

## Seventh Semester B.E. – Syllabus

### Internet of Things (IoT)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15IST71	3-0-0-0	3	CIE:50 SEE:50	3 Hours	FC

#### Course Objectives:

This course will enable students to :

- Learn about Vision and Strategic Research and Innovation Directions to IoT.
- Understand IoT Market perspective.
- Understand Data and Knowledge Management and use of Devices in IoT Technology.
- Understand State of the Art – IoT Architecture.
- Get exposed to Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

#### Syllabus

##### Module – I

**IoTand Web Technology:** The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy and Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

**08 Hours**

##### Module – II

M2M to IoT – A Basic Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies.

M2M to IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities.

**08 Hours**

##### Module – III

An IoT architecture outline, standards considerations, IoT Architecture -State of the Art – Introduction, State of the art, Architecture Reference Model- Introduction, Reference Model and architecture, IoT reference Model.

**08 Hours**

##### Module – IV

IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

**IoT Applications for Value Creations:** Introduction, IoT applications for industry.

**08 Hours**

## Module – V

Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth. **08 Hours**

### Course Outcomes:

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

- Understand the vision of IoT from a global context.
- Determine the Market perspective of IoT.
- Use of Devices, Gateways and Data Management in IoT.
- Build state of the art architecture in IoT.
- App IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

### Text Book:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle: “From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”, 1<sup>st</sup> Edition, Academic Press, 2014, ISBN: 978-0-12-407684-6.

### Reference Books:

1. Vijay Madiseti, Arshdeep Bahga: “Internet of Things (A Hands-on-Approach)”, 1<sup>st</sup> Edition, VPT, 2014.
2. Francis daCosta: “Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”, 1<sup>st</sup> Edition, Apress Publications, 2013.

### E-Resources:

1. <https://github.com/connectIOT/iottoolkit>
2. <https://www.arduino.cc/>
3. <http://www.zettajs.org/>
4. Contiki (Open source IoT operating system)
5. Arduino (open source IoT project)
6. IoT Toolkit (smart object API gateway service reference implementation)
7. Zetta (Based on Node.js, Zetta can create IoT servers that link to various devices and sensors)



## Image Processing

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15IST72	3:0:0:0	3	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Obtain a broad understanding of image representation.
- Understand the enhance and filtering of image quality.
- Have a basic knowledge on image restoration.
- Know how segment the image.
- Learn about morphological operations on given image.

### Syllabus

#### Module – I

**Introduction to Image Processing:** Digital Image Fundamentals Light, brightness adaption and discrimination, Human visual system, Image as a 2D data, Image representation Gray scale and Color images, Image sampling and quantization, Color Fundamentals, Color Models, Pseudo-color image processing. **06 Hours**

#### Module – II

**Image Enhancement and Filtering:** Image enhancement and filtering in spatial domain: Intensity transformation functions: Contrast stretching, Thresholding, Image negative, Log transformation, Power-law transformation, Intensity level slicing and Bit-plane slicing. Image histogram, Histogram equalization process. Fundamentals of spatial filtering, Correlation and convolution, Spatial filtering mask for low pass filtering (smoothing) and high pass filtering (sharpening). **10 Hours**

#### Module – III

**Image Restoration:** Reasons for image degradation, Model of image degradation/restoration process, Noise probability density functions, Image restoration using spatial filtering (Mean filters, Order statistic filters and adaptive filters), Inverse Filtering, MMSE (Wiener) Filtering. **08 Hours**

#### Module – IV

**Image Segmentation:** Edge based segmentation, Region based segmentation, Region split and merge techniques, Region growing by pixel aggregation, optimal thresholding. **08 Hours**

## Module –V

**Morphological Image Processing:** Basic morphological operations, Erosion, dilation, opening, closing, Structuring elements, Hit-or-Miss transform, Basic Morphological Algorithms: hole filling, connected components, thinning, skeletons, Reconstruction by erosion and dilation. **07 Hours**

### Course Outcomes:

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

- Analyze image representation.
- Enhance and filter the image quality using image enhancement and filtering techniques.
- Develop the right image restoration technique to remove degradation from given image.
- Perform image segmentation technique.
- Perform morphological operations on given image.

### Text Book:

1. Rafael C. Gonzalez and Richard E. Woods: “Digital Image Processing, 3<sup>rd</sup> Edition, Pearson Education, Pearson Education, 2014, ISBN-10: 9332518467, ISBN-13: 9789332518469, (Chapters 2,3,5.1-5.10,9,10).

### Reference Books:

1. S Jayaraman, S Esakkirajan, T Veerakumar: “Digital Image Processing”, Tata McGraw Hill Publication.
2. S Sridhar: “Digital Image Processing”, Oxford University Press, ISBN-10: 0199459355, ISBN-13: 9780199459353.

### E-Resources:

1. <https://www.abebooks.com/9789332518469/Digital-Image-Processing-3rd-Edition-9>
2. [www.synergy.ac.in/intranet/classnotes/introduction.pdf](http://www.synergy.ac.in/intranet/classnotes/introduction.pdf)



## Soft Computing (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ISI731	3:0:2:0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable students to :

- Introduce the ideas of Soft Computing.
- Become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for interneccine systems.
- Provide the mathematical background for fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- Familiarize with genetic algorithms and other random search procedures useful while seeking global optimum in self-learning situations.
- Introduce case studies utilizing the above and illustrate the intelligent behavior of programs based on soft computing.

