

Hours per Week	30
Credits	2
Students who can take	2nd Year B. Tech

Course Objective: The students are going to explore the world of hand-crafted toys and animation during this week. Thus, taking an idea forward from an intangible thought to a material-based product or communicating it visually. The toys we explore will be designed in relevance to the audience group that the students choose.

Course Outcome:

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

IL1102.1	Identify the user and build persona of the
IL1102.2	Sketch their ideas on paper to visualize and assess viability.
IL1102.3	Create a plan for process and management to materialize the desired idea.
IL1102.4	Test the material for possibilities and capabilities.
IL1102.5	Develop skills of joinery, material manipulation and various hand tools.
IL1102.6	Develop technical and narrative skills useful for both film and animation.
IL1102.7	Develop troubleshooting and problem solving skills.

Evaluation Criteria :

Sr. No	**Specifications**	**Marks**
1	Attendance	Nil
2	**Assignment**	**20**
3	**Class Participation**	**10**
4	Quiz	Nil

5	Theory Exam I	Nil
6	Theory Exam II	Nil
7	Theory Exam III	Nil
8	Report-1	Nil
9	Report-2	Nil
10	Report-3	Nil
11	**Project -1**	**35**
12	**Project -2**	**35**
13	Project -3	Nil
14	Lab Evaluation1	Nil
15	Lab Evaluation2	Nil
16	Course portfolio	Nil
	Total (100)	**100**

Course Contents:

1. Introduction to Design Process for making Toys.
2. Material properties – Cardboard, Epoxy Putty, Wire, Thread
3. Material joinery
4. Use of tools – Plier, Paper Cutter, Basic Stationery
5. Developing creative thinking.
6. Basic drawing and visualisation skills including 2D to 3D - Form exploration.
7. Principles of animation.
8. Technical aspects of animation and film making (Frame rate, persistence of vision).

9. Building a Narrative – Start, Middle and End of a story.
10. Mediums of animation.

Suggested Reading Materials:

1. Simple wooden toymaking by Mathias, available at MP Ranjan LRC [Call number: 745.592]
2. Model Making by Megan Werner Learning Resource Centre [Call number: 720.2 WER at MP Ranjan LRC].
3. Joy of making Indian Toys [Call number 688.72 at MP Ranjan LRC]
4. Made by hand at MP Ranjan LRC Call number 745.0974
5. Universal Perception of Design at MP Ranjan LRC Call number 745.403
6. https://www.etsy.com/market/toys_handmade
7. https://en.wikipedia.org/wiki/Toy
8. https://en.wikipedia.org/wiki/Category:Traditional_toys (Hover over the categories to see the thumbnail)
9. https://fashion.mithilaconnect.com/6-popular-traditional-toys-in-india/
10.
11. https://www.dutchcrafters.com/Amish-Toys-Games-Hobbies/cat/98
12. https://www.walmart.com/cp/toys/4171 (Toys that we are not interested in)
13. https://www.target.com/c/toys/-/N-5xtb0 (Toys that we are not interested in)
14. https://in.pinterest.com/pin/12807180177802375/
15. https://www.youtube.com/watch?v=_ppedXZHhE0 (Stop Motion Basics)
16. https://www.youtube.com/watch?v=p5SygzMSLhM (Stop Motion in Movies)
17. https://www.youtube.com/watch?v=GcryIdriSe4 (12 principles of animation)

Course Title and Code: Design of RCC and Steel Structures CE1107	
Hours per Week	**L-T-P: 3-0-2**
Credits	**4**
Students who can take	**B. Tech Semester-V**

Course Objective:

This course aims to develop understanding about design of RCC and steel structure components for structural design.

