Dr. B. C. Roy Engineering College, Durgapur (An Autonomous Institute)

Department of Basic Science & Humanities

Presents

Course Coordinators:

Dr. Saurav Ranjan Das Dr. Jayanta Pal

Dr. Santanu Patra Dr. Sukalpa De

Dr. Saurav Bhattacharya

Prof. Kingsuk Majumdar

Dr. B. C. Roy Engineering College, Durgapur

Department of Basic Science & Humanities

Add-On Course

Non-Conventional Energy: Fundamentals, Technologies, Applications & Waste Management

Duration: **30 Hrs**

Course Objective: This course is aimed to provide students the knowledge of solar, wind, geothermal and biomass energy technology and how to explore their applications. The course will give an overview on the energy conversion processes and apply the same skill as practicing engineer.

Course Outcome:

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

CO1: Learn to harness solar, wind, geothermal & nuclear energy and explore their applications.

CO2: Understand different energy conversion processes from nonconventional natural resources.

CO3: Learn to harness energy from biomass.

CO4: Learn Waste Management and its utilisation.

CO5: Understand the methods to harness solar, wind, nuclear, biomass, hydro, geothermal, and ocean energy, and learning their applications in the society.

Course Content:

Module 1

Lecture 1: **Introduction to Energy Sources**: World energy futures, Conventional energy sources, Nonconventional energy sources, Prospects of Renewable energy sources.

Lecture 2: **Energy Sources and their availability**: renewable energy sources, Prospects of renewable energy sources, application of non-conventional and renewal energy sources, smart grid.

Lecture 3: **Solar Energy**: Introduction to solar radiation and its measurement, Introduction to Solar energy Collectors and Storage.

Lecture 4: **Solar Energy:** Solar radiation estimation, Basic Principle of Solar Energy physical Principal of the conversion of solar radiation into heat.

Lecture 5: **Application of solar energy**: Solar thermal electric conversion, Thermal electric conversion systems, Solar electric power generation, Solar photo-voltatics.

Lecture 6: Solar Cell principle, Semiconductor junctions, Conversion efficiency and power output, Basic photo-voltaic system for power generation.

Module 2

Lecture 7: **Nuclear Energy:** sources of nuclear energy, technology of nuclear energy conversion, Application of nuclear energy.

Lecture 8: **Nuclear Wastes Management**

Lecture 9: Importance Nuclear power generation and environment, Green House Gas Effects.

Module 3

Lecture 10: **Ocean Thermal Energy (OCET):** Technology, Application, Indian Context

Lecture 11: **Ocean Energy:** Ocean thermal electric conversion, site selection, Power Plant, Prospects of ocean energy in India, tidal Power tidal Power Plant, Prospects in India.

Module 4

Lecture 12: **Waste Management:** types of thermal wastes and their effects on environment, reuse and recycle of various wastes

Lecture 13: Agricultural waste utilisation and energy conversion.

Lecture 14: **Environmental Aspects of Electric Energy Generation:** Introduction Thermal pollution, Atmospheric pollution.

Module 5

Lecture 15: **Plasto Oil**: generation, technology (TCD) and utilisation, Fuel generation from sea weeds.

Lecture 16: **Energy from Biomass**: Introduction: Biomass conversion technologies, photosynthesis, Bio-gas generation, types of bio-gas plants.

Lecture 17: Biomass as a Source of Energy: Methods for obtaining energy from Bio-mass.

Lecture 18: **Biomass Energy:** Biomass conversion technologies bio mass generation, classification of Bio Gas Plants material used in Bio Gas Plants.

Lecture 19: **Biofuels:** Biodiesel, Renewable diesel (HVO), Biogas, Bioethanol, Biobutanol, Biomethane.

Module 6

Lecture 20: Fuel Cells: H2, O2 cells, classification of fuel cells, types, Advantages, Electrodes, Polarization. Applications of alternative fuel generation from hydrogen

Lecture 21: Principle and classification of fuel cell energy, hydrogen as alternative fuel for Generation of Electrical Energy.

Lecture 22: **Fuel Cell:** Fuel Cell, Management of Fuel, Thermionic power generation.

Module 7

Lecture 23: **Wind Energy:** 1. History and Evolution of Wind Power 2. Basic Principles of Wind Energy 3. Wind Power Generation 4. Induction Generators: - Basics of induction generators - Types (squirrel cage and wound rotor) - Application in wind turbines

Lecture 24: 1. Environmental Benefits and Challenges 2. Economic Aspects of Wind Power 3. Case Studies

Lecture 25: 1. Advancements in Wind Turbine Technology 2. Integration with Other Renewable Energies 3. Policy and Future Trends

Module 8

Lecture 26: **Hydro Power:** General description, classification of schemes, siting and economic considerations.

Lecture 27: Effects of Hydroelectric projects on environmental perspective

Lecture 28: **Geothermal Energy:** Sources of Geothermal energy Estimation of Geothermal Power.

Lecture 29: Geothermal Power Plants, Geothermal energy in India and Prospects.

Lecture 30: Water Resource Electricity divined scenario storage and handling, Introduction to smart grid**.**

Syllabus

		Faculty/Teacher
Module 1	Lecture 1: **Introduction to Energy Sources**: World energy futures, Conventional energy sources, Nonconventional energy sources, Prospects of Renewable energy sources.	**JP & SKP**
	Lecture 2: **Energy Sources and their availability**: renewable energy sources, Prospects of renewable energy sources, application of non-conventional and renewal energy sources, smart grid.	
	Lecture 3: **Solar Energy**: Introduction to solar radiation and its measurement, Introduction to Solar energy Collectors and Storage.	
	Lecture 4: **Solar Energy:** Solar radiation estimation, Basic Principle of Solar Energy physical Principal of the conversion of solar radiation into heat.	
	Lecture 5: **Application of solar energy**: Solar thermal electric conversion, Thermal electric conversion systems, Solar electric power generation, Solar photo-voltatics.	
	Lecture 6: Solar Cell principle, Semiconductor junctions, Conversion efficiency and power output, Basic photo-voltaic system for power generation.	
Module 2	Lecture 7: **Nuclear Energy:** sources of nuclear energy, technology of nuclear energy conversion, Application of nuclear energy.	**SB**
	Lecture 8: **Nuclear Wastes Management**	
	Lecture 9: Importance Nuclear power generation and environment, Green House Gas Effects.	
Module 3	Lecture 10: **Ocean Thermal Energy (OCET):** Technology, Application, Indian Context	**SB**
	Lecture 11: **Ocean Energy:** Ocean thermal electric conversion, site selection, Power Plant, Prospects of ocean energy in India, tidal Power tidal Power Plant, Prospects in India.	
Module 4	Lecture 12: **Waste Management:** types of thermal wastes and their effects on environment, reuse and recycle of various wastes	**SD**
	Lecture 13: Agricultural waste utilisation and energy conversion.	

	Lecture 14: **Environmental Aspects of Electric Energy Generation:** Introduction Thermal pollution, Atmospheric pollution.	
Module 5	Lecture 15: **Plasto Oil**: generation, technology (TCD) and utilisation, Fuel generation from sea weeds.	**SRD**
	Lecture 16: **Energy from Biomass**: Introduction: Biomass conversion technologies, photosynthesis, Bio-gas generation, types of bio-gas plants.	
	Lecture 17: Biomass as a Source of Energy: Methods for obtaining energy from Bio-mass.	
	Lecture 18: **Biomass Energy:** Biomass conversion technologies bio mass generation, classification of Bio Gas Plants material used in Bio Gas Plants.	
	Lecture 19: **Biofuels:** Biodiesel, Renewable diesel (HVO), Biogas, Bioethanol, Biobutanol, Biomethane.	
Module 6	Lecture 20: Fuel Cells: H2, O2 cells, classification of fuel cells, types, Advantages, Electrodes, Polarization. Applications of alternative fuel generation from hydrogen	**SD**
	Lecture 21: Principle and classification of fuel cell energy, hydrogen as alternative fuel for Generation of Electrical Energy.	
	Lecture 22: **Fuel Cell:** Fuel Cell, Management of Fuel, Thermionic power generation.	
Module 7	Lecture 23: **Wind Energy:** 1. History and Evolution of Wind Power 2. Basic Principles of Wind Energy 3. Wind Power Generation 4. Induction Generators: - Basics of induction generators - Types (squirrel cage and wound rotor) - Application in wind turbines	**KM**
	Lecture 24: 1. Environmental Benefits and Challenges 2. Economic Aspects of Wind Power 3. Case Studies	
	Lecture 25: 1. Advancements in Wind Turbine Technology 2. Integration with Other Renewable Energies 3. Policy and Future Trends	
Module 8	Lecture 26: **Hydro Power:** General description, classification of schemes, siting and economic considerations.	**JP & SKP**
	Lecture 27: Effects of Hydroelectric projects on environmental perspective	
	Lecture 28: **Geothermal Energy:** Sources of Geothermal energy Estimation of Geothermal Power.	
	Lecture 29: Geothermal Power Plants, Geothermal energy in India and Prospects.	
	Lecture 30: Water Resource Electricity divined scenario storage and handling, Introduction to smart grid**.**	

The basics of fluid power, which encompasses both pneumatic and hydraulic systems, are taught to students. Each system has four fundamental parts: a reservoir/receiver, a pump/compressor, a valve, and a cylinder. Pneumatic and hydraulic systems are introduced to students, along with their background information, as well as common applications seen in our daily lives (bulldozers, front-end loaders, excavators, chair height lever adjusters, door closer dampers, dental drills, and car brakes).

Key Features of the Course

- ⇒ important terminologies
- ⇒ concepts
- ⇒ applicability

Course Duration

~40 hrs

ADD - ON COURSE

On

Industrial Fluid Movers

Offered by

Department of Mechanical Engineering

Dr. B.C. Roy Engineering College

Durgapur

For

B.Tech Students

7th Semester

Registration link

https://forms.gle/vda67zQCA7rhN5wz5

At the end of course, each successful participant will get certificate

DR. B.C. ROY SOCIETY ENGINEERING

Add-On Course on

FUZZY EXTENSIONS AND DECISION MAKING

Organized By

Department of Basic Science & Humanities (Mathematics)
Dr. B. C. Roy Engineering College, Durgapur
(An Autonomous Institute)

For B.Tech 1st Year Students

Session: 2024-25
Duration: 30 Hours

Registration Link

https://forms.gle/nWPTPGMYV3SSH6Mr5

Course Coordinator:
Dr. Avijit De
Course Co-Coordinator:
Sudip Kumar Gorey

ADD ON COURSE IN 2025-26

DR. B. C. ROY ENGINEERING COLLEGE, DURGAPUR

Basic Science & Humanities (Mathematics)

(For B.Tech 1st Year Students)

Course: AOCM201: Add-On Course on Fuzzy Extensions and Decision Making

Course Coordinator: Dr. Avijit De

Course Co-Coordinator: Sudip Kumar Gorey

Course Duration: 30 Hrs

Course Objective: This course is designed to provide comprehensive knowledge on **Fuzzy Extensions and Decision Making** with following learning objectives:

1. To provide a comprehensive understanding of fuzzy set and its extensions, including linguistic variables, and different decision making methods.
2. To Develop Analytical Skills among students to design fuzzy inference systems and rule-based frameworks for solving decision-making problems.
3. To explore how fuzzy set theory can be applied to real-world decision-making scenarios, such as optimization, resource allocation, and risk analysis etc.
4. Introduce Computational Tools like MATLAB and Mathematica for implementing and simulating fuzzy logic-based systems.
5. To encourage students in Research and Problem-Solving to critically analyze fuzzy approaches, compare them with traditional methods, and explore their application in advanced research and practical challenges

Course Outcome:

After completion of this course the students will be able to

1. Understand the Foundations of Fuzzy Sets and its extensions.
2. Apply the concept of membership functions and relations, such as union, intersection, complement to solve real-life problems.
3. Analyse the effectiveness of Advanced Fuzzy sets Concepts to organize complex real-life problems.
4. Evaluating Distance and Similarity Measures and Aggregation Operators to comparing fuzzy numbers.
5. Multi-Criteria Decision-Making (MCDM) Techniques Construct logical and analytical skills to create a new idea appreciated by academics, research & emerging trends in industry.
6. Develop and design and implement fuzzy rule-based systems using methods like: **AHP, TOPSIS, GRA.** for Multi-Criteria Decision-Making problems.

Course Contents:

UNIT I:
Fuzzy Set: Introduction to Fuzzy Set basic, $\alpha - cut$ of a fuzzy set, Convex Fuzzy Set, Support , Core and Height of Fuzzy Set, Operations on Fuzzy Sets (Equal fuzzy sets Union, Intersection, complement, algebraic sum, and algebraic product), Membership Function (triangular , trapezoidal) Fuzzy Numbers and Fuzzy Intervals, Extension Principle, Linguistic Variables. **[8]**

UNIT II:
Fuzzy extensions: Intuitionistic fuzzy sets, Hesitant Fuzzy Set, Type-2 Fuzzy Set, Picture fuzzy sets, neutrosophic sets, Operations on different fuzzy sets. Distance and Similarity Measures, score and accuracy function, Aggregation Operator, Weighted Averaging Operator. **[8]**

UNIT III:
Different MCDM techniques: Making Weighted Sum Model (WSM), Analytic Hierarchy Process (AHP), Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), Grey Relational Analysis (GRA). **[8]**

UNIT IV: Decision making using MATLAB/ Mathematica/excel **[6]**

Course Lecture Plan:

UNIT I: Fuzzy Set and related definitions:

Lecture 1: Introduction to Fuzzy Set basic
Lecture 2: $\alpha - cut$ of a fuzzy set, Convex Fuzzy Set, Support, Core and Height of Fuzzy Set
Lecture 3: Operations on Fuzzy Sets (Equal fuzzy sets Union, Intersection, complement, algebraic sum, and algebraic product)
Lecture 4: Operations on Fuzzy Sets (Equal fuzzy sets Union, Intersection, complement, algebraic sum, and algebraic product)
Lecture 5: Membership Function and operations (triangular)
Lecture 6: Membership Function and operations (triangular, trapezoidal)
Lecture 7: Fuzzy Numbers and Fuzzy Intervals
Lecture 8: Extension Principle, Linguistic Variables.

UNIT II: Fuzzy extensions:

Lecture 9: Intuitionistic fuzzy sets and operations
Lecture 10: Hesitant Fuzzy Set and operations
Lecture 11: Type-2 Fuzzy Set and operations
Lecture 12: Picture fuzzy sets, Neutrosophic sets and operations
Lecture 13: Neutrosophic sets and operations
Lecture 14: Different Distance and Similarity Measures
Lecture 15: Score and Accuracy function for different sets
Lecture 16: Aggregation Operator, Weighted Averaging Operator.

UNIT III: Different MCDM techniques:

Lecture 17: Making Weighted Sum Model (WSM)
Lecture 18: Hands-on: WSM

Lecture 19: Analytic Hierarchy Process (AHP)
Lecture 20: Hands-on: AHP
Lecture 21: Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS)
Lecture 22: Hands-on: TOPSIS
Lecture 23: Grey Relational Analysis (GRA)
Lecture 24: Hands-on: GRA.

UNIT IV: Problem Solving on Decision making

Lecture 25-30: Problem Solving Decision making using MATLAB/ Mathematica/ MS Excel.

Books Recommended:

1. Fuzzy Set Theory-and Its Applications by H.-J. Zimmermann.
2. Fuzzy Set and Its Extension by Tamalika Chaira.
3. Intuitionistic Fuzzy Sets Theory and Applications by Krassimir T. Atanassov
4. Hesitant Fuzzy Sets Theory by Zeshui Xu.
5. Type-2 Fuzzy Decision-Making Theories, Methodologies and Applications by Jindong Qin, Xinwang Liu.
6. Fuzzy Multi-Criteria Decision-Making Using Neutrosophic Sets by Cengiz Kahraman, Irem Otay.

Dr. B.C. Roy Engineering College, Durgapur

Department of Mechanical Engineering

Offering

ADD ON COURSE ON

Electric Vehicles

(AC-ME 02)

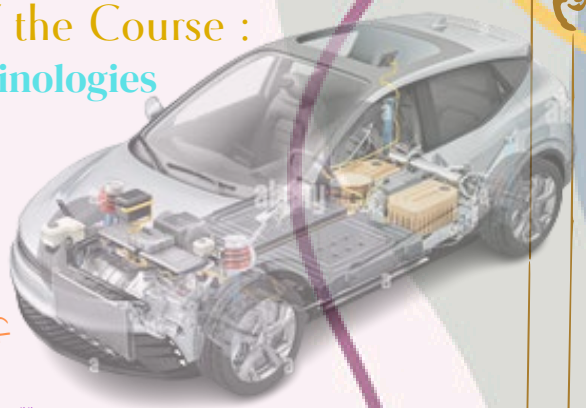
Session 2024-25 Odd Semester

FOR

B.Tech Students

5th Semester

Electric Vehicles (EV), identifying hidden triple bottom line risks and highlighting innovative clean and green technologies and business models that mitigate those risks, thereby building a value as Electric Vehicles through mechanical engineering. The course will give overview as well as a pragmatic analysis of the current and projected EV scenario in India versus the internal combustion engine in the near future and the concept of hybrid Electric Vehicles.



Key Features of the Course :

important terminologies
concepts
applicability
impact

"" A new Approach of Motions through Mechanical Engineering ""

Registration link :

https://forms.gle/XRuJc4MASxpcQoLx8

Course Coordinator :

Koushik Chatterjee
Assistant Professor
Department of Mechanical Engineering
Mob. No. : +919474639225

ADD-ON COURSE

On

ADVANCED CONSTRUCTION MATERIALS AND TECHNOLOGY

Duration: 30 Hours

Dr. B. C. Roy Engineering College, Durgapur
Department of Civil Engineering
Jemua Road, Fuljhore, Durgapur - 713206 (Affiliated to M.A.K.A.U.T.) West Bengal

ABOUT THE COURSE:

This course is designed to provide an in-depth understanding of modern construction materials and innovative techniques. It explores the properties, applications, and economic implications of various materials, while emphasizing sustainable and eco-friendly practices. Students will gain knowledge of advanced concrete technologies, including mix design and high-performance concrete. Additionally, the course covers emerging trends like 3D printing and prefabrication in the construction industry.