### Syllabus

#### Module – I

**Introduction:** Introduction to Soft Computing, Historical Development, Definitions, advantages and disadvantages, solution of complex real life problems. **07 Hours**

#### Module – II

**Neural Network:** Introduction – Fundamental concept – Evolution of Neural Networks – Basic Models of Artificial Neural Networks – Important Terminologies of ANNs – McCulloch-Pitts Neuron – Linear Separability – Hebb Network. Supervised Learning Network: Perceptron Networks – Adaline – Multiple Adaptive Linear Neurons – Back-Propagation Network – Radial Basis Function Network. **09 Hours**

#### Module – III

**Fuzzy Logic:** Introduction to Classical Sets and Fuzzy sets – Classical Relations and Fuzzy Relations – Tolerance and Equivalence Relations – Noninteractive Fuzzy sets – Membership Functions: Fuzzification – Methods of Membership Value Assignments – Defuzzification – Lambda-Cuts for Fuzzy sets and Fuzzy Relations – Defuzzification Methods. **07 Hours**

## Module – IV

**Genetic Algorithms:** Introduction – Basic Operators and Terminologies in GAs – Traditional Algorithm vs. Genetic Algorithm – Simple GA – General Genetic Algorithm – The Scheme Theorem – Classification of Genetic Algorithm – Holland Classifier Systems – Genetic Programming. Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR Image for Flood Area Analysis – Optimization of Travelling Salesman Problem using Genetic Algorithm Approach- Genetic Algorithm based Internet Search Technique – Soft Computing based Hybrid Fuzzy Controllers – Soft Computing based Rocket Engine – Control.

**09 Hours**

## Module –V

**Hybrid Systems:** Genetic Algorithm based Back propagation Network, Fuzzy – Back propagation, Fuzzy Logic Controlled Genetic Algorithms.

**07 Hours**

### List of Lab programs

#### List of Experiments: (Work in Computation lab)

1. Problems based on GA and its applications in transportation.
2. Problems based on Fuzzy logic and its applications in transportation.
3. Problems based on ANN and its applications in transportation.
4. Problems based on hybrid systems and its application in transportation.

#### Design based Problems (DP)/Open Ended Problem:

1. Solving routing problem of mass transit system using GA.
2. Developing trip generation relationship using ANN.
3. Developing mode choice model using Fuzzy Logic.
4. Obtaining optimal mix design of Bituminous Concrete using GA or Hybrid system.

#### Course Outcomes:

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

- Describe basic idea of modern computing techniques which are useful for solving the non-linear and complex functions that may come across during dissertation/ research work.
- Differentiate conversant with artificial intelligent techniques.
- Solve issues involved in Fuzzy logic, Artificial Neural Network.
- Manage GA systems.
- Design hybrid systems which are used for solving different transportation problems.

### Text Books:

1. S.N. Sivanandan, S.N. Deepa: "Principles of Soft Computing", Wiley India, 2007, ISBN-10: 81-265-1075-7.
2. Sinha N.K., Gupta M. M.: "Soft Computing and Intelligent Systems Theory and Applications", (Chapters 1-25), Academic Press, 2000, ISBN-10: 0126464901, ISBN-13: 9780126464900.
3. S. Rajasekaran, G.A. VijayalaksmiPai: "Neural Network, Fuzzy Logic, and Genetic Algorithms - Synthesis and Applications", 2005, Prentice Hall, (Chapters 1-15), Page 1-435, ISBN: 8120321863.

### Reference Books:

1. Timothy J.Ross: "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
2. Davis E.Goldberg: "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
3. S. Rajasekaran, G.A.V.Pai: "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
4. R.Eberhart, P.Simpson, R.Dobbins: "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.

### E-Resources:

1. [https://books.google.co.in/books/about/PRINCIPLES\\_OF\\_SOFT\\_COMPUTING\\_With\\_CD.html?id=CXru](https://books.google.co.in/books/about/PRINCIPLES_OF_SOFT_COMPUTING_With_CD.html?id=CXru)
2. <https://books.google.co.in> › Computers › Intelligence (AI) and Semantics



## Big Data (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ISI732	3-0-2-0	4	CIE:50 SEE:50	3 Hours	FE

### Course Objectives:

This course will enable students to :

- Understand big data, types, benefits, industry examples for business intelligence.
- Understand NOSQL data models.
- Learn how to manage Nosql data with multiple databases.
- Understand Hadoop, map-reduce architecture and Fundamentals.
- Learn HBase, Cassandra, Cassandra Query language, data replication.

### Syllabus

#### Module – I

**Overview of Big Data:** Defining Big Data, Big Data Types, Analytics, Industry Examples of Big Data, Benefits of Big Data, Crowd Sourcing Analytics, Indian Big Data companies. **07 Hours**

#### Module – II

**NoSQL Data Management:** Introduction to NoSQL – aggregate data models – aggregates – key-value and document data models –relationships – graph databases – schema less databases – materialized views – distribution models –sharding – version – Map reduce – partitioning and combining – composing map-reduce calculations **08 Hours**

#### Module – III

**NoSQL Data Management:** Key Value Databases, Document Databases, Column Family Stores, Graph Databases. **08 Hours**

#### Module – IV

**Basics of Hadoop:** Understanding Hadoop features, Learning the HDFS and MapReduce architecture, Introducing Hadoop MapReduce, Understanding the Hadoop MapReduce fundamentals. **08 Hours**



## Module – V

**Hbase and Cassandra:** Introduction to HBase, Row-Oriented vs Column-Oriented data stores, HBase Architecture, Understanding HBase Data Model, Casandra: Introduction, Features of Cassandra, Data Replication in Cassandra, Cassandra Query language(CQL), Cassandra Data Model. **09 Hours**

### Lab Experiments

#### Exercise 1 --- HDFS

Start by reviewing HDFS. You will find that its composition is similar to your local Linux file system.