Course outcomes:

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

CE1107.1 Understand material properties and design methodologies for Concrete and Steel structures
CE1107.2 Analyse and design reinforced concrete elements like beam and slab
CE1107.3 Analyse and design steel elements like tension member and compression member
CE1107.4 Design different type of connections for steel members

Prerequisites	Structural Analysis

Sr. No.	**Evaluation Component**	**Marks**
1	Attendance	NIL
2	Assignment	15
3	Class Participation	10
4	Quiz	15
5	Theory Exam-I	Nil
6	Theory Exam-II	15
7	Theory Exam-III	25
8	Report-I	10
9	Report-II	Nil
10	Report-III	NIL
11	Project-I	10
12	Project-II	NIL
13	Project-III	NIL
14	Lab Evaluation-I	NIL
15	Lab Evaluation-II	NIL
16	Course Portfolio	NIL
	Total (100)	100

Course Syllabi (Theory):

Reinforced Concrete Materials: Concrete- Grade of concrete, Characteristic strength, Compressive strength, Flexural tensile strength, modulus of elasticity and Poisson's Ratio, creep & shrinkage, Stress-strain behavior, Design stress-strain curve of concrete, Nominal mix and design mix of concrete. **Reinforcing steel**-Types, sizes and grades, Stress-strain behavior, Design stress-strain curve. Sustainable concrete by using Recycled Concrete Aggregates (RCA) & other waste materials.

Basic concepts of Reinforced Concrete Design: Working Stress Method (WSM), Ultimate Load Method (ULM) and Limit State Method (LSM), Characteristic strength of materials, Characteristic loads, Partial safety factors for materials and loads.

Reinforced Concrete Beams: Design of singly & doubly reinforced rectangular sections in flexure, Design for shear, Design for bond and anchorage of reinforcement.

Slabs: Analysis and design of one way and two way slabs by LSM.

Introduction and Design Philosophies: Types of Structural Steel, structural steel sections, Working Stress Method (WSM) and Limit State Method (LSM).

Introduction to Connections: Types of Bolts, Bolted and Welded Connections under axial loadings.

Tension Members: Design of axially loaded tension members.

Compression Members: Design of axially loaded compression members, Design of Built-up Columns.

Syllabus (Practical)

Design problems based on theory syllabus

References:

Textbooks

1. Pillai, S.U. and Menon, D., "Reinforced Concrete Design", McGraw Hill Education (India) Pvt. Ltd (2003).
2. Sinha, S. N., "Reinforced Concrete Design", Tata McGraw Hill Education Pvt. Ltd. (Second Edition).
3. Jain, A.K., "Reinforced Concrete Limit State Design", Nem Chand & Brothers, Roorkee (2012)
4. Subramanian, N., "Steel Structures-Design and Practice", Oxford University Press (2008).
5. Arya, A.S. and Ajmani, J.L., "Design of Steel Structures", Nem Chand & Brothers (2000).
6. Duggal SK, "Limit State Design of Steel Structures", Tata McGraw Hill (Third edition).

IS Codes:

1. IS 456-2000 Plain and Reinforced Concrete - Code of Practice
2. IS: 800-2007 General Construction in Steel-Code of Practice
3. SP 6-1: ISI Handbook for Structural Engineers -Part- 1 Structural Steel Sections

NPTEL – SWAYAM MOOC Courses:

1) Design of Reinforced Concrete Structures.
   Course url: https://swayam.gov.in/nd1_noc19_ce22/preview
2) Design of Steel Structures
   Course url: https://swayam.gov.in/nd1_noc19_ce25/preview

Course Title and Course Code	**Geotechnical Engineering (CE1108)**
Hours per week	**L T P: 3 0 2**
Credits	**4**
Students who can take	**B.Tech, Semester-V**

Course Objective:

To introduce students to the fundamental concepts of soil mechanics dealing with historical development, water-capillary phenomena, vertical stress distribution, compaction behaviour, shear strength, compressibility and consolidation behaviours of soil.

Course Outcomes:

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

CE1108.1 assess index properties of different soil types.

CE1108.2 evaluate the effect of pore water and seepage on the soil strength.

CE1108.3 estimate vertical stress distribution beneath the foundation on account of superstructure load, up to certain depth.

CE1108.4 calculate the shear strength of soil under different configurations of principal and shear stresses.

CE1108.5 determine the compaction characteristics, optimum water content and maximum dry density of soil.