PREREQUISITES:

Basic knowledge of civil engineering principles, including materials science, structural analysis, and construction methods.

COURSE OUTCOME:

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

CO1: Judge the properties and applications of modern construction materials.

CO2: Describe the principles and processes of innovative building techniques.

CO3: Design sustainable construction materials and practices.

CO4: Use advanced concrete technologies to improve construction efficiency and durability.

CO5: Compare the economic and environmental impact of construction materials and methods.

CO6: Develop innovative solutions for construction challenges using emerging technologies.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	2	1	1	1	1	2	2	2	3	3	2	2
CO2	2	3	3	3	3	2	2	1	2	3	3	2	2	3	2	3
CO3	2	3	3	2	3	3	3	2	1	2	2	3	3	3	2	3
CO4	3	2	3	3	3	1	2	1	2	2	2	2	3	3	2	3
CO5	2	3	3	3	3	3	3	2	1	3	3	3	3	3	3	2
CO6	2	3	3	3	3	2	2	2	3	3	3	3	3	3	3	3

Course Co-ordinator: Prof. Anupam Kumar Biswas

Course Instructors:

1. Prof. Anupam Kumar Biswas
2. Prof. Chanchal Das
3. Mr. Ajitesh Bhattacharjee

Verified By

Prof. (Dr.) Sanjay Sengupta
Head of the Department
Civil Engineering

H.O.D
CIVIL ENGG. DEPT.
Dr. B. C. ROY ENGINEERING COLLEGE
DURGAPUR

SYLLABUS

Module 1	**Introduction to Modern Construction Materials** Overview of modern construction materials and their properties; Economic and environmental considerations; Local availability and pricing of materials.
Module 2	**Innovative Building Techniques** Prefabrication and modular construction; Industrialized Building Systems (IBS); 3D printing in construction; Case studies of successful implementations.
Module 3	**Sustainable Construction Materials** Green building concepts and materials; Recycled and reclaimed materials; Bio-based materials; Life cycle assessment of construction materials.
Module 4	**Concrete Technology and Mix Design** High-performance concrete (HPC); Mix design with admixtures; Self-compacting concrete (SCC); Fiber-reinforced concrete.
Module 5	**Construction Planning and Execution** Setting out building foundation plans; Construction methods and quality control; Project management and cost control; Emerging trends and future perspectives.

COURSE LAYOUT

Module 1: Introduction to Modern Construction Materials

Lecture 1: Overview of modern construction materials
Lecture 2: Classification of construction materials
Lecture 3: Sustainable materials and their importance
Lecture 4: Economic analysis of construction materials
Lecture 5: Case studies of modern materials in India
Lecture 6: Local availability and pricing of materials

Module 2: Innovative Building Techniques

Lecture 7: Prefabrication and modular construction
Lecture 8: Industrialized Building Systems (IBS)
Lecture 9: 3D printing in construction
Lecture 10: Case studies of innovative projects
Lecture 11: Virtual and augmented reality applications
Lecture 12: Emerging trends in building techniques

Module 3: Sustainable Construction Materials

Lecture 13: Green building concepts and principles
Lecture 14: Recycled and reclaimed materials
Lecture 15: Bio-based materials and their applications
Lecture 16: Energy-efficient materials and technologies
Lecture 17: Life cycle assessment of construction materials
Lecture 18: Case studies of sustainable projects

Module 4: Concrete Technology and Mix Design

Lecture 19: High-performance concrete (HPC)
Lecture 20: Mix design principles for HPC
Lecture 21: Admixtures and their applications
Lecture 22: Self-compacting concrete (SCC)
Lecture 23: Fiber-reinforced concrete
Lecture 24: Concrete durability and protection

Module 5: Construction Planning and Execution

Lecture 25: Setting out building foundation plans
Lecture 26: Quantity surveying and estimation
Lecture 27: Construction project management
Lecture 28: Construction safety and quality control
Lecture 29: Case studies of successful projects
Lecture 30: Emerging trends in construction industry

Assessment & Evaluation Process:

Assessment questions follow blooms level and are mapped with concerned COs;

1. Module based Assignment-1 (25 Marks)
2. Module based Assignment-2 (25 marks)
3. Final exam (50 marks)

ADD-ON COURSE

On

CONTRACT MANAGEMENT AND INDUSTRY SOFTWARE

Duration: 30 Hours

Dr. B. C. Roy Engineering College, Durgapur
Department of Civil Engineering
Jemua Road, Fuljhore, Durgapur - 713206 (Affiliated to M.A.K.A.U.T.) West Bengal

ABOUT THE COURSE:

This course is designed for final-year civil engineering students to provide a foundational understanding of contract management and the various software tools used in industries. This course covers the principles of contract management, the legal frameworks and the specific industry tools that are required for project management. Students will be able to utilize industry software tools effectively for project planning, scheduling, and resource management. The curriculum includes modules on data analytics techniques to enhance contract performance and decision-making and also Building Information Modeling (BIM) for improved collaboration and project efficiency in construction projects.

PREREQUISITES:

This add-on course is designed for students with a fundamental understanding of engineering principles. This is a self-contained course for students, and hence, no prerequisite is required.

COURSE OUTCOME:

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

CO1: Explain the foundational principles of contract management.

CO2: Examine legal frameworks relevant to contract management.

CO3: Select industry software tools for project management.

CO4: Implement data analytics techniques for contract management.

CO5: Develop project plans and schedules for construction projects.

CO6: Implement BIM for construction project management.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	2	1	2	3	2	3	2	2	3	3	3	1	3	2
CO2	1	1	1	0	1	3	2	3	2	2	3	3	2	1	3	2
CO3	2	2	3	3	3	2	2	0	2	2	3	3	2	2	3	3
CO4	3	3	3	3	3	2	2	1	2	2	3	3	2	2	3	3
CO5	3	3	3	3	3	2	2	0	2	2	3	3	2	3	3	3
CO6	3	3	3	3	3	2	2	0	2	2	3	3	2	3	3	3

Course Co-ordinator: Prof. Koyndrik Bhattacharjee

Course Instructors:

1. Prof. Koyndrik Bhattacharjee
2. Prof. Pranoy Roy
3. Mr. Ajitesh Bhattacharjee
4. Mr. Aditya Prasad Roy

Verified By

Prof. (Dr.) Sanjay Sengupta
Head of the Department
Civil Engineering

H.O.D
CIVIL ENGG. DEPT.
Dr. B. C. ROY ENGINEERING COLLEGE
DURGAPUR

SYLLABUS

Module 1	**Introduction to Contract Management**: Introduction to contracts and their role in construction projects, Types of contracts: Lump sum, unit price, cost plus fee, etc, Elements of a contract: Offer, acceptance, consideration, etc, Contract lifecycle stages: Initiation, execution, performance, and closure, Legal aspects in contract management: Liability, indemnity, breach, and remedies.
Module 2	**Legal Framework for Contracts:** Overview of the Indian Contract Act, 1872: Formation, performance, and enforcement of contracts, Principles of interpretation of contracts under Indian law, key provisions and implications of the Arbitration and Conciliation Act 1996, International standards in contracts: Introduction to FIDIC contracts and their applications, Dispute resolution mechanisms: Arbitration, mediation, and litigation.
Module 3	**Introduction to Industry Software:** Overview of project management software: Primavera P6, MS Project, and their features, project planning and scheduling capabilities of industry software, Resource management: Allocating resources, tracking costs, and managing budgets, Integration of project management software with other tools and systems, Hands-on exercises: Creating project schedules, Gantt charts, and resource histograms.
Module 4	**Basics of Data Analytics using RDBMS:** Introduction to Relational Database Management Systems (RDBMS): Structure and operations, Basics of data modeling and database design, Data querying using SQL: Select statements, joins, and aggregation functions, Data analytics for contract performance: Trend analysis, forecasting, and risk assessment, Case studies: Analyzing contract data to optimize performance and mitigate risks.
Module 5	**Project Planning and Scheduling:** Project planning fundamentals: Scope definition, work breakdown structure (WBS), and milestone identification, Techniques for project scheduling: Critical path method (CPM) and Program Evaluation and Review Technique (PERT), Resource leveling and allocation in project scheduling, Monitoring and controlling project schedules: Earned value analysis (EVA) and progress tracking, Software applications in project scheduling: Practical exercises using Primavera P6 or MS Project.
Module 6	**Building Information Modeling (BIM):** Introduction to Building Information Modeling (BIM): Concepts, benefits, and applications, BIM software tools: Autodesk Revit, Navisworks, and their functionalities, Collaborative BIM workflows: Integration with project management and scheduling software, BIM for design coordination and clash detection, BIM in facility management and as-built documentation.

COURSE LAYOUT

Module 1: Introduction to Contract Management

Lecture 1: Introduction to contracts and their role in construction projects
Lecture 2: Types of contracts: Lump sum, unit price, cost plus fee, etc
Lecture 3: Elements of a contract: Offer, acceptance, consideration, etc
Lecture 4: Contract lifecycle stages: Initiation, execution, performance, and closure
Lecture 5: Legal aspects in contract management: Liability, indemnity, breach, and remedies

Module 2: Legal Framework for Contracts

Lecture 6: Overview of the Indian Contract Act, 1872: Formation, performance, and enforcement of contracts
Lecture 7: Principles of interpretation of contracts under Indian law
Lecture 8: Key provisions and implications of the Arbitration and Conciliation Act, 1996
Lecture 9: International standards in contracts: Introduction to FIDIC contracts and their applications
Lecture 10: Dispute resolution mechanisms: Arbitration, mediation, and litigation

Module 3: Introduction to Industry Software

Lecture 11: Overview of project management software: Primavera P6, MS Project, and their features
Lecture 12: Project planning and scheduling capabilities of industry software
Lecture 13: Resource management: Allocating resources, tracking costs, and managing budgets
Lecture 14: Integration of project management software with other tools and systems
Lecture 15: Hands-on exercises: Creating project schedules, Gantt charts, and resource histograms

Module 4: Basics of Data Analytics using RDBMS

Lecture 16: Introduction to Relational Database Management Systems (RDBMS): Structure and operations
Lecture 17: Basics of data modeling and database design
Lecture 18: Data querying using SQL: Select statements, joins, and aggregation functions
Lecture 19: Data analytics for contract performance: Trend analysis, forecasting, and risk assessment
Lecture 20: Case studies: Analyzing contract data to optimize performance and mitigate risks

Module 5: Project Planning and Scheduling

Lecture 21: Project planning fundamentals: Scope definition, work breakdown structure (WBS), and milestone identification

Lecture 22: Techniques for project scheduling: Critical path method (CPM) and Program Evaluation and Review Technique (PERT)
Lecture 23: Resource leveling and allocation in project scheduling
Lecture 24: Monitoring and controlling project schedules: Earned value analysis (EVA) and progress tracking
Lecture 25: Software applications in project scheduling: Practical exercises using Primavera P6 or MS Project

Module 6: Building Information Modeling (BIM)

Lecture 26: Introduction to Building Information Modeling (BIM): Concepts, benefits, and applications
Lecture 27: BIM software tools: Autodesk Revit, Navisworks, and their functionalities
Lecture 28: Collaborative BIM workflows: Integration with project management and scheduling software
Lecture 29: BIM for design coordination and clash detection
Lecture 30: BIM in facility management and as-built documentation

Assessment & Evaluation Process:

Assessment questions follow blooms level and are mapped with concerned COs;

1. Module based Assignment-1 (25 Marks)
2. Module based Assignment-2 (25 marks)
3. Final exam (50 marks)

ADD-ON COURSE

On

EXPLORING CIVIL ENGINEERING SKILLS WITH CONTEMPORARY SOFTWARE & TOOLS

Duration: 30 Hours

Dr. B. C. Roy Engineering College, Durgapur
Department of Civil Engineering
Jemua Road, Fuljhore, Durgapur - 713206 (Affiliated to M.A.K.A.U.T.)
West Bengal

ABOUT THE COURSE:

This course is designed for third-year civil engineering students to provide the knowledge of the application of different software and tools used for the present industry practices in Civil Engineering. The course will give overview as well as hands on experience so that the students get motivated to learn different software and tools in a more detailed way and apply the same skill as practicing engineer.

PREREQUISITES:

This add-on course is designed for students with a fundamental understanding of engineering principles and application of software with Civil Engineering knowledge. This is a self-contained course for students, and hence, no prerequisite is required.

COURSE OUTCOME:

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

CO1: Model, analyse and design different types of concrete and steel structures/foundations using different available software, programming languages and tools.

CO2: Manage civil engineering projects using software and tools**.**

CO3: Perform 3D modelling of buildings and structures using software**.**

CO4: Apply 3D modelling software to foundation and structure for preparation of bar bending schedule and to estimate the quantity of materials.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	1	1	1	1	2	2	2
CO2	2	2	2	1	3	2	1	1	3	3	3	2
CO3	2	2	2	1	3	1	1	1	2	2	2	2
CO4	2	2	3	2	3	1	2	1	2	2	2	2

Course Co-ordinator: Prof. (Dr.) Sanjay Sengupta,

Course Instructors:

1. Prof.(Dr.) Sanjay Sengupta Sanjay Sengupta.
2. Mr. Surajit Sen Surajit Sen
3. Mrs. Anindita Sengupta Anindita Sengupta

Verified By

Sanjay Sengupta.

Prof. (Dr.) Sanjay Sengupta
Head of the Department
Civil Engineering

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Dr. B. C. ROY ENGINEERING COLLEGE
DURGAPUR

SYLLABUS

Module 1	**Introduction** Basic concept of different types of software used in Civil Engineering for problem solving. Identification of various real time problems in Civil Engineering and providing solution with the help of problem solving tools like application software.
Module 2	**Use of Design, Drafting software:** Learning widely used Civil Engineering software like Staad Pro, ETabs, SAP, AutoCAD. Design and creating model of RCC/Steel structure, atleast one of such type.
Module 3	**Use of 3D Modeling software and Building Information and Modelling:** Application of Revit software for preparing 3D model of different structures and preparation of bar bending schedule with quantity take-off.
Module 4	**Use of Spreadsheet:** Learning spreadsheet like MS Excel, for quantity estimation of various Civil Engineering projects, and preparing optimized valuation chart.
Module 5	**Use of MS Project:** Familiarity with software like MS Project/Primavera to create and maintain the schedule of any Civil Engineering project. Preparation of Gantt Chart, BAR Chart with the help of tools like MS Project.
Module 6	**Basic concept and application of programming language:** Learning Python and C programming and familiarize with the applications.

COURSE LAYOUT

Module 1: Introduction

Session 1: Introduction to different software available in learning Civil Engineering.

Session 2: Structural analysis through software, e.g., StaadPro, ETabs etc.

Session 3: Hands-on on download and installation of open source software.

Module 2: Design, Drafting software:

Session 4: Introduction to drafting and modelling software like AutoCAD, Civil 3D etc.

Session 5: Hands-on on CAD.

Session 6: Hands-on on Staad Pro (creating 2D, 3D models and analyse).

Session 7: Hands-on on Staad Pro (analysis of structure for dynamic loads like Seismic and Wind load).

Session 8: Hands-on on Staad Pro (Design of RCC and Steel structure).

Session 9: Foundation design through Staad Foundation software.

Session 10: Introduction to ETabs

Session 11: Hands-on on ETabs

Session 12: Introduction to SAP

Session 13: Hands-on on SAP

Session 14: Hands-on on Staad Foundatoin.

Session 15: Interpretation and comparison of results using different design software.

Module 3: Modeling Software:

Session 16: Basic ideas on Building Information and Modeling (BIM) using 3D modelling software like Revit.

Session 17: Hands-on on importing and merging of 2D drawings in 3D software.

Session 18: Hands-on on Revit (creating models).

Session 19: Hands-on on Revit (creating interior details, landscape, walk-through).

Module 4: Spreadsheet:

Session 20: Hands-on on spreadsheet (basic calculation through spreadsheet, making and using tables, graphs and charts)

Session 21: Hands-on on spreadsheet (application of spreadsheet in Civil Engineering design and calculations).

Module 5: Use of MS Project

Session 22: Introduction to MS Project.

Session 23: Hands-on on MS Project.

Session 24: Hands-on on MS Project.

Session 25: Hands-on on MS Project.

Module 6: Basic concept and application of programming language:

Session 26: Introduction on programming language and their applications.

Session 27: overview on structured and object oriented programming and their reusability and scalability.

Session 28: Hands-on on C programming language.

Session 29: Hands-on on Python and writing through IDE (Visual Studio/PyCharm)

Session 30: Hands-on on Python (simple mathematical problem solving, writing on files etc.).

Module 1: Introduction

Session 1: Introduction to different software available in learning Civil Engineering

Civil engineering software is crucial for learning and practice, spanning various areas from drafting and design to structural analysis and geotechnical modeling. Key software include AutoCAD, Revit, Civil 3D, STAAD.Pro, ETABS, PLAXIS, and GeoStudio. These tools are used to create 2D and 3D models, analyze structures, and simulate soil behavior, among other tasks.

Session 2: Structural analysis through software, e.g., StaadPro, ETabs etc.

Structural analysis software like STAAD.Pro and ETABS are used to analyze and design structures, especially buildings. ETABS is more specialized for building design, while STAAD.Pro is more versatile and can handle a wider range of structures, including bridges.

Session 3: Hands-on on download and installation of open source software.

To install open source software, download the software and then follow the installation instructions provided by the developers. These instructions often involve configuring system's environment, compiling the source code (if needed), and then running the installer or setup program.

Module 2: Design, Drafting software

Session 4: Introduction to drafting and modelling software like AutoCAD, Civil 3D etc.