You will use the `hadoop fs` command when interacting with HDFS.

1. Review the commands available for the Hadoop Distributed File System:
2. Copy file `foo.txt` from local disk to the user's directory in HDFS
3. Get a directory listing of the user's home directory in HDFS
4. Get a directory listing of the HDFS root directory
5. Display the contents of the HDFS file `user/fred/bar.txt`
6. Move that file to the local disk, named as `baz.txt`
7. Create a directory called `input` under the user's home directory
8. Delete the directory `input` and all its contents
9. Verify the copy by listing the directory contents in HDFS:

#### Exercise 2 --- MapReduce

1. Create a JOB and submit to cluster
2. Track the job information
3. Terminate the job
4. Counters in MR Jobs with example
5. Map only Jobs and generic map examples
6. Distributed cache example
7. Combiners, Secondary sorting and Job chain examples

#### Exercise 3 --- MapReduce (Programs)

Using movie lens data

1. List all the movies and the number of ratings.
2. List all the users and the number of ratings they have done for a movie.
3. List all the Movie IDs which have been rated (Movie Id with at least one user rating it).

4. List all the Users who have rated the movies (Users who have rated at least one movie).
5. List of all the User with the max, min, average ratings they have given against any movie.
6. List all the Movies with the max, min, average ratings given by any user.

### Course Outcomes:

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

1. Describe big data, types, and benefits and used cases from selected business domains.
2. Explain NoSQL big data using data models.
3. Use various databases like Key value, documents, etc.
4. Explain Hadoop, perform map-reduce analytics using Hadoop.
5. Use Hadoop related tools such as HBase, Cassandra.

### Text Books:

1. V K Jain: "Big Data and Hadoop", 2017 Edition, Khanna Book Publishing, ISBN: 978-93-82609-13-1, (Chapters 1.2, 1.4, 1.5, 1.6, 1.16, 1.19, 1.20 and 6.1, 6.2, 6.4, 6.6, 6.8, 6.9, 6.11, 6.13, 6.14).
2. Pramod J. Sadalage, Martin Fowler: "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley, ISBN: 9780133036121 (Chapters 2-4,8-11).
3. VigneshPrajapati: "Big data analytics with R and Hadoop", 2013, SPD, ISBN-13: 978-93-5110-410-0 (Chapters 1,2).

### Reference Books:

1. Tom White: "Hadoop: The Definitive Guide", 3<sup>rd</sup> Edition, O'Reilly, 2012.
2. Lars George: "HBase: The Definitive Guide", O'Reilly, 2011.

### E-Resources:

1. <http://www.tutorialspoint.com/hadoop/>
2. [http://www.sas.com/en\\_us/insights/big-data/what-is-big-data.html](http://www.sas.com/en_us/insights/big-data/what-is-big-data.html)



## Web Technologies – Servlet, JSP (IC)

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ISI733	3-0-2-0	4	CIE:50 SEE:50	N/A	FE

### Course Objectives:

This course will enable students to :

- Understand the concepts of Web Technologies.
- Understand what are Web Servers and App Servers, and their differences.
- Understand Request and Response models
- Understand how to build e-commerce applications using Servlets and JSP
- Understand what EL and EL Tags are, and their usage in developing dynamic web pages.

### Syllabus

#### Module – I

**Introduction to Web Technologies:** JEE, PHP, ASP and Net.

**Introduction Web Dev environment:** App Server, Web Server, 2-Tier and 3 -Tier Architecture.

**Introduction to Servlet:** Introduction to JEE containers, Application directory structure, Servlet Interface / Generic Servlet / HttpServlet, Servlet life cycle, Request and Response objects, Building sample application. **09 Hours**

#### Module – II

**Inter Servlet Communication:** RequestDispatcher, Include / Forward / Redirect, Building sample application.

**Session Management:** Creating and invalidating session, Different ways to handle session, Session time out configuration. **08 Hours**

#### Module – III

**Introduction to JSP:** Need for JSP, JSP life cycle. **06 Hours**

#### Module – IV

**Introduction to EL:** Need for EL and its advantages, Fundamentals of EL.

**EL Tags:** Core Tags, Introduction to MVC, Building sample application. **08 Hours**

## Module – V

**Project Work:** Create an e-commerce application using the client-side languages, such as Bootstrap3, HTML5, CSS3, JavaScript and jQuery, along with the server-side Java language - Servlets and JSP. **32 Hours**

### Laboratory

1. Programs covering Web Technologies, Web Dev environment, Servlet.
2. Programs covering Inter Servlet Communication, Session Management.
3. Programs covering JSP, Introduction to EL, EL Tags.

### Course Outcomes:

This course will enable students to :

- Analyze the concepts of Web Technologies.
- Compare Web Servers and App Servers.
- Implement Request and Response models.
- Demonstrate how to build e-commerce applications using Servlets and JSP.
- Design dynamic web pages using EL Tags.