CE1108.6 determine the consolidation characteristics of different type of soils and estimate the settlement under superstructure loads.

Prerequisites		**Engineering Mechanics and Solid Mechanics**
Sr. No	**Specifications**	**Marks**
1.	Attendance	Nil
2.	Assignment	Nil
3.	**Class Participation**	**5**
4.	**Quiz**	**15**
5.	**Theory Exam-I**	**20**
6.	Theory Exam-II	Nil
7.	**Theory Exam-III**	**30**
8.	Report-I	Nil
9.	Report-II	Nil
10.	Report-III	Nil
11.	**Project-I**	**10**
12.	Project-II	Nil
13.	Project-III	Nil
14.	**Lab Evaluation-I [Report (2.5) + Exam (10) + Viva (7.5)]**	**20**
15.	Lab Evaluation-II	Nil
16.	Course Portfolio	Nil
Total		**100**

COURSE SYLLABUS (Theory):

UNIT I Historical Development of Soil Engineering
Origin and general types of soils, Soil structure, Clay minerals, Three-phase system, Identification and Classification of soils.

UNIT II Soil Water-Capillary Phenomena
Concept of effective and neutral stresses, Permeability, Determination of coefficient of permeability in the laboratory, Seepage flow, Head, Gradient, Pressure, Steady-state flow, Two-dimensional flow net.

UNIT III Vertical Stress Distribution in Soil
Boussinesq and Westergaard's equation, Newmark's influence chart, Principle, Construction and Use, Equivalent point load and Other approximate methods, Pressure bulb.

UNIT IV Compaction and Shear Strength
Mohr-Coulomb failure criterion, Shear strength tests, Different drainage conditions, Shear properties of cohesionless and cohesive soils, Use of Mohr's circle, Relationship between principal stresses and shear parameters.

UNIT V Compressibility and Consolidation
Terzaghi's one-dimensional consolidation theory, Pressure void ratio relationship, Preconsolidation pressure, Total settlement and time rate of settlement, Coefficient of consolidation, Curve fitting methods, Correction with construction time.

UNIT VI Sustainability in Geotechnical Engineering

Indian Standard Codes for Geotechnical Engineering (IS 2720, Part 1-41, IS 6403, etc.).

COURSE SYLLABUS (Practical):

1. Collection of Soil Sample and Determination of Moisture Content
2. Determination of Specific Gravity by (a) *Density bottle* and (b) *Pycnometer*
3. Grain Size Distribution of Soil Using Dry Sieve Analysis
4. Grain Size Distribution of Soil Using Wet Sieve Analysis
5. Particle Size Distribution Using Hydrometer
6. Determination of Liquid Limit Test by Casagrande Apparatus
7. Determination of Liquid Limit Test by Cone Penetrometer
8. Plastic Limit Test
9. Shrinkage Limit Test
10. Field Density Test by Core Cutter Method
11. Field Density Test by Sand Replacement Method
12. Standard Proctor Compaction Test
13. Modified Proctor Compaction Test
14. Consolidation Test

Text Books:

7. Arora, K. R. (1992). *Soil Mechanics and Foundation Engineering in SI Units*. Standard Publishers Distributors.
8. Coduto, D. P. (1999). *Geotechnical Engineering: Principles and Practices,* Pearson.
9. Lambe, T. W., & Whitman, R. V. (2008). *Soil mechanics SI version*. John Wiley & Sons.
10. Murthy, V. N. S. (2002). *Geotechnical Engineering: Principles and Practices of Soil Mechanics and Foundation Engineering*. CRC press.
11. Punmia, B., & Jain, A. K. (2005). *Soil Mechanics and Foundations*. Firewall Media.
12. Ranjan, G., & Rao, A. S. R. (2007). *Basic and Applied Soil Mechanics*. New Age International.
13. Singh, A., & Chowdhary, G. R. (1967). *Soil Engineering in Theory and Practice*. Asia Publishing House.
14. Venkatramaiah, C. (1995). *Geotechnical Engineering*. New Age International.