Drafting and modeling software, like AutoCAD and Civil 3D, are used to create 2D and 3D designs and technical documentation. They are essential tools for engineers, architects, and designers, enabling them to visualize and simulate their ideas digitally before physical production.

Session 5: Hands-on on CAD.

Students are given small projects, like buildings / structures to draw 2D diagrams and taking out of print of that project with proper texts and dimensions.

Session 6: Hands-on on Staad Pro (creating 2D, 3D models and analyse).

To create models in STAAD.Pro, Analytical Modeler or the Physical Modeler can be used. The Analytical Modeler is used for traditional finite element modeling, while here students will use Physical Modeler which allows to model structures physically.

Session 7: Hands-on on Staad Pro (analysis of structure for dynamic loads like Seismic and Wind load).

After creating models of various structures, seismic and wind loads are created and applied to the model.

Session 8: Hands-on on Staad Pro (Design of RCC and Steel structure).

STAAD.Pro has a very interactive user interface which allows the users to draw the frame and input the load values and dimensions. Then according to the specified criteria assigned it analyses the structure and designs the members with reinforcement details for RCC frames.

Session 9: Foundation design through Staad Foundation software.

Staad Foundation Advanced is a software used for structural foundation design and analysis, designed to handle various foundation types and complexities. It offers features for isolated, combined, pile cap, and mat foundations, as well as more specialized ones like horizontal vessel and tank foundations. The software also supports lateral analysis of piles and vibrational analysis for machine foundations.

Session 10: Introduction to ETabs

ETABS is a Building Information Modeling (BIM) software used for structural analysis and design, particularly for building systems. It is developed by Computers and Structures, Inc. (CSI). ETABS, which stands for "Extended 3D Analysis of Building System," allows engineers to model, analyze, and design various types of building structures, from simple to complex, including high-rise concrete and steel buildings.

Session 11: Hands-on on ETabs

ETABS is a widely used software for structural analysis and design of multi-story buildings. Hands-on training in ETABS involves learning how to model, analyze, and design building structures using the software, often including practical exercises and projects. This training helps individuals gain proficiency in using ETABS for real-world structural engineering applications.

Session 12: Introduction to SAP 2000

SAP2000 is a comprehensive structural analysis and design software used by civil engineers worldwide. It's known for its user-friendly interface, ability to handle complex models, and versatile analysis capabilities.

Session 13: Hands-on on SAP

Hands-on is done for different structures starting from simple to complex high rise building through SAP2000.

Session 14: Hands-on on Staad Foundation.

STAAD Foundation Advanced is a software application for structural foundation design and analysis. It's designed to handle a wide variety of foundation types, from simple to complex, including isolated, combined, pile cap, and mat foundations, as well as specialized designs like horizontal vessel foundations and tank annular ringwalls. The software also includes features for lateral analysis of piles and vibrational analysis for machine foundations. Through hands-on practice students can understand the various aspects of designing.

Session 15: Interpretation and comparison of results using different design software.

When comparing results from different design software, it's crucial to first understand the specific capabilities and limitations of each tool. Then, focus on comparing the outputs, considering factors like accuracy, efficiency, and the ease of implementation. Analyze the strengths and weaknesses of each software based on the specific project requirements.

Module 3: Modeling Software

Session 16: Basic ideas on Building Information and Modeling (BIM) using 3D modelling software like Revit.

Building Information Modeling (BIM) with software like Revit involves creating a digital representation of a building, including its physical and functional characteristics. This model allows for better coordination, visualization, and analysis throughout the building's lifecycle, from design to construction and beyond.

Session 17: Hands-on on importing and merging of 2D drawings in 3D software.

Importing and merging 2D drawings in 3D software allows users to incorporate existing 2D CAD designs into their 3D models, which can be useful for various purposes like creating 3D representations of existing 2D plans, adding textures or details to 3D models, or using 2D drawings as a basis for 3D modeling. The process typically involves importing the 2D drawing file into the 3D software and then using the software's tools to either directly use the drawing as a reference for 3D modeling or to create a 3D model from the 2D drawing.

Session 18: Hands-on on Revit (creating models).

In Revit, creating a model involves several steps, starting with selecting a template and then utilizing tools like extrusions, blends, revolves, sweeps, and swept blends to define 3D geometry. You can also import external 3D models, and utilize features like Model in-Place to create custom components.

Session 19: Hands-on on Revit (creating interior details, landscape, walk-through).

Starting by opening Revit project and navigating to the view where we want to add our landscaping. It's often best to work in a site plan or 3D view for better visibility. Next, locate the 'Massing & Site' tab in the ribbon menu. Revit provides various tools for creating topography and site elements.

Module 4: Spreadsheet:

Session 20: Hands-on on spreadsheet (basic calculation through spreadsheet, making and using tables, graphs and charts)

Spreadsheets can perform basic calculations, create organized tables, and visualize data with graphs and charts. To calculate, use formulas in cells, and to create tables, format data as a table. Graphs and charts visually represent data, and different types like bar, line, or pie charts can be used to show different aspects of the data.

Session 21: Hands-on on spreadsheet (application of spreadsheet in Civil Engineering design and calculations).

Spreadsheets like Excel are valuable tools in Civil Engineering for various design and calculation tasks, ranging from basic calculations like cost estimation and material quantity to more complex structural analysis and data management. They enable engineers to perform calculations, organize data, and visualize results efficiently.

Module 5: Use of MS Project

Session 22: Introduction to MS Project.

Microsoft Project is project management software that's used to create schedules, project plans, manage resources and keep track of time. It has features such as Gantt charts and project calendars for project management professionals.

Session 23: Detailing on MS Project.

Calendar Creation & WBS Creation, Estimating and Costing

Session 24: Detailing on MS Project.

Earned Value Management (EVM): It provides a way to assess project health and forecast future performance by integrating scope, schedule, and cost.

Tracking: This involves comparing actual work and costs to the planned schedule and budget, and making necessary adjustments to stay on track.

Session 25: Detailing on MS Project.

Cash Flow Report: It essentially shows how much cash the project is spending or earning at different points.

S Curve: A graph that visually represents the cumulative progress of a project or activity over time, often tracking costs, hours, or other metrics.

Module 6: Basic concept and application of programming language

Session 26: Introduction on programming language and their applications.

Introduction on programming language and their applications.

A programming language is a set of instructions and syntax used to create software programs. Some of the key features of programming languages include:

Programming languages are used across a wide range of applications, from developing software and websites to analyzing data and creating artificial intelligence models. They are essential tools for communicating with computers, enabling automation, and solving complex problems.

Session 27: overview on structured and object oriented programming and their reusability and scalability.

Basic Terminologies in Programming Languages:

Algorithm: A step-by-step procedure for solving a problem or performing a task.

Variable: A named storage location in memory that holds a value or data.

Data Type: A classification that specifies what type of data a variable can hold, such as integer, string, or Boolean.
Function: A self-contained block of code that performs a specific task and can be called from other parts of the program.
Control Flow: The order in which statements are executed in a program, including loops and conditional statements.
Syntax: The set of rules that govern the structure and format of a programming language.
Comment: A piece of text in a program that is ignored by the compiler or interpreter, used to add notes or explanations to the code.
Debugging: The process of finding and fixing errors or bugs in a program.
IDE: Integrated Development Environment, a software application that provides a comprehensive development environment for coding, debugging, and testing.
Operator: A symbol or keyword that represents an action or operation to be performed on one or more values or variables, such as + (addition), – (subtraction), * (multiplication), and / (division).
Statement: A single line or instruction in a program that performs a specific action or operation.
Session 28: Hands-on on C programming language.
Writing and running basic programs, such as "Hello World" or a simple calculator, and then progressively work on more complex projects like a library management system etc.
Session 29: Hands-on on Python and writing through IDE (Visual Studio/PyCharm)
Python-specific editors and IDEs are built exclusively for Python development. PyCharm, Spyder, and Thonny are among the most popular ones. PyCharm is a full-featured IDE that supports Python development directly, with support for source control and projects.
Session 30: Hands-on on Python (simple mathematical problem solving, writing on files etc.).
Through hands-on Mathematical Operations and Solving Equations can be done. Python supports all standard arithmetic operations.

Dr. B. C. Roy Engineering College, Durgapur

Department of Basic Science and Humanities (Mathematics)

Add-On Course

Applications on Engineering Mathematics

Duration: 30 Hrs

Add-on course for first-year B. Tech students titled "**Applications on Engineering Mathematics**". This course aims to enhance and build up the strong foundation on different applications of real life problem using advanced mathematical tools.

Course Title:

Applications on Engineering Mathematics

Course Description:

This course is designed to provide first-year B. Tech students with an in-depth understanding of advanced mathematical concepts and their applications in engineering. The course will cover topics such as linear algebra, differential equations, preliminaries of Optimization Techniques, basics of discrete mathematics and numerical methods, with a strong emphasis on practical problem-solving and real-world applications.

Course Objectives:

1. To deepen the understanding of advanced mathematical concepts and their applications in engineering.
2. To develop problem-solving skills using advanced mathematical techniques.
3. To enhance computational skills through numerical methods and software tools.
4. To apply mathematical concepts to real-world engineering problems.

Prerequisites:

- Basic understanding of calculus and linear algebra.
- Familiarity with fundamental engineering mathematics.

Course Content:

Module-I: Linear Algebra (6L)

- Vector Spaces
- Basis and Dimension
- Eigen values and Eigen vectors and its uses in engineering problems
- Matrix Diagonalization
- Applications of vector space in engineering problems

Module-II: Numerical Methods (8L)

- Error Analysis
- Numerical Interpolation, extrapolation and difference equations.
- Location of real roots of a f(x)=0.
- Numerical Integration
- Solutions of ordinary Differential Equations including boundary value problem.
- Applications in Engineering (e.g., computational fluid dynamics, heat transfer)

Module-III: Optimization Techniques (8L)

- Basics of Optimization- Modelling of different real life problem
- Constrained and Unconstrained linear Optimization
- Game Theory
- Applications in Engineering (e.g., operations research, design optimization)

Module-IV: Basics of Discrete Mathematics (8L)

- Set Theory
- Number Theory
- Concept on Graph Theory and applications

ADD-ON COURSE

ON

SURVEYING TECHNIQUES: MODERN METHODS AND APPLICATIONS

Duration: 30 Hours

DR. B.C. ROY SOCIETY ENGINEERING

Dr. B. C. Roy Engineering College, Durgapur
Department of Civil Engineering
Jemua Road, Fuljhore, Durgapur - 713206 (Affiliated to M.A.K.A.U.T.)
West Bengal

ABOUT THE COURSE:

This course is designed for second-year civil engineering students to provide a foundational understanding of modern application of surveying. This course covers practical surveying exercises, quantity calculations for cut and fills operations, GIS and Remote Sensing & use of drone in surveying.

PREREQUISITES:

This add-on course is designed for a student with a fundamental understanding of engineering principles. This is a self-contained course for students, and hence, no prerequisite is required.

COURSE OUTCOME:

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

CO1: Understand the concepts and ideas of Modern Surveying Techniques and coordinate transformations

CO2: Discuss the techniques of geodetic surveying and application of remote sensing.

CO3: Apply the methods of digital Image Processing and GIS.

CO4: Relate Techniques for achieving high precision in GPS measurement.

CO5: Evaluate the techniques for error analysis, and hydrographic Surveys.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	2	3	1	1	1	1	1	0	0	2	2	0	0
CO2	2	3	3	3	3	2	2	1	1	1	0	0	2	1	1	0
CO3	2	2	3	2	3	1	2	1	2	1	0	0	1	2	1	0
CO4	2	3	2	3	3	2	2	1	1	0	0	0	1	1	0	0
CO5	3	3	2	3	3	2	2	2	2	0	0	0	1	1	1	0

Course Co-ordinator: Prof. Soumyodip Das, Prof Amit Kotal

Course Instructors:

1. Prof. Soumyodip Das, Soumyadip Das
2. Prof. Amit Kotal Amit Kotal
3. Mrs. Anindita Sengupta Anindita Sengupta
4. Mrs. Barnali Das Barnali Das

Verified By

Sanjay Sengupta

Prof. (Dr.) Sanjay Sengupta
Head of the Department
Civil Engineering

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Dr. B. C. ROY ENGINEERING COLLEGE
DURGAPUR

SYLLABUS

Module 1: Modern Surveying Techniques and Coordinate Transformations

Introduction to the Concepts and Ideas of Modern Surveying Techniques- Overview of contemporary surveying technologies and methodologies, Key advancements and their impact on the field of surveying,

Importance of Usage of Coordinate Transformations- Role of coordinate transformations in modern surveying, Accurate transformations are crucial for data integration and analysis.

Common Coordinate Transformations and Practical Applications- Common methods for coordinate transformations (e.g., from geographic to Cartesian coordinates), Practical examples and case studies of coordinate transformations in various surveying projects.

Challenges and Considerations of Coordinate Transformations- Potential errors and challenges in coordinate transformations, Considerations for ensuring accuracy and reliability in transformation processes.

Module 2: Geodetic Surveying and Remote Sensing

Introduction to Geodetic Surveying- Overview of geodetic surveying techniques and their importance, Introduction to geodetic control networks and measurements.

Concepts, Applications, and Challenges in Geodetic Surveying- Detailed exploration of geodetic concepts such as datums and ellipsoids, Applications in various fields and challenges faced in geodetic surveys.

Remote Sensing Fundamentals- Basic principles of remote sensing and its technologies, Types of sensors and platforms used in remote sensing.

Remote Sensing Applications- Applications of remote sensing in environmental monitoring, urban planning, and disaster management, Case studies demonstrating the use of remote sensing data.

Recent Developments in Remote Sensing- Innovations and emerging trends in remote sensing technologies, Future directions and potential impacts on the field.

Module 3: Digital Image Processing and GIS

Digital Image Processing - Fundamentals and Techniques- Introduction to digital image processing concepts, Techniques for enhancing and analyzing digital images.

Digital Image Processing Applications- Applications of digital image processing in various fields such as remote sensing and medical imaging, Real-world examples and case studies.

Introduction to Geographic Information Systems (GIS)- Basics of GIS, including its components and functionality, How GIS integrates spatial data for analysis and decision-making.

Functions and Applications of GIS- Detailed exploration of GIS functions, such as spatial analysis, data management, and visualization, Applications of GIS in urban planning, environmental management, and more.

Global Positioning System (GPS) - Overview and Working Principle- Fundamentals of GPS technology and how it works, Key components of the GPS system and its applications.

Module 4: Advanced GPS Techniques and Setting of curves

Advancements and Applications of GPS- Recent advancements in GPS technology and their implications, Applications of GPS in various fields, including surveying and navigation.

High Precision GPS – Techniques- Techniques for achieving high precision in GPS measurements, Methods such as Differential GPS (DGPS) and Real-Time Kinematic (RTK) positioning.

High Precision GPS - Applications and Future Trends- Applications of high precision GPS in engineering, surveying, and geodesy, Future trends and developments in high precision GPS technology.

Introduction to Curve Setting - Advanced Techniques- Basics of curve setting in surveying, Advanced techniques for accurate curve setting and alignment.

Curve Setting and Advanced Techniques- Practical applications and case studies of advanced curve setting techniques, Challenges and solutions in implementing these techniques.

Module 5: Contouring, Error Analysis, and Hydrographic Surveys

Introduction and Requirements of Contouring- Fundamentals of contouring and its significance in mapping, Requirements and techniques for effective contouring.

Modern Methods of Contouring- Overview of modern contouring methods, including digital and automated techniques, Applications and benefits of modern contouring approaches.

Introduction to the Theory of Errors- Basic principles of error theory in surveying, Types of errors and their sources.

Error Analysis, Reduction, and Practical Applications- Techniques for error analysis and reduction, Practical applications and methods for minimizing errors in surveying.

Introduction to Hydrographic Surveys- Basics of hydrographic surveying, including objectives and methods, Introduction to technologies and techniques used in hydrographic surveys.

COURSE LAYOUT

Module 1: Modern Surveying Techniques and Coordinate Transformations

Lecture 1: Introduction to the concepts and ideas of Modern Surveying Techniques
Lecture 2: Importance of Usage of Coordinate Transformations
Lecture 3: Common Coordinate Transformations and Practical Applications
Lecture 4: Challenges and Considerations of Coordinate Transformations

Module 2: Geodetic Surveying and Remote Sensing

Lecture 5: Introduction to Geodetic Surveying
Lecture 6: Concepts, Applications, and Challenges in Geodetic Surveying
Lecture 7: Remote Sensing Fundamentals
Lecture 8: Remote Sensing Applications
Lecture 9: Recent Developments in Remote Sensing

Module 3: Digital Image Processing and GIS

Lecture 10: Digital Image Processing- Fundamentals and Techniques
Lecture 11: Digital Image Processing Applications
Lecture 12: Introduction to Geographic Information Systems (GIS)
Lecture 13: Functions and Applications of GIS
Lecture 14: Global Positioning System (GPS)- Overview and Working Principle

Module 4: Advanced GPS Techniques and Setting of Curves

Lecture 15: Advancements and Applications of GPS
Lecture 16: High Precision GPS- Techniques
Lecture 17: High Precision GPS- Applications and Future Trends
Lecture 18: Introduction to Curve Setting - Advanced Techniques
Lecture 19: Curve Setting and Advanced Techniques

Module 5: Contouring, Error Analysis, and Hydrographic Surveys

Lecture 20: Introduction and Requirements of Contouring
Lecture 21: Modern Methods of Contouring
Lecture 22: Introduction to the Theory of Errors
Lecture 23: Error Analysis, Reduction and Practical Applications
Lecture 24: Principles and Methods in Field Astronomy
Lecture 25: Applications and Modern Techniques Used in Field Astronomy
Lecture 26: Introduction to Hydrographic Surveys
Lecture 27: Emerging Technologies Used in Hydrographic Surveys
Lecture 28: Objectives and Applications of Control Surveys
Lecture 29: Objectives and Applications of Geodetic Reductions
Lecture 30: Applications of Advanced EDM

Assessment & Evaluation Process:

Assessment questions follow blooms level and are mapped with concerned COs;

1. Module based Assignment-1 (25 Marks)
2. Module based Assignment-2 (25 marks)
3. Final exam (50 marks)

ADD-ON COURSE

On

SUSTAINABLE STRUCTURES AND DISASTER MANAGEMENT IN CONSTRUCTION

Duration: 30 Hours

Dr. B. C. Roy Engineering College, Durgapur
Department of Civil Engineering
Jemua Road, Fuljhore, Durgapur - 713206 (Affiliated to M.A.K.A.U.T.) West Bengal

ABOUT THE COURSE:

This course is designed for first-year civil engineering students to provide a foundational understanding of sustainable construction practices and disaster resilience. This course covers the principles of sustainable design, material selection, and construction techniques that minimize environmental impact. Students will learn about various natural and man-made disasters, their impacts on structures, and strategies for disaster risk reduction. The curriculum includes modules on the lifecycle analysis of building materials, green building certifications, innovative construction technologies, and safety protocols.