### Text Books:

1. Basham, Bryan, Sierra Kathy, Bates, Bert : “Head First Servlets and JSP”, 2<sup>nd</sup> Edition, Shroff, ISBN-10: 8184044976.
2. Santosh Kumar K: “JDBC 4.2, Servlet 3.1, and JSP 2.3 Includes JSF 2.2 and Design Patterns, Black Book”, 2<sup>nd</sup> Edition, Dreamtech Press, ISBN-10: 9351199088.

### Reference Books:

1. Budi Kurniawan: “Servlet & JSP: A Tutorial”, 2<sup>nd</sup> Edition, Brainy Software, ISBN-10: 1771970278.



## System Modeling and Simulation

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15IST741	3-0-0-0	3	100	3 Hours	EE

### Course Objectives:

This course will enable students to :

- Study the basic system concept and definitions of system.
- Understand the techniques to model and to simulate various systems.
- Acquire knowledge to analyze a system and to make use of the information to improve the performance.
- Understand the value of rapid prototyping for: requirements, potential design issues, modelling inputs.
- Understand the need for quantification and understand the limits of quantification.

### Syllabus

#### Module – I

**Introduction:** When simulation is the appropriate tool and when it is not appropriate; Advantages and disadvantages of Simulation; Areas of application; Systems and system environment; Components of a system; Discrete and continuous systems; Model of a system; Types of Models; Discrete-Event System Simulation; Steps in a Simulation Study. The basics of Spreadsheet simulation, Simulation example: Simulation of queuing systems in a spreadsheet. **08 Hours**

#### Module – II

**General Principles, Simulation Software:** Concepts in Discrete-Event Simulation: The Event-Scheduling / Time-Advance Algorithm, World Views, Manual simulation Using Event Scheduling; **08 Hours**

#### Module – III

**Random-Number Generation, Random-Variate Generation:** Properties of random numbers; Generation of pseudo-random numbers; Techniques for generating random numbers; Tests for Random Numbers Random-Variate Generation: Inverse transform technique; Acceptance-Rejection technique; Special properties. **08 Hours**

#### Module – IV

**Input Modeling:** Data Collection; Identifying the distribution with data; Parameter estimation; Goodness of Fit Tests; Fitting a non-stationary Poisson process; Selecting input models without data; Multivariate and Time-Series input models. **08 Hours**

## Module – V

Verification, Calibration, and Validation; Optimization: Model building, verification and validation; Verification of simulation models; Calibration and validation of models, Optimization via Simulation. **08 Hours**

### Course Outcomes:

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

- Explain the system concept and apply functional modelling method to model the activities of a static system;
- Apply the behaviour of a dynamic system and create an analogous model for a dynamic system;
- Assess and select a model for an engineering system taking into consideration its suitability to facilitate engineering decision making and predicted advantages over alternative models.
- Explain the simulation results of an engineering system model, within the context of its capabilities and limitations, to address critical issues in an engineering project.
- Manage expectation level of different stakeholders

### Text Book:

1. Jerry Banks, John S. Carson II, Barry L. Nelson, David M. Nicol: “Discrete-Event System Simulation”, (Chapters, 1-12), 5<sup>th</sup> Edition, Pearson Education, 2010, ISBN: 9789332518759.

### Reference Books:

1. Lawrence M. Leemis, Stephen K. Park: “Discrete – Event Simulation: A First Course”, Pearson Education, 2006, ISBN: 9780132020565.
2. Averill M. Law: “Simulation Modeling and Analysis”, 4<sup>th</sup> Edition, Tata McGraw-Hill, 2007, ISBN: 9780070667334.

### E-Resources:

1. <http://home.ubalt.edu/ntsbarsh/simulation/sim.htm>
2. <http://searchworks.stanford.edu/view/10091706>



## Tax Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15HOE751	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

This course will enable students to :

- Familiarise the students with the significance of taxation system.
- Understand the structure of Indian Taxation system.
- Gain knowledge about the practical aspects of Indian taxation.
- Understand the system of computation of tax from Salaries.
- Sketch the recent trends in Indian taxation system.

### Syllabus

#### Module – I

Introduction to taxation system, Objectives of taxation, Factors to be considered for tax planning Canons of taxation, Types of taxation, Direct tax, Indirect tax (Broad perspective only). **07 Hours**

#### Module – II

Taxation system in India, Types of taxes levied in India, Various heads of income tax (Broad outline only) Basic concepts in taxation, Assessment year, Financial year, assessee, Residential status, Tax liability **08 Hours**

#### Module – III

Income tax authorities in India, Constitution, Powers, Functions specimen of Form 16, Filing of returns, tax evasion, Penalties for contravening the provisions of income tax. **08 Hours**

#### Module – IV

System of computation of tax from salaries, Taxable income, Permissible deductions from 80C to 80U Fringe benefits exempted from tax, exempted income under section 10 of Income tax act. **10 Hours**

#### Module – V

Trends in Indian taxation system, Self assessment, PAN card, Budgetary provisions of the financial year 2017-18 on taxation, GST, Advantages, Problems in implementing GST, Measures to overcome the limitations of GST. **06 Hours**

**Course Outcomes:**

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

- Gain knowledge about the system of taxation prevailing in the country.
- Compute tax under different heads.
- Gain practical knowledge on filing returns.
- Calculate the payable tax for salaried individuals.
- Gain insight into recent practices on taxation.