Other Important Links:

3. Online Lecture Notes on Geotechnical Engineering:
   (*https://nptel.ac.in/courses/Webcourse-contents/IIT-%20Guwahati/soil_mech/index.htm*)
4. Video Lecture on Geotechnical Engineering:

   (*https://www.youtube.com/watch?v=DuZllNDex6s*)

Course Title and Code – Understanding and Managing Conflict| CC1105|Semester- V

Course Description

In today's increasingly complex and fragmented world, it is important to be able to resolve conflicts and build healthy relationships. Interpersonal and Group Dynamics is a course designed to prepare students to identify conflicts, manage emotions, analyze the situation and characters, and practice different frameworks to deal with conflicts.

Course Outcomes

The students will be able to:

CC1105.1 Define a group and explain the stages of group development
CC1105.2 Describe conflict and explain types and causes of conflict
CC1105.3 Use inquiry and advocacy to engage with groups
CC1105.4 Give and receive feedback effectively
CC1105.5 Identify sources of conflict and manage them using difference conflict handling styles

Prerequisites		**N/A**
Hours per Week		**L-T-P: 2-0-0**
Credits		**2**
Sr. No	**Specifications**	**Marks**
1.	Attendance	Nil
2.	Assignment	30
3.	Class Participation	20
4.	Quiz	20
5.	Theory Exam-I	Nil
6.	Theory Exam-II	Nil
7.	Theory Exam-III	30
8.	Report-I	Nil
9.	Report-II	Nil
10.	Report-III	Nil
11.	Project-I	Nil
12.	Project-II	Nil
13.	Project-III	Nil
14.	Lab Evaluation-I	Nil
15.	Lab Evaluation-II	Nil
16.	Course Portfolio	Nil
	Total (100)	100

Course Content

1. Introduction to the stages of group development
2. Introduction to Personality, Perception and Learning as source of differences in individual and groups
3. Nature, Types and sources of Conflict

4. Conflict Resolution Strategies
5. Emotional Intelligence
6. Empathy and Feedback
7. Inquiry & Advocacy – Concept of silence (Masking, Avoiding, Withdrawing) and violence (Controlling, Labeling, Attacking)

References for Reading:

1. Fisher, R., & Ury, W. (2011). Getting to yes: Negotiating agreement without giving in. Toronto, ON: Penguin Random House.
2. Harper, G. (2004). The joy of conflict resolution: Transforming victims, villains and heroes in the workplace and at home. Gabriola Island, BC: New Society Publishers.
3. Miles, E. W. (2013). Developing strategies for asking questions in negotiation. Negotiation Journal, 29(4): 383–412. doi: 10.1111/nejo.12034.

Course code	Course Title	Teaching Scheme				
		L	T	P	S	Credits
EE1111	Introduction to IoT	1	0	2	0	2

Course Objectives:

The course aims to develop understanding of Internet of Things concepts and working on IoT development boards to interface sensors and actuators. The course will enable the students to upload data from sensors on a web server and to use this data for analytical purposes or to actuate some transducers.

Course Outcomes:

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

EE1111.1 Interface the Analog and Digital sensors to Node-MCU
EE1111.2 Develop Embedded C programs to read sensor data and upload to public cloud platform.
EE1111.3 Use Python-based IDE (integrated development environments) for the Raspberry Pi
EE1111.4 Interface Raspberry Pi with I/O devices.
EE1111.5 Visualize sensor data uploaded on public cloud.
EE1111.6 Apply standard protocol(s) for implementation of IoT Systems.
EE1111.7 Analyze and Improve existing systems with innovative IoT based approaches.