PREREQUISITES:

This add-on course is designed for students with a fundamental understanding of engineering principles.This is a self-contained course for students, and hence, no prerequisite is required.

COURSE OUTCOME:

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

CO1: Define key terms related to sustainable construction and disaster management.

CO2: Explain the principles of sustainable design and their impact on the environmental performance of structures.

CO3: Identify and compare different eco-friendly construction materials and their suitability for various applications.

CO4: Relate basic structural vulnerabilities to natural disasters and propose corresponding mitigation techniques.

CO5: Evaluate the trade-offs between sustainability, cost, ethics, and structural performance during the initial design stages of a simple civil engineering project.

COURSE ARTICULATION MATRIX:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	0	0	0	1	2	0	0	1	0	0	1	1	1	0
CO2	1	2	2	0	1	2	3	0	0	1	0	0	1	1	1	0
CO3	1	1	1	0	1	1	2	0	0	1	0	0	1	1	1	0
CO4	1	2	2	0	1	2	2	0	0	1	0	0	1	2	2	0
CO5	2	3	3	1	2	3	3	2	1	2	1	1	1	2	2	1

Course Co-ordinator: Prof. Arijit Kumar Banerji

Course Instructors:

1. Prof. Arijit Kumar Banerji _____
2. Prof. MD. Hamjala Alam _____
3. Mr. Surajit Sen _____
4. Mr. Aditya Prasad Roy _____

Verified By

_____

Prof. (Dr.) Sanjay Sengupta
Head of the Department
Civil Engineering

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Dr. B. C. ROY ENGINEERING COLLEGE
DURGAPUR

SYLLABUS

Module 1	**Introduction to Sustainable Construction and Disaster Management**: Introduction to sustainability, life cycle assessment, disaster risk, mitigation, resilience, Fundamentals of Sustainable Design, Integration of technology in sustainable infrastructure, Types of natural disasters affecting construction, Ethical considerations in sustainable construction and disaster management.
Module 2	**Eco-Friendly Construction Materials:** Overview of Eco-Friendly Materials: Types and characteristics, Environmental impact and benefits, Comparison of traditional vs. sustainable materials, Sustainable design principles (energy efficiency, material selection, waste reduction).
Module 3	**Construction Safety:** Introduction to Construction Safety, Common hazards and risks on construction sites, Overview of safety regulations and compliance requirements, Role of OSHA (Occupational Safety and Health Administration) and other regulatory bodies, Components of an effective safety management system, Safety audits and inspections.
Module 4	**Disaster Risk Assessment and Mitigation Strategies:** Risk Assessment Techniques: Identification and assessment of structural vulnerabilities, Tools and methodologies for risk assessment. Disaster Mitigation Strategies: Techniques for mitigating earthquake, flood, and wind damage, Design considerations for resilient infrastructure.
Module 5	**Flood Risk Management and Emergency Response Planning:** Flood risk (floodplain, flood hazards)management, Structural and non-structural flood mitigation measures, Emergency response protocols, Disaster preparedness and response plans, Developing and implementing emergency response plans, Role of civil engineers in emergency response, Ethical considerations in flood risk management.

COURSE LAYOUT

Module 1: Introduction to Sustainable Construction and Disaster Management

Lecture 1: Introduction to sustainability and life cycle assessment
Lecture 2: Disaster risk, mitigation, and resilience
Lecture 3: Fundamentals of sustainable design
Lecture 4: Integration of technology in sustainable infrastructure
Lecture 5: Types of natural disasters affecting construction
Lecture 6: Ethical considerations in sustainable construction and disaster management

Module 2: Eco-Friendly Construction Materials

Lecture 7: Overview of eco-friendly materials: types and characteristics
Lecture 8: Environmental impact and benefits of eco-friendly materials
Lecture 9: Comparison of traditional vs sustainable materials
Lecture 10: Sustainable design principles: energy efficiency
Lecture 11: Sustainable design principles: material selection
Lecture 12: Sustainable design principles: waste reduction

Module 3: Construction Safety

Lecture 13: Introduction to construction safety
Lecture 14: Common hazards and risks on construction sites
Lecture 15: Overview of safety regulations and compliance requirements
Lecture 16: Role of OSHA and other regulatory bodies
Lecture 17: Components of an effective safety management system
Lecture 18: Safety audits and inspections

Module 4: Disaster Risk Assessment and Mitigation Strategies

Lecture 19: Risk assessment techniques: Identification of structural vulnerabilities
Lecture 20: Risk assessment techniques: Tools and methodologies
Lecture 21: Disaster mitigation strategies: Earthquake damage mitigation
Lecture 22: Disaster mitigation strategies: Flood damage mitigation
Lecture 23: Disaster mitigation strategies: Wind damage mitigation
Lecture 24: Design considerations for resilient infrastructure

Module 5: Flood Risk Management and Emergency Response Planning

Lecture 25: Flood risk management: Floodplain and flood hazards
Lecture 26: Structural flood mitigation measures
Lecture 27: Non-structural flood mitigation measures
Lecture 28: Emergency response protocols and disaster preparedness
Lecture 29: Developing and implementing emergency response plans
Lecture 30: Role of civil engineers in emergency response and ethical considerations

Assessment & Evaluation Process:

Assessment questions follow blooms level and are mapped with concerned COs;

1. Module based Assignment-1 (25 Marks)
2. Module based Assignment-2 (25 marks)
3. Final exam (50 marks)

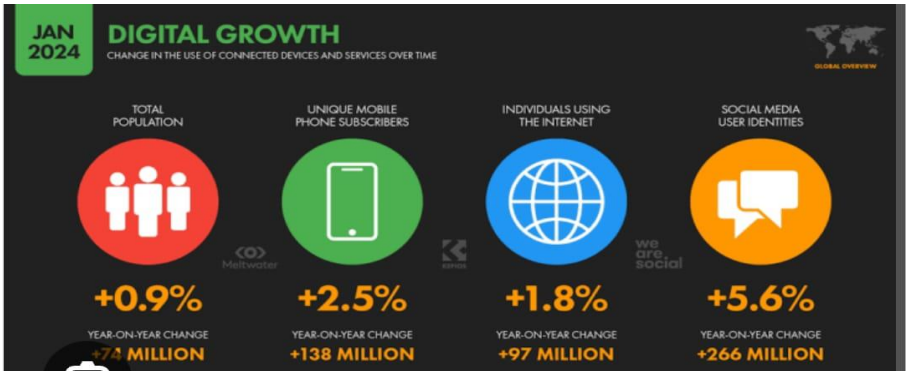
Dr. B. C. Roy Engineering College, Durgapur

(An Autonomous Institute)

Department of Basic Science & Humanities

Presents

Add-On Course on: Statistics and Information Theory



Session: 2024-25

Duration: 30 hours

For B. Tech 1st year Students

Course Coordinator: Dr. Arnab Bandyopadhyay

Course Co- coordinator: Prof. Sreejata Sen Sarma

Join Us with

Add on Course Statistics and Information science
WhatsApp group

Registration https://forms.gle/ijwRwsDcYVAXsoPG8

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For Further details, Please join us on WhatsApp Group link provide as

Dr. B. C. Roy Engineering College, Durgapur

Department of Basic Science & Humanities

Add-On Course

Statistics and Information Theory

Duration: **30 Hrs.**

Course Objective: The objective of statistics and information science in engineering is to utilize statistical methods to analyze and interpret large datasets generated within engineering systems, providing valuable insights to inform decision-making, optimize processes, predict future trends, and ultimately improve engineering design and operations by extracting meaningful patterns from data.

Course Outcome:

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

CO1: Solve the problems involving multiple random variables.

CO2: Compare and contrast different interpretations of probability theory selecting the preferred one in a specific context.

CO3: Formulate predictive models to tackle situations where deterministic algorithms are intractable.

CO 4: Quantifies the amount of uncertainty involved in the value of a random variable or the outcome of a random process.

CO 5: Understand mathematical analysis of problems in Information Theory.

CO6: Summarize data visually and numerically.

Course Content:

Module -I: Single and Bivariate Probability Distributions:

Lecture 1: Review of basic probability

Lecture 2 : Review of Baye's Theorem and conditional probability

Lecture 3 : Moment generating functions

Lecture 4 : Markov's inequality

Lecture 5 : Chebyshev's inequality and law of large numbers

Lecture 6 : Joint distribution using joint probability mass function

Lecture 7 : Joint distribution using joint probability density function

Lecture 8 : Multiplicative property of joint pmf/ pdf in case of independent random variables

Module -II: Markov Chains and Statistical Methods:

Lecture 9: Markov Chains: Introduction

Lecture 10: Chapman-Kolmogorov equations.

Lecture 11: Classification of states

Lecture 12: Some applications: Gambler's Ruin Problem

Lecture 13: Spearman's Rank Correlation coefficient

Lecture 14: Curve fitting: Straight line and parabolas

Module -III: Statistics:

Lecture 15: Population and Samples,

Lecture 16: The sampling distribution of mean (standard deviation known),

Lecture 17: The sampling distribution of mean (standard deviation unknown),

Lecture 18: Point estimation,

Lecture 19: Maximum Likelihood Estimation

Lecture 20: Interval estimation,

Lecture 21: Point and Interval estimation,

Lecture 22: Tests of Hypotheses (Test of Mean from one sample and two sample)

Lecture 23: Tests of Hypotheses (Test of proportion from one sample and two sample)

Lecture 24: Tests of Hypotheses (Goodness of fit)

Module -IV: Classical Information Theory:

Lecture 25: Motivation with some relevant examples

Lecture 26: Entropy : Definition with example

Lecture 27: Joint Entropy and Conditional Entropy

Lecture 28: Relative Entropy and Mutual Information

Lecture 29: Relationship Between Entropy and Mutual Information

Lecture 30: Chain Rules for Entropy, Relative Entropy and Mutual Information

Syllabus

Module	Content	Faculty
Module -I: (Single and Bivariate Probability Distributions)	Lecture 1 : Review of basic probability	**SS**
	Lecture 2 : Review of Baye's Theorem and conditional probability	
	Lecture 3 : Moment generating functions	
	Lecture 4 : Markov's inequality	
	Lecture 5 : Chebyshev's inequality and law of large numbers	
	Lecture 6 : Joint distribution using joint probability mass function	
	Lecture 7 : Joint distribution using joint probability density function	
	Lecture 8 : Multiplicative property of joint pmf/ pdf in case of independent random variables	
Module -II: (Markov Chains and Statistical Methods)	Lecture 9: Markov Chains: Introduction	**AB**
	Lecture 10: Chapman-Kolmogorov equations.	
	Lecture 11: Classification of states	
	Lecture 12: Some applications: Gambler's Ruin Problem	
	Lecture 13: Spearman's Rank Correlation coefficient	
	Lecture 14: Curve fitting: Straight line and parabolas	
Module -III: (Statistics)	Lecture 15: Population and Samples,	**AB & SS**
	Lecture 16: The sampling distribution of mean (standard deviation known),	
	Lecture 17: The sampling distribution of mean (standard deviation unknown),	
	Lecture 18: Point estimation,	
	Lecture 19: Maximum Likelihood Estimation	
	Lecture 20: Interval estimation,	
	Lecture 21: Point and Interval estimation,	
	Lecture 22: Tests of Hypotheses (Test of Mean from one sample and two sample)	
	Lecture 23: Tests of Hypotheses (Test of proportion from one sample and two sample)	
	Lecture 24: Tests of Hypotheses (Goodness of fit)	
Module -IV: (Classical Information Theory)	Lecture 25: Motivation with some relevant examples	**AB & SS**
	Lecture 26: Entropy : Definition with example	
	Lecture 27: Joint Entropy and Conditional Entropy	
	Lecture 28: Relative Entropy and Mutual Information	
	Lecture 29: Relationship Between Entropy and Mutual Information	

	Lecture 30: Chain Rules for Entropy, Relative Entropy and Mutual Information	

Text Books

1. Elements of Information Theory - Thomas M. Cover , Joy A. Thomas, Wiley
2. Fundamentals of Mathematical Statistics - S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons
3. Business Statistics - J. K. Sharma, Vikas Publishing House.

Reference Books

1. Introduction to Probability Models - S. M. Ross, Elsevier.
2. Information Theory and Reliable Communication - Robert G. Gallager, John Wiley and Sons
3. Business Statistics Problem and Solutions - J. K. Sharma, Pearson

Textbook Companion (TBC)

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Some of the completed TBCs in R

- A First Course in Probability by Sheldon Ross, Pearson, 2008
- Applied Statistics and Probability for Engineers by Douglas C. Montgomery and George C. Runger, John Wiley & Sons, 2014
- Biostatistics: Basic Concepts and Methodology for the Health Sciences by Daniel W. Wayne, Chad L. Cross, John Wiley & Sons, 2014
- Data Mining: Concepts and Techniques by Jiawei Han, Micheline Kamber, and Jian Pei, Morgan Kaufmann, 2011
- Fundamentals of Matrix Algebra, Third Edition by Gregory Hartman, CreateSpace Independent Publishing Platform, 2011
- Numerical Methods in Finance and Economics: A MATLAB-Based Introduction by Paolo Brandimarte, John Wiley & Sons, Inc., Hoboken, 2006
- Statistics for Management and Economics by Gerald Keller, Cengage Learning, 2012
- Statistics for Psychology by Arthur Aron, Elliot J. Coups, and Elaine N. Aron, Pearson. 2013

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- Supporting workshops for faculty, students & staff

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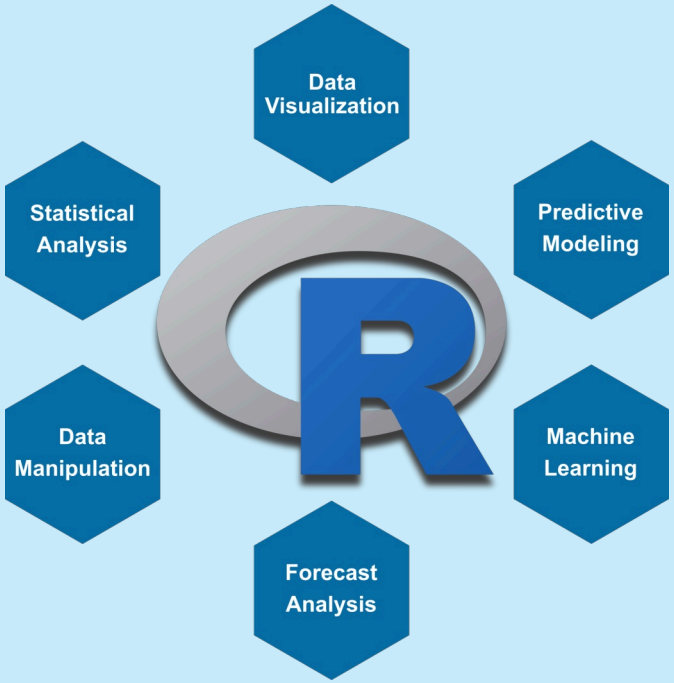
The FOSSEE Team conducts workshops on R and other FLOSS using spoken tutorials and gives certificates to those who pass an online test.

For more details please write to:

contact-r@fossee.in

https://fossee.in

The FOSSEE project is funded by the National Mission on Education through ICT, MHRD, Govt. of India.



r.fossee.in

IIT BOMBAY

Introduction

R is a language and environment for statistical computing & graphics.

R is available as Free Software under the terms of the Free Software Foundation's GNU (General Public License) in source code form.

Download & Installation

Download R

https://www.r-project.org/

Download RStudio

https://www.rstudio.com/

Features

A) R is an integrated suite of software facilities for data manipulation, calculation and graphical display. It includes

- a well-developed, simple yet effective programming language which includes conditionals, loops, user-defined recursive functions and input and output facilities
- an effective data handling and storage facility
- a suite of operators for calculations on arrays, matrices in particular
- a large, coherent, integrated collection of intermediate tools for data analysis
- graphical facilities for data analysis and display either on-screen or on hardcopy

B) R has its own LaTeX-like documentation format, which is used to supply comprehensive documentation, both on-line in various formats and in hardcopy.

Who can use R language:

- Educational Institutions like universities, colleges and schools
- Statisticians and data miners for developing statistical software and data analysis, polls, data mining surveys
- Data Scientist, Market Analyst, Social Scientist

R Series on Spoken Tutorial

Basic Tutorials:

1. Introduction to basics of R
2. Introduction to data frames in R
3. Introduction to RStudio
4. Introduction to R script
5. Working Directories in RStudio
6. Indexing and Slicing Data Frames
7. Creating Matrices using Data Frames
8. Operations on Matrices and Data Frames
9. Merging and Importing Data
10. Data Types and Factors
11. Lists and its Operations
12. Plotting Histograms and Pie Chart
13. Plotting Bar Charts and Scatter Plot
14. Introduction to ggplot2
15. Aesthetic Mapping in ggplot2
16. Data Manipulation using dplyr Package
17. More functions in the dplyr Package
18. Pipe Operator
19. Conditional Statements
20. Functions in R

Target Audience

- Any Teacher/Trainer
- Students

About FOSSEE

The FOSSEE (Free/Libre and Open Source Software for Education) project team works on 'Adaptation and development of Open Source simulation packages equivalent to proprietary software', and is based at Indian Institute of Technology Bombay. FOSSEE is promoting open source software across India through various projects and activities like Textbook Companions, Lab Migration, Workshops, FOSSEE Forum, Conferences, FOSSEE Fellowship etc. for students, faculty and other FLOSS evangelists.