**Reference Books:**

1. Dr. Vinod K. Singhania: "Direct taxes-Law and Practice", Taxmann Publication.
2. Dr. Mehrotra, Dr. Goyal: "Direct taxes- Law and Practice", Sahitya Bhavan Publication.
3. "7 lectures-Income tax-I ", VBH.
4. Swaminathan: "Income Tax", KPH.
5. T.N.Manoharan: "Income tax including VAT".
6. R.G.Saha, Ushadevi: "Taxation", HPH.





## Assessment of Building Energy Performance

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15HOE752	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

This course will enable students to :

- Provide a foundation for performing a building energy audit
- Perform assessment tasks on building energy performance
- Submit a Building EQ rating
- Understand the methods and processes to be performed in the field
- Know the process of certifying professionals in energy assessment

### Syllabus

#### Module – I

Introduction, global energy consumption characteristics and the role of commercial and residential buildings, building energy end use consumption characteristics, impact of time variations in building energy consumption, Building mechanical, electrical, and lighting systems.

**08 Hours**

#### Module – II

Anatomy of typical HVAC systems in commercial buildings, typical primary and secondary HVAC equipment and their role in meeting system requirements, basics of electrical distribution systems and their equipment in commercial buildings, basics of lighting system in buildings, including performance terminology, lighting technologies, energy performance, and the role of day lighting.

**08 Hours**

#### Module – III

Introduction to building energy benchmarking and assessment, differences between benchmarking, labeling programs, and energy and environmental auditing, role of building type and climate zone on energy use, key aspects of ENERGY STAR® Portfolio Manager and other tools for benchmarking, ASHRAE Building EQ As Designed and In Operation ratings, differences between Building EQ and Portfolio Manager, Preliminary Energy Use Analysis (PEA).

**08 Hours**

#### Module – IV

Measuring and monitoring building performance, instrumentation for measuring indoor environmental quality and building energy flows, Perform measurements of indoor environmental quality and building energy flows, accuracy of building

measurements, Identify the components of an ASHRAE Level 1 walk through survey and the differences between Level 1, 2, and 3 surveys, Indoor Environment Quality.

**08 Hours**

### **Module – V**

Energy Efficiency Measures – Building Envelope and Lighting, role of building envelope characteristics on energy use, energy conservation and energy efficiency measures related to envelope and lighting characteristics, Energy Efficiency Measures – HVAC Systems, energy conservation and energy efficiency measures related to HVAC systems, financial analysis of expected improvements to HVAC systems. **08 Hours**

#### **Course Outcomes:**

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

- Produce an ASHRAE Building EQ In Operation rating for the buildings provided in the class
- Produce a listing of potential Energy Efficiency Measures (EEM) including financial payback analysis
- Perform measurements of indoor environmental quality and HVAC system performance
- Identify different building types and determine the impact of climate on energy use.
- Analyze raw energy consumption data from measured-meter readings

#### **Text Books:**

1. ASHRAE Building Energy Quotient Program website.
2. ASHRAE BEAP certification study guide.
3. ASHRAE Standard 105-2014 Standard Methods of Determining, Expressing, and Comparing Building Energy Performance and Greenhouse Gas Emission.

#### **Reference Books:**

1. ASHRAE Performance Measurement Protocols for Commercial Buildings: Best Practices Guide.
2. ENERGY STAR® Portfolio Manager website.



## Natural Disaster Mitigation and Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15HOE753	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

Students will be able

- Teach students about types of natural and environmental disasters.
- Help students to develop skills in various stages of disaster preparedness, mitigation and management.
- Teach the students the methodologies for disaster risk assessment.

### Syllabus

#### Module – I

**Natural Disasters-Overview:** Introduction- Natural Disasters around the world- Natural Disaster Risk Assessment- Earth and its characteristics Human Dimensions of Global environment Change – Disaster mitigation, preparedness, response and recovery comprehensive emergency management Early warning systems and Disaster Preparedness– Rehabilitation, Vulnerable Populations - Logistics and Services, Food, Nutrition and Shelter -Role of UN Red cross and NGOs. **08 Hours**

#### Module – II

**Natural Hazards:** Introduction and Review - Natural Disasters -Principles, Elements, and Systems - Geological-Geomorphological aspects, - Earthquake-Geology, Seismology, Characteristics and dimensions– Landslides- Human impact on the mountainous terrain and its relationship with Rainfall, liquefaction etc- Tsunami - Nature and characteristics. **08 Hours**

#### Module – III

**Climate system aspects and Processes:** Oceanic, Atmospheric and Hydrologic cycles - Severe Weather and Tornadoes , Cyclones, Floods and Droughts - Global Patterns - Mitigation and Preparation – Drought – Famine- nature and dimensions – Drought Assessment and Monitoring. **08 Hours**

#### Module – IV

**Natural Disaster Communication:** Mapping - Modeling, risk analysis and loss estimation – Natural disaster risk analysis - prevention and mitigation - Applications of Space Technology (Satellite Communications, GPS, GIS and Remote Sensing and

Information / Communication Technologies ( ICT ) in Early warning Systems - Disaster Monitoring and Support Centre– Information Dissemination, mobile communication – etc.

**08 Hours**

### Module – V

**Administrative mechanisms:** Community and Social organizations – Education and Training – Establishment of capacity building among various stake holders – Government - Educational institutions – Use of Multi-media knowledge products for self education.