Assessment Scheme:

Prerequisites	**Basic Programming**
Teaching Scheme (Hours per Week)	L T P 1 0 2
Credits	2

Sr. No.	Evaluation Component	Marks
1	Attendance	NA
2	Assignment	NA
3	Class Participation	NA
4	Quiz	10
5	Theory Exam-I	10
6	Theory Exam-II	NA
7	Theory Exam-III	20
8	Report-I (Case Study on Raspberry Pi, IoT)	20
9	Report-II	NA

10	Report-III	NA
11	Project-I	NA
12	Project-II	NA
13	Project-III	NA
14	Lab Evaluation-I (Continuous)	30
15	Lab Evaluation-II	NA
16	Course Portfolio (MOOC certificate)	10
	Total (100)	100

Evaluation Scheme for Retest

1	Theory Exam-III	20
2	Lab Evaluation-II	0
	Total (40)	20

Course Syllabi (Theory):

UNIT 1: Introduction to IoT Fundamentals: Definition, Characteristics, Applications, Connectivity Layers, Addressing, Networking.

UNIT 2**:** Sensors and Actuators: Sensors and Transducers, Sensor Classes, Sensor Types, Actuator Basics, Actuator Types,

UNIT 3**:** Basics of IoT Networking & Protocol: IoT Components, Inter-dependencies, SoA, Wireless Networks, Protocol Classification, MQTT, Secure MQTT, CoAP, XMPP, AMQP (Advanced Message Queuing Protocol)

UNIT 4**:** Connectivity Technologies: IEEE 802.15.4, ZigBee, 6LoWPAN, RFID, HART, NFC, Bluetooth, Zwave.

UNIT 5**:** Introduction to NodeMCU and Server: Basic Concepts of Arduino Platform, Examples of Arduino Programming, Interfacing different sensors with NodeMCU. Introductio to Blynk App, Uploading and downloading data from server using Blynk App. Intoduction to ThingSpeak Server, Uploading and downloading data from ThingSpeak server.

UNIT-6 Raspberry Pi: Basic functionality of the Raspberry Pi B+ board, Setup and Configuring Raspberry Pi, programming on the Raspberry Pi using Python, Python functions

to access the Raspberry Pins, how Raspberry Pi interact with online services through the use of public APIs and SDKs, case studies.

References:

1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. "Internet of Things: A Hands-on Approach", by Arshdeep Bahga and Vijay Madisetti (Universities Press)
3. Rajkamal, Internet of Things, Architecture and Design Principles, Mc. Graw Hill Education (India) Pvt Ltd.
4. IoT fundamentals: networking technologies, protocols, and use cases for the internet of things : Hanes, David | Salgueiro, Gonzalo | Grossetete, Patrick | Barton, Robert Henry, Jerome, Pearson, 2018, ISBN: 9789386873743.
5. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning IOT by David Etter,

Video lectures:

1. Introduction to internet of things By Prof. Sudip Misra, IIT Kharagpur
   https://swayam.gov.in/nd1_noc20_cs66/preview
2. https://www.coursera.org/specializations/iot#courses
3. https://www.coursera.org/specializations/embedding-sensors-motors

MOOC course
The Arduino Platform and C Programming

https://www.coursera.org/learn/arduino-platform?specialization=iot#syllabus

Course code	Course Title	Teaching Scheme	
		NA	Credits
PR1101	Automation Project		2

Course Objectives: The course aims to train students for designing and implementing solutions for Automation using Internet of Things.

Course Outcomes:

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

PR1101.1 Design and implement a complete project in IoT using Node-MCU and sensors using Embedded C programs

Or

Design and implement a complete project in IoT using Raspberry pi and sensors using Python programs

PR1101.2 Apply one/more standard protocol(s) during project implementation

PR1101.3 Demonstrate sensitivity to sustainability issues for power consumption/ Bandwidth utilization/economic solutions during implementation of projects**.**

Assessment Scheme:

Sr. No.	Evaluation Component	Marks
1	Attendance	Nil
2	Assignment	Nil
3	Class Participation	Nil
4	Quiz	Nil
5	Theory Exam-I	Nil
6	Theory Exam-II	Nil
7	Theory Exam-III	Nil
8	Report I (Synopsis)	30
9	Report II (Midterm Progress Presentation and Viva)	30
10	Report III	Nil
11	Project I (with Report)	Nil
121	Project II	Nil
13	Project III (With working model)	40

14	Lab Evaluation I	Nil
15	Lab Evaluation II	Nil
16	Course Portfolio	Nil
	Total (100)	**100**
Evaluation scheme for retest.		
	Project III (with Report)	**40**
	Total (100)	**40**

Course Title and Code: Transportation Engineering (CE1113).	
Hours per Week	**L-T-P: 3-0-2**
Credits	**4**
Students who can take	**B.Tech Semester-VI**

Course Objective:

This course aims to develop understanding about coordinated planning of highways, railways and airport along with design of various components.