The Spoken Tutorial project

*Self-explanatory - uses simple language

*Audio-video - uses multisensory approach

*Small duration - has better retention

*Learner centered - learn at your own pace

*Learning by doing - learn and practice simultaneously

*Empowerment - learn a new FOSS

Target Group

*Students - High School and College

*Working professional - Software users, developers and trainers

*Research scholars

*Community at large

Workshops

The Spoken Tutorial Project Team conducts workshops on LaTeX and several FOSS using spoken tutorials and gives certificates to those who pass an online test.

For more details, please write to
contact@spoken-tutorial.org

The Spoken Tutorial Project is funded by the National Mission on Education through Information and Communication Technology, Ministry of Human Resource Development, Government of India.

Contact us

Email: contact@spoken-tutorial.org

Website: http://spoken-tutorial.org

IIT Bombay

Spoken Tutorial

LaTeX

National Mission on Education through Information and Communication Technology (NMEICT)
www.sakshat.ac.in

Funded by MHRD, Government of India

http://spoken-tutorial.org

What is LaTeX?

LaTeX is a document preparation system for high-quality typesetting. Often used for technical or scientific documents, it can be used for almost any form of publishing: letter, report, textbook, etc...
LaTeX lets authors get with writing documents without being bothered about document design.

Download LaTeX from
http://tug.org/begin.html

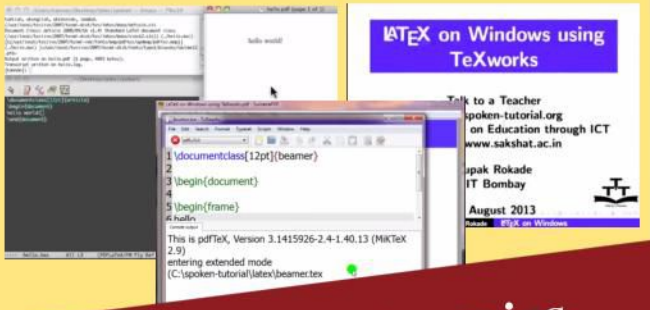
Benefits of LaTeX:

Benefits of LaTeX:

*Works on all OS: Linux, Windows, Mac OSX.
*Easily typesets journal articles, technical reports, books and slide presentations.
*Controls large documents containing sectioning, cross-references, tables and figures.
*Typesets complex mathematical formulae with ease.
*Advanced typesetting available for mathematical equations.
*Automatic generation of bibliographies and indexes.
*Multi-lingual typesetting.
*Inclusion of artwork and process or spot colour.
*Uses PostScript or Metafont fonts.
*Very active user community.

Xfig

*Xfig is a free and open source vector graphics editor. It is a drawing tool for use on the Linux and UNIX services.
*Xfig was written by Supoj Sutanthavibul in 1985.
*In Xfig, figures may be drawn using objects such as circles, boxes, lines, spline curves, text etc.
*It is also possible to import images in formats such as GIF, JPEG, EPS, PostScript etc.
*These objects can be created, deleted, moved or modified. Attributes such as colours or line styles can be selected in various ways.
*Xfig has a facility to print figures to a Post-Script printer too.
*Convenient feature is the PSTEX or PDFTEX export format. This allows a smooth integration of Xfig-generated images into LaTeX documents.
*Most operations in Xfig are performed using the mouse. But some operations may also be performed using keyboard (accelerators) shortcuts.
*The interface is designed for a three-button mouse, although it is also possible to use a two button or a one button mouse with appropriate emulation.



Tutorials in the series

*LaTeX on Windows using TeXwork
*What is Compiling?
*Letter Writing
*Report Writing
*Mathematical Typesetting
*Equations
*Tables and Figures
*Beamer
*Bibliography
*Inside story of Bibliography
*Simple block diagram
*Feedback control diagram
*Feedback diagram with Maths

These tutorials are also available in many Indian languages such as English, Hindi, Bengali, Bhojpuri, Gujarati, Kannada, Marathi, Sanskrit, Tamil, Telugu.

About the Spoken Tutorial project

- Self explanatory - uses simple language
- Audio-video - uses multisensory approach
- Small duration - has better retention

  Learner-centered - learn at your own pace
- Learning by doing - learn and practice

  Simultaneous empowerment - learn a new FLOSS

Target Audience

Students

The Spoken Tutorial Project Team conducts workshops on Introduction to Computers and other FLOSS using spoken tutorials and gives certificates to those who pass an online test.

For more details, please write to

contact@spoken-tutorial.org

The Spoken Tutorial Project is funded by the National Mission on Education through Information and Communication Technology, Ministry of Human Resource Development, Government of India.

Contact US:
Email: contact@spoken-tutorial.org
Website: https://spoken-tutorial.org

Spoken Tutorial

https://spoken-tutorial.org

Introduction to Computers

National Mission on Education through Information and Communication Technology (NMEICT)
www.sakshat.ac.in
Funded by MHRD, Government of India.

Introduction

These Spoken Tutorials help the beginners to learn the basics about computer components and Using Gmail and Google drive. It is easy to learn for beginners

The following things are explained in this series

Computer

Various components of a computer and their connections
Connecting to a Printer and take a test print

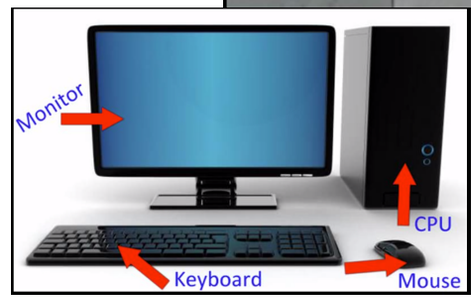
Gmail

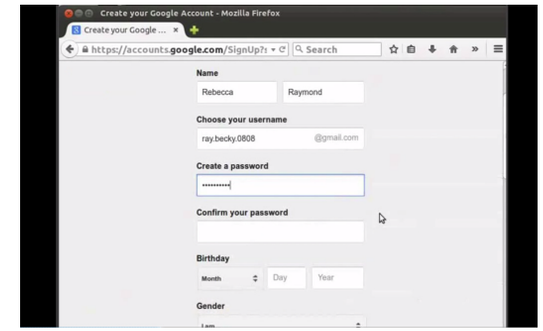
Create a Gmail account
Compose Option for Emails
Format the email text.
Attach files to emails

Google Drive

Share files via Google Drive
Insert a photo or link into an email and about the Compose window options
Creating a document, a spreadsheet and a presentation

Uploading files & folders





Spoken Tutorials in Introduction to Computers series

Getting to know computers
Printer Connection
Introduction to Gmail
Compose Options for Email
Google Drive Options

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- Learning by doing - learn and practice simultaneously
- Empowerment - learn a new FOSS

Target Group

- Students - High-School and College
- Working professionals - software users, developers and trainers
- Research scholars
- Community at large

Workshops

The Spoken Tutorial Project Team conducts workshops on Linux, Ubuntu and other FOSS using spoken tutorials and gives certificates to those who pass an online test.

For more details, please write to
contact@spoken-tutorial.org

The Spoken Tutorial Project
is funded by the
National Mission on Education
through Information and
Communication Technology,
Ministry of Human Resource
Development,
Government of India

Contact us

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Website: http://spoken-tutorial.org

IIT Bombay

SPOKEN TUTORIALS

Linux + Ubuntu

National Mission on Education through
Information and Communication Technology
(NMEICT)
www.sakshat.ac.in

http://spoken-tutorial.org

What makes Linux endearing to users? Linux consists of the kernel, libraries, and various applications. Each distribution of Linux is a different combination of these elements. And Ubuntu has found the favour of several users making it the most popular.

What is Ubuntu Linux?

Ubuntu is an ancient African word meaning 'humanity to others'. It also means 'I am what I am because of who we all are'. The Ubuntu Linux operating system brings the spirit of Ubuntu to the world of computers.

Ubuntu is one of the latest and most widely downloaded distributions of Linux. It is the most popular flavor of Linux.

So, what are the benefits of Linux and Ubuntu?

1. Freeware software: One of the greatest advantages of Linux OS is that it is free of cost; it does not include any paid subscriptions, paid premium editions, or extra paid software. There is very little maintenance cost and it is easy to run and maintain. Further, if you just want to check out the Linux OS, you have the option to boot from a CD, without installation, and try out the Linux experience.
2. Manageability: Linux is easy to manage, starting right from its installation, startup, shutdown, initialization, and package management. It is simple to deploy and you can complete a typical installation of the standard services within 15 minutes. Also, it does not include any additional extraneous applications, making it fast and efficient.
3. Easy to upgrade and update: The Linux OS is easy to install and upgrade to obtain the latest features. Also, the process of obtaining updates is eased through the Debian and APT packaging, which makes the introduction of new software easy and smooth.
4. Security: Linux is hard-to-hack. To add to that, the frequent updates ensure that any further security risks are also eliminated.
5. Vast source of online help: There are little chances of getting stuck while installing or working with Linux. This is because of a large source of online help available for any issue related to Linux.
6. User-friendly: Ubuntu is user-friendly and easily available. It can also be easily installed. Ubuntu is one OS, currently being considered as the best bet for those struggling and considering moving away from Windows OS. Ubuntu is a clear indication that users are beginning to accept Linux as a better OS. Whether it is for personal use, for your organization or for propagating computer education among your community, Linux is the ideal choice. Its secure environment, user-friendliness and above all its ease of installation, makes it the most favoured OS among most users.
7. Add-ons: Linux is free and requires no costly add-ons. Download Linux from the Internet and install it on as many machines as you want. The same is true of most Linux application software.

So, why Linux?

Support

Ubuntu & Linux are the best supported operating systems of all time. You can get help from tens of thousands of active Linux users and programmers from all over the world, at any time.

Multi-platform

Windows is limited to Intel and Intel-compatible processors and only certain machine architectures. Linux and other Unix-compatible operating systems work on a wide variety of processors and machine architectures.

Open Protocols

Linux uses open protocols. There are no proprietary protocols that lock you. Monopolies do not exist in the Linux world.

With Linux, you can

- Browse the internet with Mozilla Firefox browser – easier, safer and faster, less susceptible to virus infections.
- Do office activities with LibreOffice Suite-a complete suite for document creation, spreadsheet, presentation, design and database. It supports all formats including MS-Word, MS-Excel, MS-Powerpoint.
- Program using Java, Python, C/C++, Shell-script, PHP & MySQL and many more.
- Create graphic designs using GIMP, Inkscape – for photo retouching, image composition and image authoring (equivalent to Photoshop).
- Use multimedia players like VLC, Movie Player for music and videos.

Do all of these & more without purchasing expensive commercial software. Use the Ubuntu Software Centre facility to download any software.

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- Learning by doing: learn and practise simultaneously
- Empowerment: learn a new **FLOSS** (**F**ree/**L**ibre and **O**pen **S**ource **S**oftware)

Target Audience

High school, College and Engineering students

Pre-requisites for Basic level tutorials:

- Basic knowledge of electronics
- Electronic components and connections
- Knowledge of C programming

Additional Pre-requisites for Intermediate level tutorial:

- Assembly language

Workshops

The Spoken Tutorial Project Team conducts workshops on Arduino and other FLOSS using spoken tutorials and gives certificates to those who pass an online test.
For more details, please visit
https://spoken-tutorial.org

Forum

We have developed a beginner friendly Forum to answer specific questions pertaining to any part of a particular tutorial.
For more details, please visit
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Forum help available to all learners

Content available in 22 Indian languages

IIT Bombay

Spoken Tutorial

https://spoken-tutorial.org

Scan the QR code to
visit Spoken Tutorial website

ARDUINO™

National Mission on Education through
Information and Communication Technology
(NMEICT)
www.sakshat.ac.in

Funded by MHRD, Government of India.

What is Arduino?

- Arduino is an open-source electronics platform used for building electronics projects.
- Arduino consists of both a physical programmable circuit board or microcontroller and a software IDE (Integrated Development Environment) that runs on the computer.
- It is used to write and upload computer code to the physical board.
- It is intended for making interactive projects.
- Download Arduino IDE from www.arduino.cc

Features of Arduino IDE

- Works on Linux, Windows and Mac operating systems
- Has many in-built functions that make programming simple and easy
- Easy to write code and upload it to the physical board
- Arduino IDE can be used with any Arduino board
- Can be easily adapted for IoT applications
- Arduino can be turned into IoT product by adding ESP8266 wifi module

Benefits of using Arduino Kit

- Arduino boards are less expensive compared to other microcontrollers platform.
- The Arduino programming environment is easy-to-use for beginners.
- For advanced users, the language can be expanded through C++ libraries and AVR-GCC programming language can be added to Arduino programs.
- The modules are published under a Creative Commons license, so circuit designers can make their own version of the module.

- Arduino platform was designed for hobbyists, students and professionals to create IoT applications that play in the human interface world using sensors, motors, etc.
- Arduino can interact with buttons, LEDs, LCDs, motors, speakers, cameras, TV and smartphones, etc.
- Arduino can be connected to one or more sensors to capture the data.

Spoken Tutorials in Arduino series

Basic Level

- Overview of Arduino
- Electronic components and connections
- Introduction to Arduino
- Arduino components and IDE
- First Arduino Program
- Arduino with Tricolor LED and Push button
- Arduino with LCD
- Display counter using Arduino
- Seven segment display
- Pulse Width Modulation
- Analog to Digital Conversion
- Wireless Connectivity to Arduino

Intermediate Level

- Assembly programming through Arduino
- Digital logic design with Arduino
- AVR-GCC programming through Arduino
- Interfacing LCD through AVR-GCC programming
- Mixing Assembly and C programming

Popular uses of Arduino

- Home automation (controlling lights, fans and other appliances) via Android smartphone
- Traffic light control
- PC controlled robotic arm
- Temperature controller
- Anti-theft camera system
- Automated irrigation system
- Feeder for Aquarium
- Garage parking
- Line follower robot

Components required to practise Arduino Spoken Tutorials

1. Arduino UNO or Compatible Board (1 no.)
2. USB Power Cable (1 no.)
3. Resistor 220 ohms (6 nos.)
4. Resistor 10K Ohms (2 nos.)
5. Resistor 1K Ohms (4 nos.)
6. Breadboard (1 no.)
7. Tricolor LED Common Cathode (1 no.)
8. Red LED Common Cathode (1 no.)
9. Seven segment display - Common cathode (1 no.)
10. Seven segment display - Common anode (1 no.)
11. Decoder – IC 7447 (1 no.)
12. LCD 16 X 2 soldered with pin header (1 no.)
13. Jumper wires Male to Male (20 nos.)
14. Jumper wires Male to Female (8 nos.)
15. Potentiometer 10K Ohms (1 no.)
16. ESP8266 es01 WiFi Black color Module (1 no.)
17. DHT11 Temp_Humidity Sensor Module (1 no.)
18. L293D H-Bridge Motor driver IC (1 no.)
19. Toy Motor (1 no.)
20. Buzzer (1 no.)
21. Push Button Switch (2 nos.)

Textbook Companion (TBC)

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- Applied Statistics and Probability for Engineers by Douglas C. Montgomery and George C. Runger, John Wiley & Sons, 2014
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- Data Mining: Concepts and Techniques by Jiawei Han, Micheline Kamber, and Jian Pei, Morgan Kaufmann, 2011
- Fundamentals of Matrix Algebra, Third Edition by Gregory Hartman, CreateSpace Independent Publishing Platform, 2011
- Numerical Methods in Finance and Economics: A MATLAB-Based Introduction by Paolo Brandimarte, John Wiley & Sons, Inc., Hoboken, 2006
- Statistics for Management and Economics by Gerald Keller, Cengage Learning, 2012
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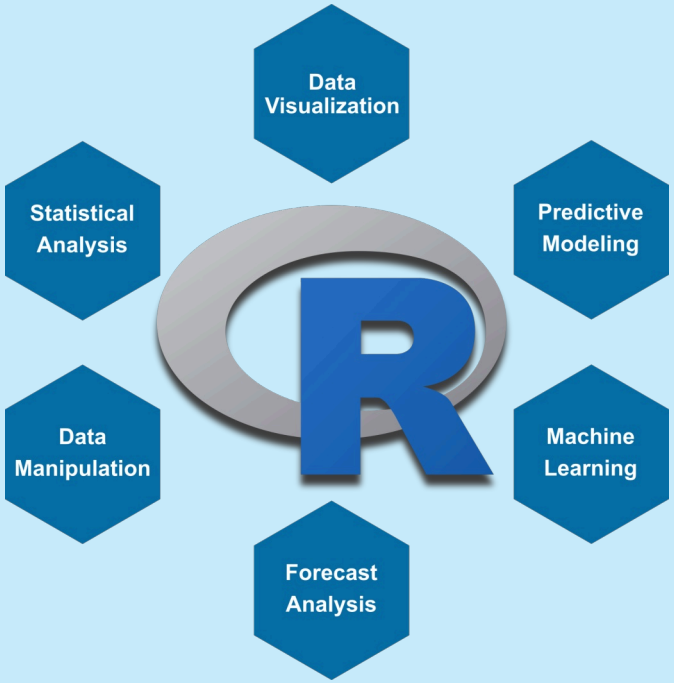

r.fossee.in

IIT BOMBAY

Introduction

R is a language and environment for statistical computing & graphics.

R is available as Free Software under the terms of the Free Software Foundation's GNU (General Public License) in source code form.