**08 Hours**

### Course Outcomes:

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

- Learn about the types of natural and environmental disasters and its causes.
- Learn about organizational and Administrative strategies for managing disasters.
- Learn about the early warning systems, monitoring of disasters effect and necessity of rehabilitation.
- Learn about the engineering and non-engineering controls of mitigating various natural disasters.
- Know the key roles of capacity building to face disaster among government bodies, institutions, NGO's, etc.
- Learn methodologies for disaster risk assessment with the help of latest tools like GPS, GIS, Remote sensing, information technologies, etc.

### Text Books:

1. Kovach, Robert L. Earth's Fury: "An Introduction to Natural Hazards and Disasters", Englewood Cliffs, N.J., Prentice Hall, 1995.
2. Siddhartha Gautam, K Leelakrishna Rao "Natural disaster Management" 3<sup>rd</sup> Edition, 2012, ISBN: 9381604320.

### Reference Book:

1. Arul Jothi, D L Balaji: "Safety And Disaster Management Education In Schools", 1<sup>st</sup> Edition, Anmol Publications, 2009, ISBN: 9380252609.

### E-Resources:

1. <https://www.publicsafety.gc.ca/cnt/mrgnc-mngmnt/dsstr.../bt-dsstr-mtgtn-en.aspx>
2. [www.nrdms.gov.in/natural\\_disaster.asp](http://www.nrdms.gov.in/natural_disaster.asp)
3. <https://www.ncbi.nlm.nih.gov> › NCBI › Literature › Bookshelf



## Small and Medium Enterprise Management

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15HOE761	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

This course will enable students to :

- Understand the various concepts of Entrepreneurship and familiarize them with the understanding of contemporary environment of MSMEs.
- Understand the business Environment to MSMEs.
- Understand the process of Enterprise Creation.
- Understand the effective Business Plan and Institutional Support Mechanism.
- Understand the concepts of marketing management in the MSMEs.

### Syllabus

#### Module – I

**Basic Aspects:** Concept, nature of Entrepreneur and Entrepreneurship, Distinction between Entrepreneur and Manager, Entrepreneurship, Medium, Small and Tiny Business : Definition, Role in the economy and significance, Changing scenario of MSMEs in the era of Liberalization and Globalization, Competitiveness. **08 Hours**

#### Module-II

**Environment assessment:** Political, Legal, Economic, Social, Technological, Global environment, Assessment of business opportunities, Government initiatives and private sector opportunity. **08 Hours**

#### Module-III

**Enterprise Creation:** Starting a small industry, Entrepreneurial function or process of starting a new venture based on personal competencies, requirements to start a business venture, Feasibility of the project, Business incubators . **08 Hours**

#### Module-IV

**Business Plan:** Developing effective business plan-meaning, benefits of business plan, Timing of the business plan, Length of the business plan, composition of the business plan or detailed project report. Institutional Support Mechanism: District Industries Centre, State Directorate of Industries, SIDBI, NSIC, SISI, KSFC, KIADB, TECSOK. **08 Hours**

## Module-V

**Small Business Marketing:** Concept of Marketing, Scope of Marketing, Marketing Mix, Product Mix, Channels of Distribution, Market Segmentation, Role of Middlemen, Distribution Strategies, Sales Promotion, Advertising and Publicity, Packaging Strategies, Branding Strategies. **08 Hours**

### Course Outcomes:

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

- Visualize the various concepts of Entrepreneurship and understand of current environment of MSMEs.
- Know the Business Environment with respect to MSMEs.
- Know the Process of Enterprise Creation.
- Prepare Business Plan and Understand the Institutional Support Mechanism.
- Know the marketing management with reference to MSMEs.

### Text Books:

1. Shukla. M.B: “Entrepreneurship and Small Business Management”, Kitab Mahal, Allahabad, 2011.
2. Sahay A., V. Sharma: “Entrepreneurship and New Venture Creation”, Excel Books, New Delhi, 2008.
3. Lall, Sahai: “Entrepreneurship”, Excel Books, New Delhi, 2006.
4. S. Anil Kumar: “Small Business and Entrepreneurship”, I.K.International Publishing House Pvt. Ltd., 2008.
5. Kotler, Keller, Koshy, Jha: “Marketing Management”, 13<sup>th</sup> Edition, Pearson Education.

### Reference Book:

1. Wickham, Phillip A: “Strategic Entrepreneurship”, Pitman, UK, 1998.



## Occupational Safety and Health Administration

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15HOE762	2:0:0:4	3	CIE:50 SEE:50	3Hours	OE

### Course Objectives:

This course will enable students to :

- Understand the occupational health and safety and sector specific occupational health and safety issues.
- Understand the socio-economic aspects of occupational health and safety.
- Understand the health screening measures.
- Understand the legal Provisions on Occupational Health and Safety.
- Understand the participatory Research and Occupational Health.

### Syllabus

#### Module – I

**Introduction to Occupational Health and Safety:** Definition and Context of OHS, Objectives and Principles of OHS, Workplace and Health Occupational Health, Hygiene and Ergonomics.

**Sector Specific Occupational Health and Safety Issues:** Health and Safety Risks in Mining, Health Hazards in Electronic Industry, Health Hazards in Food Processing Industry, Health Hazards in Other Industries. **07 Hours**

#### Module – II

**Socio-Economic aspects of Occupational Health and Safety:** Women's occupational and health safety, Child labour issues in occupational health and safety, Health issues in the unorganized sector.