Course Outcomes:

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

CE1113.1 Plan and design the alignment of highway
CE1113.2 Characterize highway construction materials
CE1113.3 Design geometric features of highway
CE1113.4 Design runway length
CE1113.5 Design super elevation and turnout of railway track
CE1113.6 Apply urban transport management plan for cities

Prerequisites	NA

Sr. No.	**Evaluation Component**	**Marks**
1	Attendance	NIL
2	Assignment	NIL
3	**Class Participation**	**10**
4	**Quiz**	**10**
5	**Theory Exam-I**	**Nil**
6	Theory Exam-II	**15**
7	**Theory Exam-III**	**25**
8	Report-I	**10**
9	Report-II	NIL
10	Report-III	NIL
11	**Project-I**	**10**
12	Project-II	NIL
13	Project-III	NIL
14	**Lab Evaluation-I (Continuous Evaluation)**	**10**
15	**Lab Evaluation-II (Examination)**	**10**
16	Course Portfolio	NIL
	Total (100)	**100**

Evaluation Scheme for Retest		
	Theory Exam	**30**

Course Syllabus (Theory):

Unit:1: Introduction & Highway Development in India: Economic and social significance of transport, modes of transport and their relative importance, characteristics of road transport, classification of roads, road patterns, road network in India, current road development plans in India.

Unit 2: Highway Materials: Desirable properties, laboratory test and MORTH specifications of highway materials such as sub-grade soil; aggregate and bitumen, grading systems for bitumen, emulsions and modified bitumen.

Unit:3: Highway Geometric Design: Cross sectional elements, camber, sight distance (SSD, OSD and ISD). Design of horizontal alignment: super elevation, extra widening, transition curves, grade compensation. Design of vertical alignment: gradients, vertical curves. Recommendations for highway geometric design parameters as per IRC code of practice (IRC: 73, IRC: 86).

Unit 4: Airport Engineering: Air transportation in India, airport terminology, classification of airports, planning of airport and terminal area, design of basic runway length, geometric design of runways.

Unit 5: Railway Engineering:

Classification of railway lines in India, types of gauges, various components of a track, track specifications on Indian railways, coning of wheels, tilting of rails, standard rail sections, introduction of ballast and sleeper, super elevation at curves, cant-deficiency and negative super elevation, turn outs.

Urban Transport: different forms of urban transport such as motor buses, trolley buses, sub urban railways/metro rail, monorails and tube railways. Coordination between different modes of transportation as traffic management in urban area.

Text and reference books:

1. Highway Engineering by S.K. Khanna, C.E.G. Justo & A. Veeraragavan, Nem Chand and Bros., Roorkee.
2. Bituminous Road Construction in India by Prithvi Singh Kandal, PHI Learning Private Limited, Delhi.
3. Principles of Transportation Engineering by Partha Chakroborty & Animesh Das, PHI, New Delhi.
4. Highway and Traffic Engineering by Subhash C. Saxena, CBS Publishers and Distributors Pvt. Ltd.

5. Specifications for Road and Bridge Works, Fifth Revision, Ministry of Road Transport and Highways (MORTH)I, ndian Roads Congress, New Delhi.
6. Relevant Indian Road Congress standards.
7. Railway Engineering by Satish Chandra and M.M Agarwal, Oxford University Press, Delhi
8. Railway Engineering by Sexena S.C. and Arora S.P, Dahnpat Rai Publishers, Delhi
9. Airport Engineering by Rangwala,Charotar Publishing House
10. Airport Engineering: Planning and Design by Subhash C. Saxena, publisher: CBS Publisher

Syllabus (Practical)