Download & Installation

Download R

https://www.r-project.org/

Download RStudio

https://www.rstudio.com/

Features

A) R is an integrated suite of software facilities for data manipulation, calculation and graphical display. It includes

- a well-developed, simple yet effective programming language which includes conditionals, loops, user-defined recursive functions and input and output facilities
- an effective data handling and storage facility
- a suite of operators for calculations on arrays, matrices in particular
- a large, coherent, integrated collection of intermediate tools for data analysis
- graphical facilities for data analysis and display either on-screen or on hardcopy

B) R has its own LaTeX-like documentation format, which is used to supply comprehensive documentation, both on-line in various formats and in hardcopy.

Who can use R language:

- Educational Institutions like universities, colleges and schools
- Statisticians and data miners for developing statistical software and data analysis, polls, data mining surveys
- Data Scientist, Market Analyst, Social Scientist

R Series on Spoken Tutorial

Basic Tutorials:

1. Introduction to basics of R
2. Introduction to data frames in R
3. Introduction to RStudio
4. Introduction to R script
5. Working Directories in RStudio
6. Indexing and Slicing Data Frames
7. Creating Matrices using Data Frames
8. Operations on Matrices and Data Frames
9. Merging and Importing Data
10. Data Types and Factors
11. Lists and its Operations
12. Plotting Histograms and Pie Chart
13. Plotting Bar Charts and Scatter Plot
14. Introduction to ggplot2
15. Aesthetic Mapping in ggplot2
16. Data Manipulation using dplyr Package
17. More functions in the dplyr Package
18. Pipe Operator
19. Conditional Statements
20. Functions in R

Target Audience

- Any Teacher/Trainer
- Students

About FOSSEE

The FOSSEE (Free/Libre and Open Source Software for Education) project team works on 'Adaptation and development of Open Source simulation packages equivalent to proprietary software', and is based at Indian Institute of Technology Bombay. FOSSEE is promoting open source software across India through various projects and activities like Textbook Companions, Lab Migration, Workshops, FOSSEE Forum, Conferences, FOSSEE Fellowship etc. for students, faculty and other FLOSS evangelists.

python™

What is Python?

Python is a general purpose, high level, remarkably powerful dynamic programming language used in a wide variety of application domains.

Why Python?

- Easy to read and learn
- Free and Open Source
- Useful for scientific computing
- Powerful interactive interpreter
- Extensive scientific libraries
- Well documented

Where can you use Python?

- Numeric and Symbolic computation
- 2D/3D Plotting
- User interfaces
- Parallel computing
- Machine Learning and Image Processing
- Game development
- Web development
- Much more...

Who uses Python?

- Google
- Yahoo
- Walt Disney
- NASA
- IBM
- YouTube
- nVIDIA
- Software - Blender, Motion Builder, Cinema 4D, etc.
- Games - Battle field 2 by EA sports, Crystal space 3D, etc.

Python is one of the most popular programming languages today, and therefore has been included in the CBSE curriculum. It easily performs tasks that proprietary tools like Matlab and Mathematica offer. Today leading companies are using Python extensively, hence there are better job opportunities. Learn Python, and grab the Opportunity!

matplotlib django pandas SciPy

SymPy IPython Interactive Computing Mayavi NumPy

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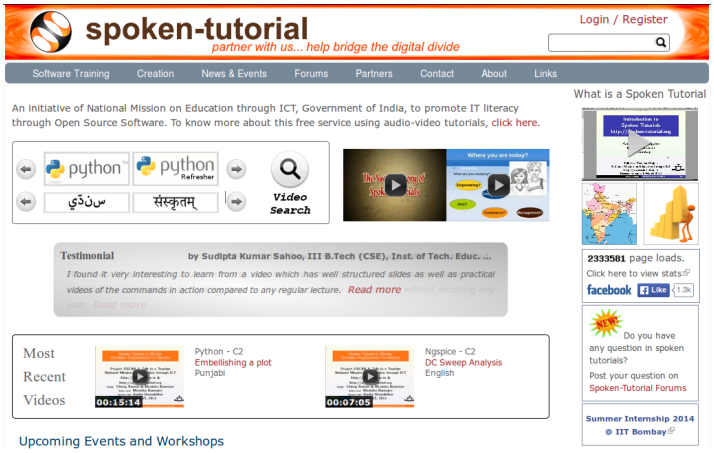
How can you learn Python

- **Spoken Tutorial -** The FOSSEE project has created a series of Spoken Tutorials on Python. Theses are available for learning, on the Spoken Tutorial website, free of cost. You can access these tutorials from this link

  python.fossee.in/spoken-tutorials



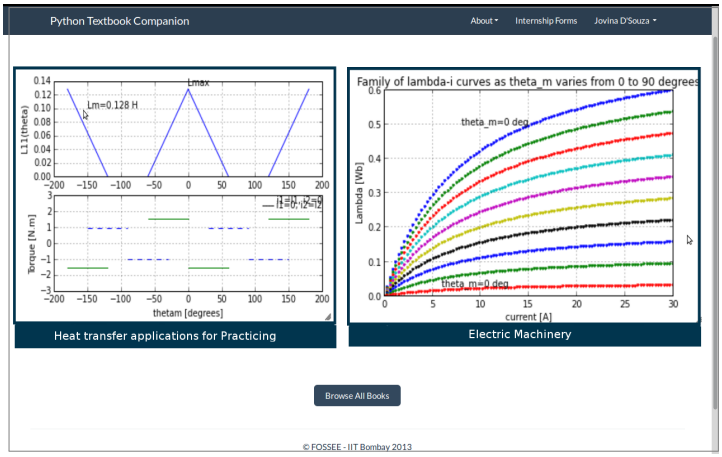
Spoken Tutorial website

- **Textbook Companion Internship -** Learn Python in a practical way by contributing to the Python Textbook Companion Internship. It aims to create Companions by coding solved examples from Standard textbooks, using Python. Participate and earn attractive honoarium and Certificate of Internship from FOSSEE, IIT Bombay! For more details, please visit:

  python.fossee.in/textbook-companion-project

Completed Book : Approx 453 books

Under Progress : Approx 113 books



Python Textbook Companion website

- **SELF Workshops -** The Spoken Tutorial Team conducts workshops on Python. These are completely free of cost, and are conducted without the need of any domain expert. Learn Python and obtain a certificate from Spoken Tutorial Project, IIT Bombay, upon successful completion of the post-workshop evaluation test. Please visit:

  python.fossee.in/spoken-tutorials

About us

Website:

http://python.fossee.in

Contact us

General help & Queries:

info@fossee.in

python@fossee.in

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The Spoken Tutorial Project

- Self-explanatory: uses simple language
- Audio-video: uses multisensory approach
- Small duration: has better retention
- Learner-centered: learn at your own pace
- Learning by doing: learn and practise simultaneously
- Empowerment: learn a new **FLOSS** (**F**ree/**L**ibre and **O**pen **S**ource **S**oftware)

Target Group

- Students- High School and College
- Working professional- Software users, developers and trainers
- Research scholars
- Community at large

Workshops

The Spoken Tutorial Project Team conducts workshops on Java and other FLOSS using spoken tutorials and gives certificates to those who pass an online test.
For more details, please visit
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Forum

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Java

National Mission on Education through Information and Communication Technology (NMEICT)

www.sakshat.ac.in

Funded by MHRD, Government of India.

Introduction

- Java is the most popular class-based, object-oriented, high-level programming language.
- Developed by James Gosling at Sun Microsystems and released in 1995 as a core component of Sun Microsystems' Java platform.
- Derives much of its syntax from C and C++.
- Is typically compiled to bytecode (class file). It can be run on any Java Virtual Machine (JVM) regardless of the architecture.
- Is specifically designed to have few implementation dependencies.
- Is Intended to let application developers write a code that runs on one platform & does not need to be recompiled to run on another.

Java has characteristics of Object-Oriented languages

- **Inheritance:** Creating new classes & extending them to reuse the existing code and adding new features as needed.
- **Encapsulation:** combining the information and providing the abstraction.
- **Polymorphism:** Providing different functionality by the functions having the same name, based on the signatures of the methods.
- **Dynamic binding:** Providing maximum functionality to a program about the specific type at runtime.

Features

Platform independence:
Key feature of Java language is write-once-run-anywhere (WORA) concept. With Java, you can run the code written on any system.

Simplicity:
Programs are easy to write and debug. Java provides a bug-free system due to strong memory management.

Portability: Java feature write-once-run-anywhere makes it portable, provided that the system has an interpreter for JVM.
Also, Java has standard data size irrespective of the OS or the processor.

Performance: Uses native code and lightweight process called threads.
The advance version of JVM uses adaptive and just-in-time compilation technique to improve the total performance.

Distributed: Widely used protocols like HTTP and FTP are developed in Java.
Internet programmers can call functions on these protocols and can access the files from any remote machine on the internet, rather than writing codes on their local system.

Secure:
- Programs in Java run under an area known as the sandbox.
- Security manager determines the accessibility options of a class like reading and writing a file to the local disk.
- Uses public key encryption system to allow the java applications to transmit over the internet, in a secure and encrypted form.
- The bytecode verifier checks the classes after loading.

Robust:
Java has
- Strong memory allocation.
- Automatic garbage collection mechanism.
- Powerful exception handling.
- Type-checking mechanism.
- A compiler that checks the program for any errors and interpreter checks any runtime errors and makes the system secure from crashes.

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Target Group

- Web Administrators
- IT Faculty
- IT Students
- Web Designers
- Web Developers

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Spoken Tutorial

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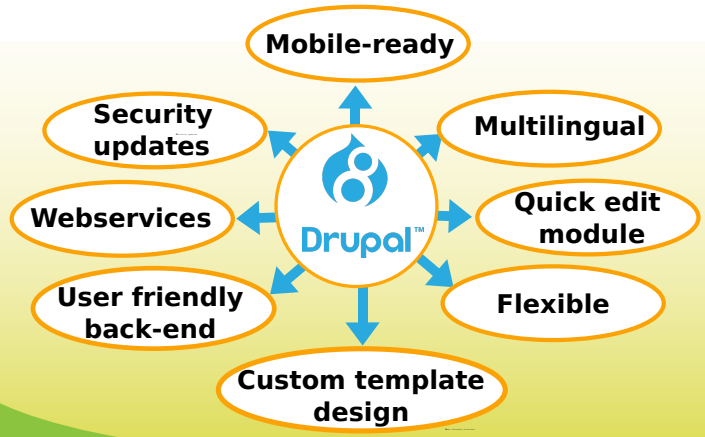
Drupal™

NMEICT, Ministry of Human Resource Development
NVLI, Ministry of Culture
Government of India

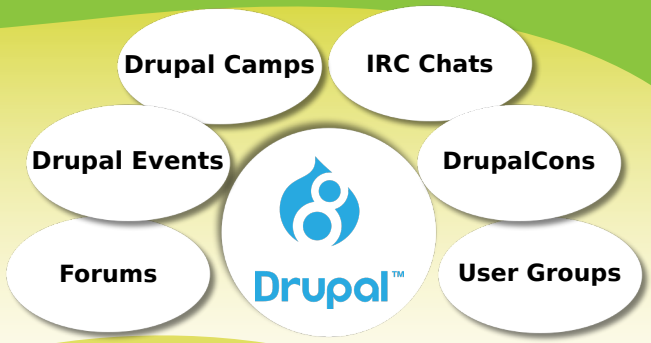
Introduction

- Drupal is a free and open source Content Management System (CMS).
- It was created in 2000 by Dries Buytaert.
- It makes even non-technical users to manage a website easily.
- It works well with sophisticated websites that require many different custom data structures.
- It uses various programming functionalities such as PHP, Ajax and Javascript.
- Over 1.2 million websites use Drupal 8.
- To download and install Drupal 8, visit https://www.drupal.org/download



Features of Drupal

- Developers use Drupal as both CMS and a broad web development platform.
- Drupal allows site editors to add tags, descriptions, keywords and human-friendly URLs.
- Drupal keeps our site safe with regular security updates, hash passwords, session IDs that change when permissions change and text format permissions that restrict user input.
- We can extend a Drupal site by using thousands of Modules that add many features to the Drupal site.
- We can view and administer every page on a Drupal site, from any mobile device.
- Drupal is friendly, social and searchable.
- It's one of the best solutions for people who want to build a feature-rich website.
- Drupal is one of the most adaptive systems available today.



Drupal community

- Drupal community is one of the largest and closely-knit open source communities.
- Because it is open source, several thousands of people have helped in improving the code base.
- Active contribution to the Drupal Code Base improves employment potential immensely.
- There are very active Forums, User Groups and IRC chats dedicated to Drupal support.
- Drupal events are conducted all over the world:
  - Local events called Drupal Camps.
  - There are also major DrupalCons all around the world every year.
- The following tagline summarizes the Drupal philosophy:
  Come for the code, stay for the community.

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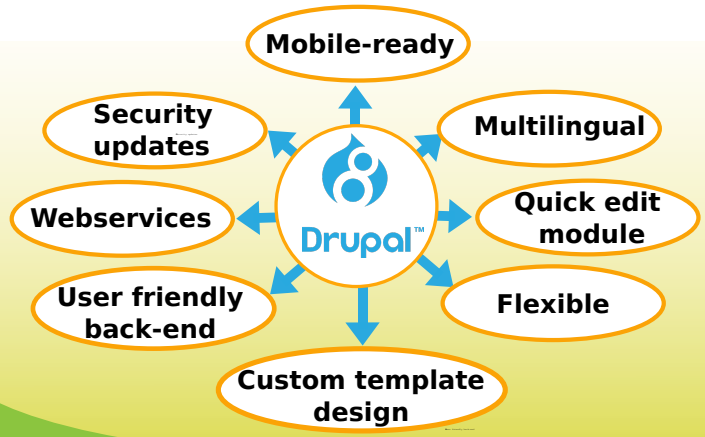

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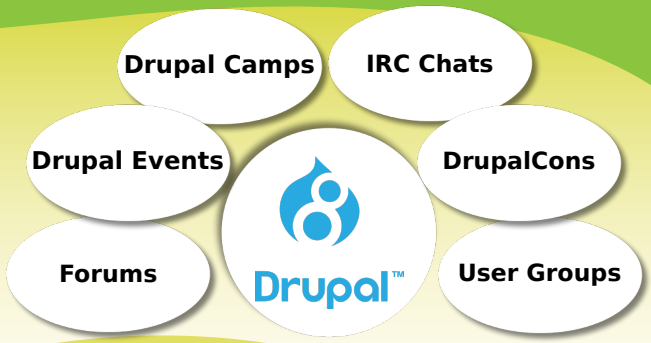

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Target Group

- Students- High School and College
- Working professional- Software users, developers and trainers
- Research scholars
- Community at large

Workshops

The Spoken Tutorial Project Team conducts workshops on C and C++ and other FLOSS using spoken tutorials and gives certificates to those who pass an online test.
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Forum help available to all learners

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THE C PROGRAMMING LANGUAGE

C++

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About C

C is a general-purpose programming language, initially developed by Dennis Ritchie between 1969 and 1973 at Bell Labs. Its design provides constructs that map efficiently to typical machine instructions. C is one of the most widely used programming language and there are very few computer architectures for which a C compiler does not exist.

Features

- C has facilities for structured programming and allows lexical variable scope and recursion.
- All executable code is contained within subroutines, called "functions."
- C program source text is free-format, using the semicolon as a statement terminator and curly braces for grouping blocks of statements.
- Typing is static, but weakly enforced: all data has a type, but implicit conversions can be performed; for instance, characters can be used as integers.
- Complex functionality such as I/O, string manipulation, and mathematical functions are easy to implement with library routines.

About C++

- C++ is a statically typed, free-form, compiled, general-purpose programming language. It was developed by Bjarne Stroustrup starting in 1979, at Bell Labs.
- It adds object-oriented features such as classes, and other enhancements to the C programming language.
- The language began as enhancements to C, first adding classes, then virtual functions, operator overloading, multiple inheritances, templates, and exception handling among other features.
- C++ is also one of the most popular programming languages and can be implemented on most hardware and OS platforms.
- As an efficient compiler to native code, its application domains include:
- Systems software
- Application software
- Device drivers
- Embedded software
- High-performance server and client applications
- Entertainment software like video games

Features

- Classes: By using classes, we can create user-defined data types. A class is the collection of a set of data and code. An object is the instance of a class.
- Inheritance: Allows one data type to acquire properties of other data types. This provides the idea of reusability, that means we can add new features to an existing class without modifying it.
- Data Abstraction and Encapsulation: Encapsulation means hiding data from the data structures. Here, the data is accessible to only the functions that are allowed to access it. Abstraction means representing essential features without including background details.
- Polymorphism: means one interface can be used for multiple implementations, so that object can behave differently for each implementation.
- Dynamic Binding: At runtime, the code matching the object under the current reference will be called.

C and C++ Advantages

- Powerful and flexible: C/C++ are used for developing operating systems, compilers, parsers, interpreters, word processors, search engines and graphic programs.
- Support: C requires less runtime support
- Portable programming language: A variety of C/C++programm written for one computer system can be compiled and run on another system, with little or no change.
- Modular: Written in routines called functions and classes (C++), programs can be used in other applications or programs.
- Preferred by professional programmers: A variety of C/C++ resources and helpful supports are widely available.
- Standardised: Many standards have been documented, maintained and updated for C and C++ as standard references.

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*Working professional - Software users, developers and trainers

*Research scholars

*Community at large

Workshops

The Spoken Tutorial Project Team conducts workshops on LaTeX and several FOSS using spoken tutorials and gives certificates to those who pass an online test.

For more details, please write to
contact@spoken-tutorial.org

The Spoken Tutorial Project is funded by the National Mission on Education through Information and Communication Technology, Ministry of Human Resource Development, Government of India.

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LaTeX

National Mission on Education through Information and Communication Technology (NMEICT)
www.sakshat.ac.in

Funded by MHRD, Government of India

http://spoken-tutorial.org

What is LaTeX?