**Basics of Preventive Techniques:** Definition of Accident, Accident Analysis, Monitoring of Hazards, Reporting and Investigation of Accidents. **08 Hours**

#### Module – III

**Health Screening Measures:** Stages of Medical Examination, Occupational History, Pulmonary Function Test (PFT), Noise Induced Hearing Loss (NIHL). **07 Hours**

#### Module – IV

**Legal Provisions on Occupational Health and Safety:** Overview of existing OHS Legislations in India, The Factories Act, The Mines Act, The Workmen's Compensation Act, The Employee's State Insurance Act. **07 Hours**

## Module-V

**Participatory Research and Occupational Health:** Philosophy of Participatory Research (PR) Analysis based on PR Methodologies Conducting Participatory Research for OHS. **07 Hours**

### Course Outcomes:

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

- Develop the ability to know the occupational health and safety.
- Have the knowledge of the socio-economic aspects of occupational health and safety.
- Demonstrate purpose of health screening measures.
- Know the legal Provisions on Occupational Health and Safety.
- Participate in Research and Occupational Health.

### References:

1. International Labour Organization. Mining: a hazardous work [Internet]. ; 2015 ([cited 2015 Feb 2]. Available from: [http://www.ilo.org/safework/areasofwork/hazardous-work/WCMS\\_124598/lang--en/index.htm](http://www.ilo.org/safework/areasofwork/hazardous-work/WCMS_124598/lang--en/index.htm)
2. Gyekye, S.A. Workers' perceptions of workplace safety: an African perspective. *Int J Occup Saf Ergon*. 2006;12:31–42.Crossref | PubMed | Scopus (4)
3. Amponsah-Tawiah, K., Jain, A., Leka, S., Hollis, D., Cox, T. Examining psychosocial and physical hazards in the Ghanaian mining industry and their implications for employees' safety experience. *J Safety Res*. 2013;45:75–84.Crossref PubMed | Scopus (5)
4. Owiredo D. Annual chamber of mines presidential review. 83rd Annual General Meeting of the Ghana Chamber of Mines [Internet]. 2011 [cited 2014 Mar 1]. Available from:<http://www.ghanachamberofmines.org>.
5. Helliwell, J.F., Putnam, R.D. The social context of wellbeing. *Philos Trans R Soc Lond B Biol Sci*. 2004;35:1435–1446.Crossref | Scopus (550)
6. Bhagawati, B. Basics of occupational safety and health. *IOSR J Environ Sci Toxicol Food Technol*. 2015;9:91–94.
7. Amponsah-Tawiah, K., Dartey-Baah, K. Occupational health and safety: key issues and concerns in Ghana. *Int J Bus Soc Sci*. 2011;14:120–126.  
National Safety Council. Injury facts. NSC, Itasca (IL); 2004.





## Animation and Multimedia Engineering

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15HOE763	2:0:0:4	3	CIE:50 SEE:50	3 Hours	OE

### Course Objectives:

This course will enable students to:

- Understand the basics of Animation.
- Understand computer animation using characters.
- Learn how to create quality animation characters.
- Learn about volume construction and action made from face, gestures.
- Understand Acting and Sketching techniques.

### Syllabus

#### Module – I

**Introduction to Animation:** History of Animation, The Origins of Animation, Types of Animation, Terms used in Animation, Basic Principles of Animation.

**Introduction to equipment required for Animation:** Animator's Drawing Tools, Rapid Sketching and Drawing, Developing Animation Character. **07 Hours**

#### Module – II

**Developing the characters with computer animation:** Anatomy and Body Language, 2-D virtual drawing for animation.

**Motion studies:** : Thumbnails, sequential movement drawing, drawing for motion. **08 Hours**

#### Module – III

**Essentials and qualities of good animation characters:** Three dimensional drawings of characters.

**Skills and Basic proportions:** Visual and creative development of an artist, how to draw gestures, Heads, Rotation in Arcs, Key Lines, Perspective. **08 Hours**

#### Module – IV

**Volume Construction:** Balance, Muscles, Light and shade.

**Shape and Action:** Hands and Legs, Foreshortening, Facial expressions. **08 Hours**

#### Module – V

**Acting and Sketching techniques:** Introduction to Acting, Modeling, Sketching from Acting, Sketching from live models, Introduction to Rapid Sketching Techniques, Sketching from Memory, live action. **09 Hours**

**Course Outcomes:**

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

- Recognize the basics of animation along the tools.
- Develop characters with computer animation.
- Develop 3D drawings of characters and acquire skills regarding basic level of sketching.
- Explain Foreshortening, Facial expressions.
- Develop small animation characters by using acting and sketching techniques.

**Text Book:**

1. Chris Patmore: "The Complete Animation course: The Principles, Practice and Techniques of Successful Animation", (Chapters 1-10), Barons Educational Series New York, 2003, ISBN-13: 978-0764123993.

**Reference Books:**

1. Frank Thomas, Ollie Johnston: "The Illusion of Life by Walt Disney", Abbeville Press, 1981.
2. Daniel Carter, Michael Courtney: "Anatomy for the Artist: A Comprehensive Guide to Drawing the Human Body, A Complete Guide", 2011.

**E-Resources:**

1. [http:// www.animationmentor.com/](http://www.animationmentor.com/)
2. <https://www.blopanimation.com/animation-for-beginners/>
3. <https://robots.thoughtbot.com/css-animation-for-beginners>



## Internet of Things Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ISL77	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Provide the students with a hands-on experience on the theoretical concepts through simple experiments.
- Understand the architecture of IoT Toolkit.
- Understand the working of an HTTP- to-CoAP in IoT toolkit.
- Understand the application framework and working of Raspberry Pi.
- Understand overview of Zetta.