1. Aggregate Impact value test
2. Los angles abrasion test
3. Aggregate crushing value test
4. Shape test on aggregate
5. Specific gravity and water absorption test on aggregate
6. Ductility test on bitumen
7. Softening point of bitumen
8. Specific gravity of bitumen
9. Flash and fire point test of bitumen

Course Title and Code: **Digital Surveying and Mapping CE1102**	
Hours per Week	**L-T-P: 3-0-2**
Credits	**4**
Students who can take	**B. Tech Civil Engineering (Batch 2019-23) VI Semester**

Course Objective: The objective of this course is to apply knowledge of mathematics, science, and engineering to understand the advance measurement techniques and equipment used in surveying and mapping.

On successful completion of this course students will be able to:

CE1102.1 Operate modern survey equipments in the field for various civil engineering applications.
CE1102.2 Apply the basic principles of surveying and mapping.
CE1102.3 Use mathematical and computational skills for surveying and mapping
CE1102.4 Interpret survey data and compute areas and volumes.
CE1102.5 Select the type of remote sensing technique / data for required purpose
CE1102.6 Use principles of Remote sensing, GIS and GPS to collect, map and retrieve spatial information.

	Prerequisites	Basics of Science, Computer, and mathematics
Sr. No	**Specifications**	**Marks**
1	Attendance	NIL
2	Assignment	10
3	Class Participation	10
4	Quiz	NIL
5	Theory Exam-I	NIL
6	Theory Exam-II	20
7	Theory Exam-III	25
8	Report-I	NIL
9	Report-II	NIL
10	Report-III	NIL
11	Project-I (Field Project)	10
12	Project-II	NIL
13	Project-III	NIL
14	Lab Evaluation-I (Continuous Evaluation)	10
15	Lab Evaluation-II (Lab Examination)	15
16	Course Portfolio	NIL
	Total	**100**

Course Syllabi (Theory):

Course Syllabus Theory:

Distance and angle measurements: Principles and types of surveying, Maps, Topographic Sheets, their scales and uses; Classification of surveys distance measurements using chains and tapes. Direction &angle measurement: meridians and bearings, Surveyor's and Prismatic compass, magnetic declination and its variation. local attraction, traverse survey, measurement of horizontal and vertical angle by digital theodolite, electronic distance measurement (EDM) equipment.

Elevation measurements: Principle of levelling, levelling instruments Types of levelling, Instruments for levelling such as dumpy; tilting and auto level, computation of level exercise using different methods. Trigonometric levelling and its applications.

Contouring: Characteristics of contours, contour interval, contour gradient, methods of locating contours, uses of contour maps.

Total Station (TS) and digital land surveying, digital land mapping, Global Positioning System (GPS):Satellite navigation System, GPS- Space segment, Control segment, User segment, GPS satellite signals, Receivers, Static, Kinematic and Differential GPS.

Remote Sensing: Introduction, Remote sensing system- data acquisition and processing, Multi concept in remote sensing, Physical basis of remote sensing- Electro-magnetic radiation (EMR) - nature, nomenclature and radiation laws,Interaction at ground surface- soils and rocks, vegetation, water. Applications of remote sensing.

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 function, errors and corrections, Data presentation and generation of thematic maps, applications.

Syllabus (Practical)

1. Measurement of bearings using compass
2. Traverse surveying using compass.
3. Measurement of horizontal and vertical angles using digital theodolite
4. Simple leveling and measurement of gradients
5. Profile and cross-section levelingusing auto level
6. Field exercise using TS
7. Topographic survey using Total Station (TS)
8. Mapping using GPS

Text and References Books:

1. Plain Surveying, AM Chandra, New Age International Publishers
2. Lo, C.P. and A.K.W., Yeung. [2007]. Concepts and Techniques in Geographic Information Systems. 2nd, Upper Saddle River, Prentice Hall (ISBN 0-13-149502-X)
3. Chang, K.T. [2008]. Introduction to Geographic Information Systems. 5th, McGraw Hill (ISNB 978-0-07-749436-6)
4. Duggal, S.K. Surveying Vol. I and II, Tata McGraw Hill, 2004.
5. Punmia, B.C. Surveying Vol.I and II, Standard Publishers, 1994.
6. Arora, K. R. Surveying Vol. I and II, Standard Book House, 1996

Course Title and Code: Critical Thinking for Decisions at Workplace |CC1106

Course Description: In today's world, the idea of right and wrong is being challenged by businesses, use of technology, economic conditions, and norms of societies. The relevance of a well-reasoned decision is crucial. This course intends to make students take better decisions keeping in mind purpose, context, and ethics.