LaTeX is a document preparation system for high-quality typesetting. Often used for technical or scientific documents, it can be used for almost any form of publishing: letter, report, textbook, etc...
LaTeX lets authors get with writing documents without being bothered about document design.

Download LaTeX from
http://tug.org/begin.html

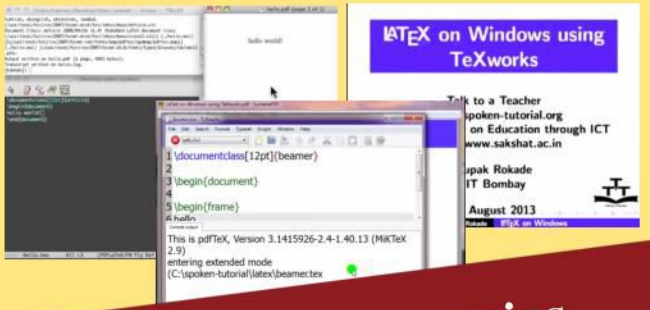
Benefits of LaTeX:

Benefits of LaTeX:

*Works on all OS: Linux, Windows, Mac OSX.
*Easily typesets journal articles, technical reports, books and slide presentations.
*Controls large documents containing sectioning, cross-references, tables and figures.
*Typesets complex mathematical formulae with ease.
*Advanced typesetting available for mathematical equations.
*Automatic generation of bibliographies and indexes.
*Multi-lingual typesetting.
*Inclusion of artwork and process or spot colour.
*Uses PostScript or Metafont fonts.
*Very active user community.

Xfig

*Xfig is a free and open source vector graphics editor. It is a drawing tool for use on the Linux and UNIX services.
*Xfig was written by Supoj Sutanthavibul in 1985.
*In Xfig, figures may be drawn using objects such as circles, boxes, lines, spline curves, text etc.
*It is also possible to import images in formats such as GIF, JPEG, EPS, PostScript etc.
*These objects can be created, deleted, moved or modified. Attributes such as colours or line styles can be selected in various ways.
*Xfig has a facility to print figures to a Post-Script printer too.
*Convenient feature is the PSTEX or PDFTEX export format. This allows a smooth integration of Xfig-generated images into LaTeX documents.
*Most operations in Xfig are performed using the mouse. But some operations may also be performed using keyboard (accelerators) shortcuts.
*The interface is designed for a three-button mouse, although it is also possible to use a two button or a one button mouse with appropriate emulation.



Tutorials in the series

*LaTeX on Windows using TeXwork
*What is Compiling?
*Letter Writing
*Report Writing
*Mathematical Typesetting
*Equations
*Tables and Figures
*Beamer
*Bibliography
*Inside story of Bibliography
*Simple block diagram
*Feedback control diagram
*Feedback diagram with Maths

These tutorials are also available in many Indian languages such as English, Hindi, Bengali, Bhojpuri, Gujarati, Kannada, Marathi, Sanskrit, Tamil, Telugu.

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HTML

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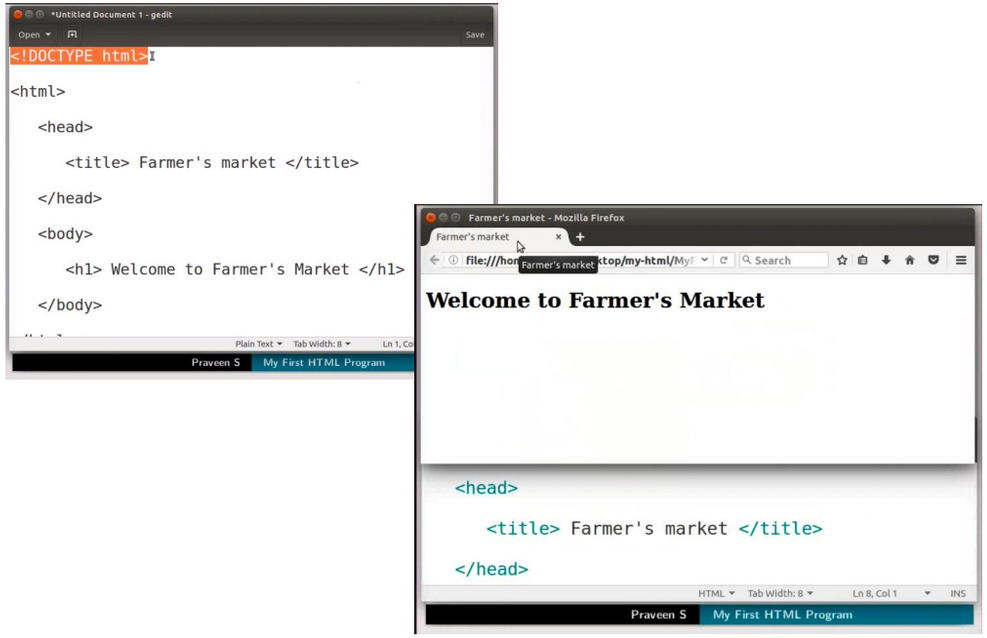
Introduction

HTML, which stands for HyperText Markup Language, is the predominant markup language for web pages. HTML elements are the basic building-blocks of web pages. HTML is written in the form of HTML elements consisting of tags, enclosed in angle brackets, within the web page content. The purpose of a web browser is to read HTML documents and compose them into visible or audible web pages. The browser does not display the HTML tags, but uses the tags to interpret the content of the page.



Features of HTML

- HTML allows images and objects to be embedded and can be used to create interactive forms.
- It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items.
- It can embed scripts in languages such as JavaScript which affect the behaviour of HTML webpages.
- Web browsers can also refer to Cascading Style Sheets (CSS) to define the appearance and layout of text and other material.
- The W3C, maintainer of both the HTML and the CSS standards, encourages the use of CSS over explicitly presentational HTML markup.

Uses of HTML

To create:

- Static websites
- Web pages
- Web forms

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Target Audience

- System Administrators
- Programmers
- Software Developers
- Web Developers

The Spoken Tutorial Project Team conducts workshops on RDBMS - PostgreSQL and other FLOSS using spoken tutorials and gives certificates to those who pass an online test.

For more details, please write to

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Website: https://spoken-tutorial.org

Spoken Tutorial

RDBMS - PostgreSQL

National Mission on Education through Information and Communication Technology (NMEICT)
www.sakshat.ac.in

Funded by MHRD, Government of India.

Introduction

- PostgreSQL is a powerful, open source relational database system
- PostgreSQL is developed by the PostgreSQL Global Development Group (a worldwide team of volunteers)
- It is open source and its source code is available free of charge

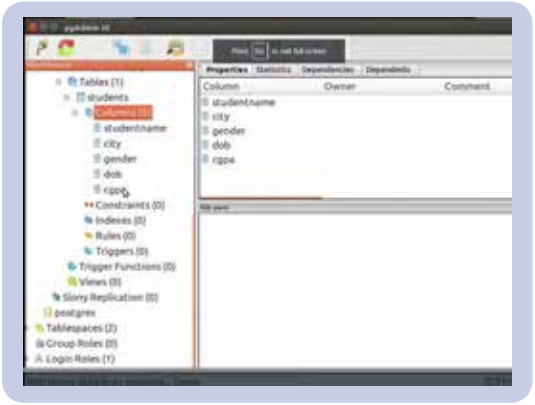
Download and Installation:

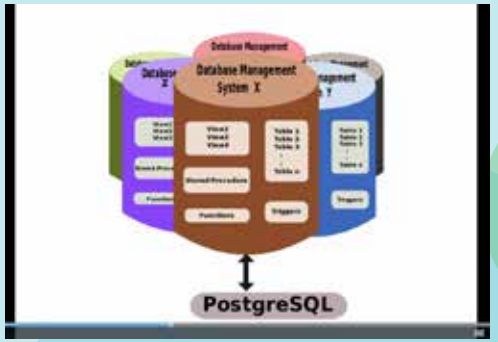
Download PostgreSQL from

https://www.postgresql.org/download

Features

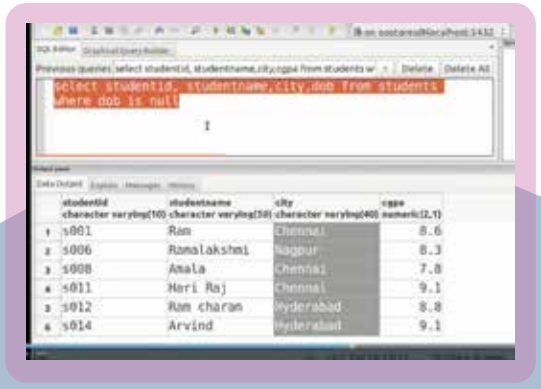
- PostgreSQL works on Linux, Windows and Mac operating system
- It is easy to learn for the beginners
- It supports client-server network architecture
- It allows to add custom functions developed using different programming languages such as C/C++, Java, etc.
- In PostgreSQL, we can define our own data types, index types, functional languages
- It is more suited for Data Warehousing and data analysis applications which need fast read-write speeds
- PostgreSQL supports a lot of features of SQL like Complex SQL queries, SQL Sub-selects, Foreign keys, Trigger, Views, Transactions
- PostgreSQL can run dynamic websites and web apps

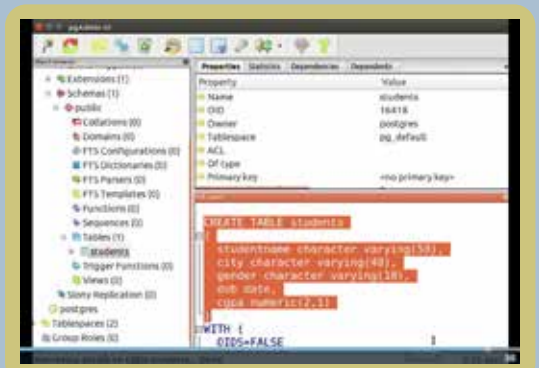




Spoken Tutorials in RDBMS - PostgreSQL Series :

- Overview of RDBMS - PostgreSQL
- Installation of PostgreSQL
- Create a database using PgAdmin
- Table with primary keys
- Select statement
- Select with Aggregate functions
- Foreign key Constraint
- Aggregation facilities in SQL
- Updating Data





Toggle Navigation Spoken-Tutorial logo Spoken Tutorial

- Software Training
  - **Software Training**
    - About the Training
    - Progress to Date
    - Software Offered
    - Contacts for Training
    - Change in Training Policy

  Procedures

    - Organising Training
    - Instruction for Downloading Tutorials
    - Create Your Own Disc Image
    - Resource Centers

  Training

    - Training & Payment Dashboard
    - Semester Training Planner Summary (STPS)
    - Student Dashboard
    - new Individual Learning
    - Individual Learning Workshop
    - Verify ILW test certificate
    - Subscription

  Online Test

    - Instruction for Invigilator
    - Instruction for Participants
    - Certificate Verification Link
    - Email Verification Link
    - new Job Recommendation
- Creation
  - Creation Process
  - Outline and Script
  - Creation Dashboard
  - Suggest a Topic
  - Suggest an Example
  - Collaborate with Us
- News
  - Testimonials
  - Articles on Spoken Tutorial project
  - Events & Happenings
  - Research / Popular Articles
- Academics
  - MOOCs acceptance
  - Official Letters and Links

Semester Training Planner Summary (STPS)

Dashboard

Instructions

STEP 1 : Upload students **Master Batch Student List** : MB Master Batch Student List

STEP 2 : Complete the **STPF** : STPF – Semester Training Planner Form

STEP 3 : Select **Participant List** : Select Participant List

×

Choose Semester to fill **Training Planner Form**

- Select Jan-Jun for 2nd, 4th, 6th, 8th semesters
- Select Jul-Dec for 1st, 3rd, 5th, 7th semesters

*In case your semester begins **mid-June** onwards, please choose July-Dec semester and select 1 July as Semester Start Date.*

Current Semester: July - December, 2025 Next Semester: January - June, 2026

×

- You are on the STPS page.
- Complete the 3 steps in sequence and follow all the instructions.
- The **Click here** will give a detailed instruction sheet for the particular step:
  1. For **Master Batch**: Click Here.
  2. For **STPF**: Click Here.
  3. For **Participants List**: Click Here.
  4. Proceed with **Test** after **30 days** of Semester Start Date.
- Please download a copy of tutorials on all the machines. For instructions to download tutorials Click Here
- Please check if your machine is ready. For the Machine Readiness document Click Here.

Dr. B. C. Roy Engineering College, Durgapur, Kolkata

July - December, 2025 (Current Semester) completed : 2 Ongoing : 0

#	Semester Start Date	Software Course	Department	Batch Year	Participant List Status
1	July 2, 2025	Python - Python 3.4.3	Information Technology	2024	60
2	July 14, 2025	Android app using Kotlin	Information Technology	2024	60

January - June, 2026 (Next Semester) Planned : 0

Training planner is empty

January - June, 2025 Total : 5

#	Semester Start Date	Software Course	Department	Participant List Status	Action
1	Jan. 20, 2025	Linux	Information Technology	73	| Participant List | Participation certificates available |
2	Feb. 3, 2025	Linux	Information Technology	64	| Participant List | Participation certificates available |
3	Feb. 3, 2025	Arduino	Information Technology	73	| Participant List | Participation certificates

					available |
4	Feb. 3, 2025	R	Information Technology	64	| Participant List | Participation certificates available |
5	Feb. 4, 2025	Web Development - JavaScript	Information Technology	69	| Participant List | Participation certificates available |

July - December, 2024 Total : 4

#	Semester Start Date	Software Course	Department	Participant List Status	Action
1	July 15, 2024	Python - Python 3.4.3	Information Technology	64	| Participant List | Participation certificates available |
2	July 15, 2024	Blender	Information Technology	64	| Participant List | Participation certificates available |
3	July 15, 2024	PHP and MySQL	Information Technology	73	| Participant List | Participation certificates available |
4	July 15, 2024	Git	Information Technology	73	| Participant List | Participation certificates available |

January - June, 2024 Total : 6

#	Semester Start Date	Software Course	Department	Participant List Status	Action
1	Jan. 3, 2024	PHP and MySQL	Information Technology	69	| Participant List | Participation certificates available |
2	Jan. 3, 2024	Web Development - CSS	Information Technology	69	| Participant List | Participation certificates available |
3	Jan. 3, 2024	PERL	Information Technology	69	| Participant List | Participation certificates available |
4	Jan. 16, 2024	Advanced Cpp	Information Technology	62	| Participant List | Participation certificates available |
5	March 1, 2024	Blender	Information Technology	62	| Participant List | Participation certificates available |
6	March 1, 2024	Android app using Kotlin	Information Technology	64	| Participant List | Participation certificates available |

July - December, 2023 Total : 6

#	Semester Start Date	Software Course	Department	Participant List Status	Action
1	July 10, 2023	Web Development - HTML	Information Technology	69	| Participant List | Participation certificates available |
2	July 10, 2023	LaTeX	Information Technology	69	| Participant List | Participation certificates available |
3	July 10, 2023	LaTeX	Information Technology	62	| Participant List | Participation certificates available |
4	July 10, 2023	Web Development - HTML	Information Technology	62	| Participant List | Participation certificates

python™

What is Python?

Python is a general purpose, high level, remarkably powerful dynamic programming language used in a wide variety of application domains.

Why Python?

- Easy to read and learn
- Free and Open Source
- Useful for scientific computing
- Powerful interactive interpreter
- Extensive scientific libraries
- Well documented

Where can you use Python?

- Numeric and Symbolic computation
- 2D/3D Plotting
- User interfaces
- Parallel computing
- Machine Learning and Image Processing
- Game development
- Web development
- Much more...

Who uses Python?

- Google
- Yahoo
- Walt Disney
- NASA
- IBM
- YouTube
- nVIDIA
- Software - Blender, Motion Builder, Cinema 4D, etc.
- Games - Battle field 2 by EA sports, Crystal space 3D, etc.

Python is one of the most popular programming languages today, and therefore has been included in the CBSE curriculum. It easily performs tasks that proprietary tools like Matlab and Mathematica offer. Today leading companies are using Python extensively, hence there are better job opportunities. Learn Python, and grab the Opportunity!

matplotlib django pandas SciPy

SymPy IPython Interactive Computing Mayavi NumPy

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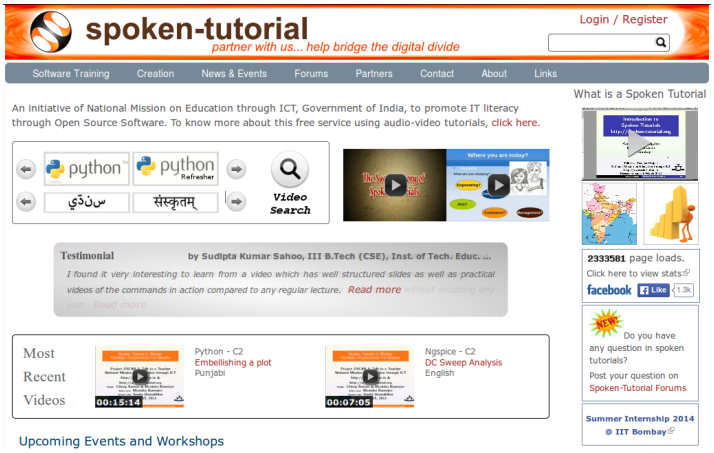
MHRD
http://www.sakshat.ac.in

IIT BOMBAY

How can you learn Python

- **Spoken Tutorial -** The FOSSEE project has created a series of Spoken Tutorials on Python. Theses are available for learning, on the Spoken Tutorial website, free of cost. You can access these tutorials from this link

  python.fossee.in/spoken-tutorials



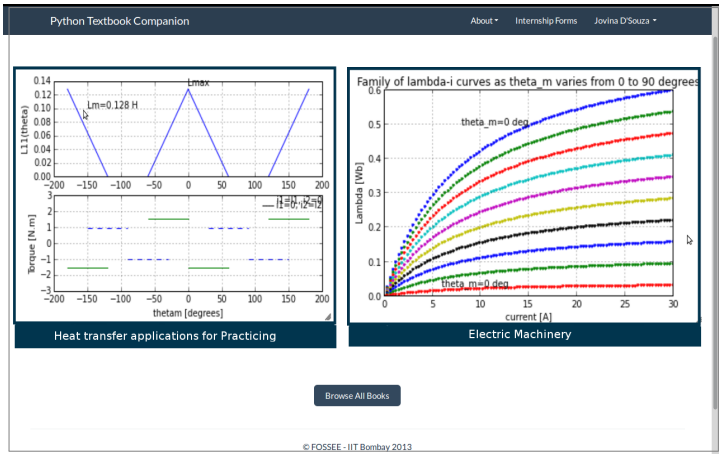
Spoken Tutorial website

- **Textbook Companion Internship -** Learn Python in a practical way by contributing to the Python Textbook Companion Internship. It aims to create Companions by coding solved examples from Standard textbooks, using Python. Participate and earn attractive honoarium and Certificate of Internship from FOSSEE, IIT Bombay! For more details, please visit:

  python.fossee.in/textbook-companion-project

Completed Book : Approx 453 books

Under Progress : Approx 113 books



Python Textbook Companion website

- **SELF Workshops -** The Spoken Tutorial Team conducts workshops on Python. These are completely free of cost, and are conducted without the need of any domain expert. Learn Python and obtain a certificate from Spoken Tutorial Project, IIT Bombay, upon successful completion of the post-workshop evaluation test. Please visit:

  python.fossee.in/spoken-tutorials

About us

Website:

http://python.fossee.in

Contact us

General help & Queries:

info@fossee.in

python@fossee.in

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National Mission on Education through ICT
MHRD
http://www.sakshat.ac.in

IIT BOMBAY

- Make users aware of the importance of circuit simulations.
- To recognise students and faculty who are good in this area.