### Syllabus

#### List of Lab programs

1. Sketch the architecture of IoT Toolkit and explain each entity in brief.
2. Demonstrate a smart object API gateway service reference implementation in IoT toolkit.
3. Write and explain working of an HTTP- to-CoAP semantic mapping proxy in IoT toolkit.
4. Explain application framework and embedded software agents for IoT toolkit.
5. Explain working of Raspberry Pi.
6. Connect Raspberry Pi with your existing system components.
7. Give overview of Zetta.

#### Design based Problems (DP)/Open Ended Problem:

1. How do you connect and display your Raspberry Pi on a Monitor Or TV?
2. Create any circuitry project using Arduino.

#### Major Equipment:

1. Raspberry pi, Arduino

#### Course Outcomes:

Upon completion of the Lab, students will be able to

- Understand the architecture of IoT Toolkit.
- Determine the smart object API gateway service.
- Use IoT toolkit.
- Analyze application framework and embedded software agents.
- Use Raspberry Pi with your existing system components.



## Image Processing Laboratory

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ISL78	1:0:2:0	2	CIE:50 SEE:50	3 Hours	FC

### Course Objectives:

This course will enable students to :

- Obtain a broad understanding of image representation
- Understand enhance and filtering of image quality.
- Have a basic knowledge on image restoration.
- Know how to segment the image.
- Learn about morphological operations on given image.

### Syllabus

List of Lab programs:

1. Write program to read and display digital image using SCILAB.
2. Write and execute image processing programs using point processing method.
3. Write and execute programs for image arithmetic operations.
4. Write and execute programs for image logical operations.
5. Write and execute program for geometric transformation of image.
6. Write programs for image restoration.
7. Write and execute programs to remove noise using spatial filters.
8. Write a program in SCILAB for edge detection using different edge detection mask.

### Course Outcomes:

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

- Analyze image representation.
- Enhance and filtering of image quality.
- Design image restoration technique.
- Perform image segmentation technique.
- Analyze and detect edge and noise removal.

### Text Book:

1. Rafael C. Gonzalez, Richard E. Woods: "Digital Image Processing", 3<sup>rd</sup> Edition, Pearson Education, 2014, ISBN-10: 9332518467, ISBN-13: 9789332518469.

### Reference Books:

1. S Jayaraman, S Esakkirajan, T Veerakumar: "Digital Image Processing", Tata McGraw Hill Publication, 2015, ISBN-10: 070144796, ISBN-13: 978070144798.
2. S Sridhar: "Digital Image Processing", Oxford University Press, ISBN-10: 0199459355, ISBN-13: 9780199459353.

**Project Phase-I and Seminar**

Course Code	L:T:P:S	Credits	Exam marks	Exam Duration	Course Type
15ISP79	0-0-6-0	3	100	3 Hours	FC

Phase	Activity	Credits
I	Batch formation, project identification, literature survey, finalization of problem statement with objectives and outcomes, Synopsis submission, Preliminary seminar for the approval of selected topic and objectives	3

## Eight Semester B.E. – Syllabus

Phase	Activity	Credits
II	Design, Theoretical/experimental investigation and Mid-term seminar to review the progress of the work and documentation (Mid term report).	4
III	Completion of the project work, participation in the project exhibition, Submission of project report Final Internal seminar and demonstration, Publications.	4
	<b>Evaluation and Viva-voce</b>	<b>5 + 5</b>

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## Program Educational Objectives (PEOs)

The graduates of Information Science and Engineering are expected to fulfill the following PEOs after a few years of their graduation.

<b>PEO1</b>	Pursue a successful career in the field of Information Science & Engineering or a related field utilizing his/her education and contribute to the profession as an excellent employee, or as an entrepreneur.
<b>PEO2</b>	Be able to work effectively in multidisciplinary environments and be responsible members/leaders of their communities.
<b>PEO3</b>	The graduates of Information Science and Engineering Program should be able to establish an understanding of professionalism, teamwork, ethics, public policy that allows them to become good professional Engineers.
<b>PEO4</b>	The graduates of Information Science and Engineering Program should be able to provide novel engineering solutions and efficient software designs with legal and ethical responsibility.
<b>PEO5</b>	Continuously improve by pursuing advanced degrees in engineering, business, or other professional fields through formal means or through informal self-study.

## Program Outcomes (POs)

<b>PO1</b>	<b>Engineering Knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and information science and engineering specialization to the solution of complex engineering problems.
<b>PO2</b>	<b>Problem Analysis:</b> Identify, formulate, review research literature, and analyze complex information science and engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO3</b>	<b>Design/ Development of solutions:</b> Design solutions for complex information science and engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
<b>PO4</b>	<b>Conduct Investigations of Complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

<b>PO5</b>	<b>Modern Tool Usage:</b> Create, select, and apply appropriate techniques, resources, and modern information science and engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
<b>PO6</b>	<b>The Engineer and Society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional information science and engineering practice.
<b>PO7</b>	<b>Environment and Sustainability:</b> Understand the impact of the professional information science and engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the information science and engineering practice.
<b>PO9</b>	<b>Individual and Team Work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the information science and engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO11</b>	<b>Project Management and Finance:</b> Demonstrate knowledge and understanding of the information science and engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
<b>PO12</b>	<b>Life-Long Learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of information science and technological change.