Course Outcomes

The students will be able to:

CC1106.1 Apply techniques of critical thinking to analyse organisational problems through positive inquiry

CC1106.2 Describe and analyse appropriate problem-solving and ethical decision-making processes

CC1106.3 Choose the most effective and logical decision among multiple alternatives

CC1106.4 Evaluate solutions and anticipate likely risks based on purpose, context and ethics

Prerequisites		**N/A**	
Hours per Week		**L-T-P: 2-0-0**	
Credits		**2**	
Sr. No	**Specifications**	**Weightage**	
		Original	**Revised**
1	Attendance	Nil	10
2	Assignment	20	30
3	Class Participation	20	10
4	Quiz	Nil	-
5	Theory Exam-II	20	15(Individual viva)
6	Theory Exam-III	30	15 (online mode)
	Presentation	20	20
	Total (100)	100	**100**

References for Readings:

1. Lehrer, J. (2010). *How we decide*. Houghton Mifflin Harcourt.
2. Heath, C., & Heath, D. (2013). *Decisive: How to make better choices in life and work*. Random House.
3. Hammond, J. S., Keeney, R. L., & Raiffa, H. (2015). *Smart choices: A practical guide to making better decisions*. Harvard Business Review Press.
4. Cases and scenario will be shared in the class.

Course Title and Code: Minor Project PR1103	
Prerequisites	**Nil**
Hours per Week	**L-T-P:**
Credits	**04**
Students who can take	**B.tech. Semester VII**

Course Objective:

In Minor Project, Students are expected to work towards the goals and milestones set in Minor Project. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. At the end there would be a demonstration of the solution and possible future work on the same problem. The student will have to present the progress of the work through seminars and progress reports. (in continue contact with Faculty Supervisor Assigned)

Operation Procedure

PR1103.1 Student has to devote full semester for Minor Project.

PR1103.2 Student has to report to the Supervisor regularly.

PR1103.3 Seminars s evaluation has to be carried out in the presence of atleast two-member Committee comprising.

PR1103.4 Experts in the relevant area constituted by the Supervisor.

PR1103.5 Final Seminar Report to be submitted has to be in formal hard bound cover bearing of the Institute emblem.

Assessment Scheme:

Sr. No	**Specifications**	**Marks**
01	Attendance	NIL
02	Assignment	NIL
03	Class Participation	NIL
04	Quiz	NIL
05	Theory Exam(Mid Term)	NIL

06	Theory Exam	NIL
07	Theory Exam(Final)	NIL
08	Report-1 (Synopsis) (Panel)	15
09	Report-2	NIL
10	Report-3	NIL
11	Project -1 (Mid Term) (Panel)	20
12	Project -2 (Day to Day work) (Demo, Presentation, Viva, Report)	25
13	Project -3 (End Term) (Panel) (Demo, Presentation, Viva, Report)	40
14	Lab Evaluation – I	NIL
15	Lab Evaluation – II	NIL
16	Course portfolio	NIL
	Total (100)	**100**

PR 1104 – Practice School II

Course Syllabi:

This course is for five four and half months (summer and one semester) in VII or VIII Semester. The objective of this programme is to provide the students, an opportunity to work on live projects of corporate world in various fields. During this programme, they will work on real world applications of their curricula through organizational function of their choice. The students are expected to be involved directly in problem solving efforts of specific interest to the host organization. The learning of PS-I will help them in completing PS-II successfully. PS-II duration of internship is 4 - 4.5 months. PS -II Winter internship Dec to May.