Participate & earn attractive honorarium + certificate of internship from IIT Bombay.

Lab Migration

We help Colleges & Institutes shift their EDA labs based on proprietary tools to eSim.

The Lab Migration team helps in the following ways:

- Provide suggestions on the different ways eSim can be implemented in the lab.
- Coordinate lab migration.
- Provide solutions to the lab's problem statements.
- Provide support to the faculty and lab in charge.

Participate and earn attractive honorarium for your efforts.

Spoken Tutorials

The eSim team has created Spoken Tutorials on eSim. For self-learning, we recommend you to use the Spoken Tutorials available on our web site.

Forum

Forum is a place where one can post all their doubts and questions which users / developers get while using eSim. Please reach out to us with your queries on installation and use of eSim through our Forum page.

About FOSSEE

FOSSEE (Free and Open Source Software for Education) project is funded by the National Mission on Education through ICT, MHRD. The FOSSEE team works on 'Adaptation & development of Open Source simulation packages equivalent to proprietary software', and is based at Indian Institute of Technology Bombay.

Other Projects under FOSSEE

Scilab, Python, DWSIM, Osdag, R, OpenFOAM, Xcos, QGIS, OpenModelica, Focal and Open hardware, etc.

Activities of FOSSEE

- Textbook Companion
- Lab Migration
- Niche Software Activities
- Forum
- Workshops and Conferences

Weblinks

eSim:

https://esim.fossee.in

Circuit Simulation Project:

https://esim.fossee.in/circuit-simulation-project

Lab Migration:

https://esim.fossee.in/lab-migration-project

Forum:

https://esim.fossee.in/forum

Spoken Tutorials:

https://esim.fossee.in/downloads/tutorials

Github repository:

https://github.com/FOSSEE/eSim

https://github.com/FOSSEE/nghdl

Contact us:

General help &, Queries:

Email: *contact-esim@fossee.in*

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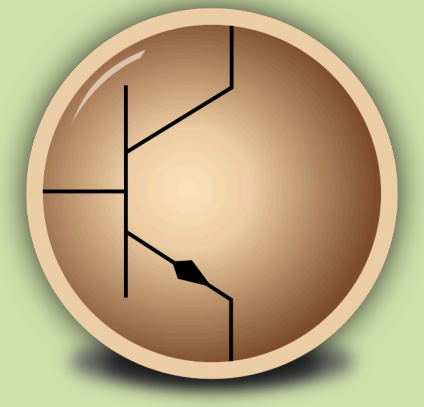
http://sakshat.ac.in



eSim

A Free and Open Source EDA Tool

https://esim.fossee.in

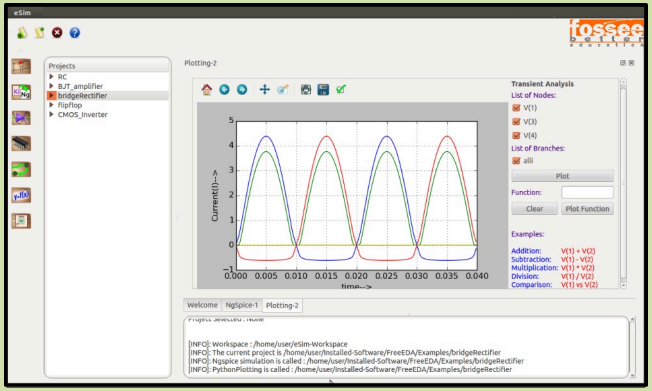
fossee better education

https://fossee.in

Introduction to eSim

eSim (previously known as Oscad / FreeEDA) is a free/ libre and open source EDA tool developed by the FOSSEE team at IIT Bombay. It can be used for circuit design, simulation, and PCB design. It also supports mixed-mode simulation.

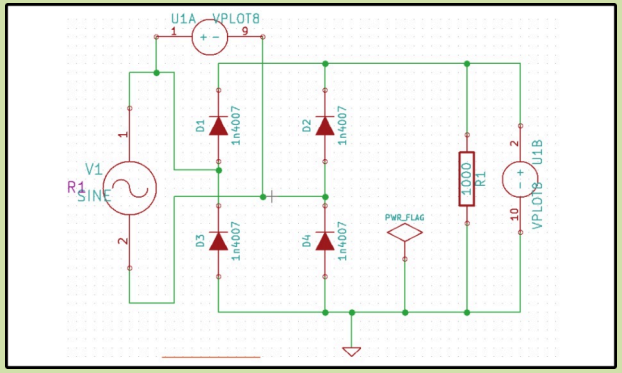
It is an integrated tool built using free/libre and open source software such as KiCad *(http://www.kicad-pcb.org)*, Ngspice *(http://ngspice.sourceforge.net/)* and GHDL *(http://ghdl.free.fr/)*. eSim is released under GNU GPL License and runs on Ubuntu Linux OS, Windows 7 and above versions of Windows OS.



Features

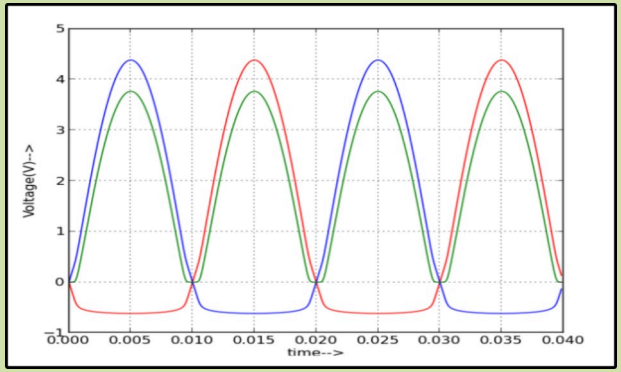
Create Circuit Schematic

- Generate netlists for simulation and PCB design.
- Perform Electric Rules Check (ERC).
- Create new components using Library Editor.



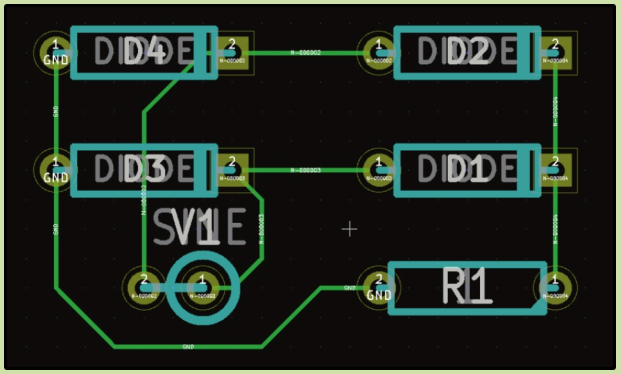
Perform Circuit Simulation

- Analog, digital and mixed signal circuit simulations.
- Perform AC, DC, DC operating point and Transient analyses.
- Interactive Python plotting.



Create PCB Layout

- Design multilayer PCB layouts.
- Create custom footprints or Modify the existing footprints per requirement.
- Export the design in formats such as Gerber, PDF, SVG and several other formats.



Advanced Features

Model Builder

- Create/upload spice model for semiconductor devices.
- Modify or edit existing spice models for semiconductor devices.

Subcircuit Builder

- Create a new subcircuit at schematic level.
- Edit existing subcircuits down to schematic level.

NGHDL

- Using NGHDL, user can create custom digital models using VHDL language. From simple multiplexers, counters to microcontrollers and ASICs, any custom component in the digital domain can be realized using the NGHDL tool.
- The created digital model can be used in either mixed-mode circuit or a standalone circuit operating in digital domain.
- NGHDL gives user the liberty to edit existing models supplied with eSim as per their needs, either for experimenting new ideas or to change the model as per their specific requirement.
- We are currently working towards including the support for simulations involving micro-controllers.

Circuit Simulation Project

FOSSEE, IIT Bombay, encourages students, faculty, and practitioners of electrical and electronics and allied fields to participate in the Circuit Simulation project using eSim. The Circuit Simulation project aims to port existing circuit designs and simulations using eSim.

The objectives of this project are to:

- Make available a large number of Circuit Simulation examples through crowdsourcing.
- Create a database of device models and subcircuits that can be distributed to other users.
- Form a community of users who can contribute and take advantage of the resources available.

The Spoken Tutorial Project

- Self-explanatory: uses simple language
- Audio-video: uses multisensory approach
- Small duration: has better retention
- Learner-centered: learn at your own pace
- Learning by doing: learn and practise simultaneously
- Empowerment: learn a new **FLOSS** (**F**ree/**L**ibre and **O**pen **S**ource **S**oftware)

Target Group

- Android App developers
- Programmers
- Software Developers

Workshops

The Spoken Tutorial Project Team conducts workshops on Android app using kotlin and other FLOSS using spoken tutorials and gives certificates to those who pass an online test.

For more details, please visit
https://spoken-tutorial.org

Forum

We have developed a beginner friendly Forum to answer specific questions pertaining to any part of a particular tutorial.
For more details, please visit
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The Spoken Tutorial Project
is funded by the
National Mission on Education through
Information and Communication Technology,
Ministry of Human Resource Development,
Government of India.

Contact us

Email: contact@spoken-tutorial.org
Website: https://spoken-tutorial.org

Forum help available to all learners

Content available in 22 Indian languages

IIT Bombay

Spoken Tutorial
https://spoken-tutorial.org

Scan the QR code to
visit Spoken Tutorial website

Android app using kotlin

National Mission on Education through Information and Communication Technology (NMEICT)
www.sakshat.ac.in

Funded by MHRD, Government of India.

Introduction

- **Android** is an open source and Linux-based Operating System for mobile devices such as smartphones and tablet computers.

- **Android Studio** is the official IDE for android application development. App development on Android was almost exclusively done using the Java programming language.

- **Kotlin** is a new open source programming language built by JetBrains, known for IntelliJ IDEA (Android Studio is based on IntelliJ IDEA). Kotlin is a language that runs on the JVM (Java Virtual Machine).

- Google has announced **Kotlin** as an official language on Android. Kotlin, is a statically typed programming language for the JVM, Android and the browser.

Download and Installation:

- Download Android studio from the below link:
  https://developer.android.com/studio

- Android Studio is available for Linux, Windows, and mac OS

Features

- Kotlin is easy to learn and the syntax is very similar to Java.

- Kotlin is more expressive, which makes the code more readable and understandable.

- It has better performance and small runtime

- It's deep interoperability with Java, which attracts more Java developers.

- It is tools-friendly as IDE gives suggestions for Kotlin code, can convert Java code to Kotlin code.

- It is expressive to make your code more readable and understandable.

- The intelligent code editor helps to write better code, work faster, and be more productive by offering advanced code completion.

- Applications built in Android Studio are then compiled into the APK format for submission to the Google Play Store.

Spoken Tutorials in Android app using Kotlin Series

Basic Level Tutorials:

- Overview of Android App using Kotlin

- Installation of Android Studio

- Getting started with Hello World App

- Creating a simple registration form

- Adding Radio Buttons

- Adding Spinner and Image

Intermedaite Level Tutorials:

- Creating a Search App

- URL Request

- Display Search Result

- Playing video using YouTube API

The Spoken Tutorial Project

- Self-explanatory: uses simple language
- Audio-video: uses multisensory approach
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- Learner-centered: learn at your own pace
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- Empowerment: learn a new **FLOSS** (**F**ree/**L**ibre and **O**pen **S**ource **S**oftware)

Target Group

- Programmers
- Web developers
- Project managers

Workshops

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IIT Bombay

-

Spoken Tutorial

https://spoken-tutorial.org

Scan the QR code to
visit Spoken Tutorial website

git

National Mission on Education through
Information and Communication Technology
(NMEICT)

www.sakshat.ac.in

Funded by MHRD, Government of India.

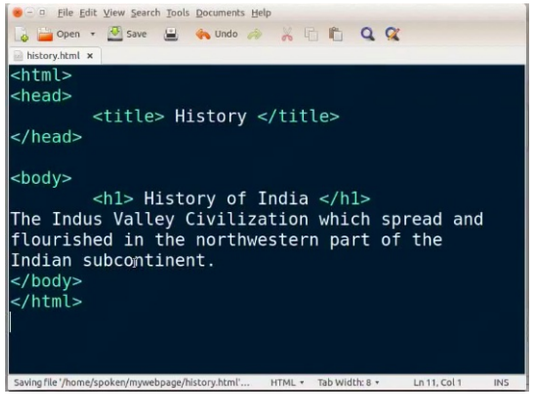
Introduction

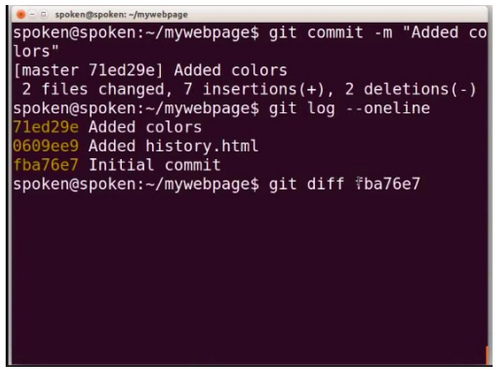
- **Git** is a distributed version control system
- It is a free and open source software
- It is designed to handle small to very large projects with speed and efficiency

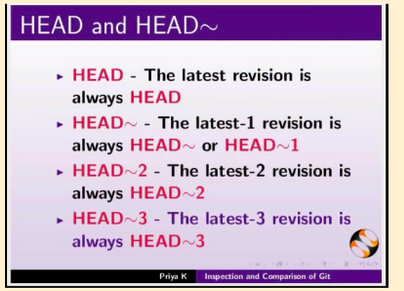
Download and Installation

Install **Git** on **Ubuntu Linux** using **Ubuntu Software Center**

Download and Install **Git** for Windows from www.git-scm.com







Features

- Git is easy to learn
- It is a source code management system for software development
- Git keeps track of changes made to a file or set of files
- It allows developers to work collaboratively
- It manages and stores versions of projects
- It helps in tracking the project progress history
- It is easy to recover previous versions of our work
- It records the complete history of all the changes
- Conflicts can be easily resolved using the suggestions given by Git
- If there is loss of data, it can be restored from any of the client repositories

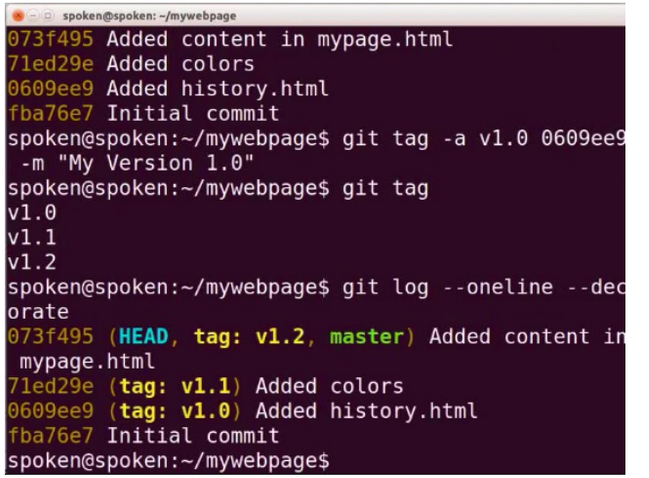
Spoken Tutorials in Git Series

Basic Level Tutorials

- Overview and Installation of Git
- Basic commands of Git
- The git checkout command
- Inspection and Comparison of Git
- Tagging in Git
- Branching in Git
- Merging and Deleting branches
- Stashing and Cleaning

Intermediate Level Tutorials

- Hosting Git Repositories
- Working with Remote Repositories



Dr.B.C.Roy Engineering College, Durgapur

Department of Electrical Engineering

Add- on course on Industrial Automation and safety

Module:1

SL No	Description	Lecture hours
1	PLC Fundamentals - (Block diagram of PLC's)Applications and Types of Transformers Selection of PLC components (Power supply, CPU, I/Os List , Communication bus Various ranges available in PLC's)I/O list selection	06
2	Concept of flags and Scan cycle executionSetting up PLCs / Connecting CPU, I/O modules, Rack, Backplane and Communication busConnecting Field devices to PLCs I/Os	06
3	Load /and /or/out / and Read / WriteCompare / Add / Sub /And /Or – BlocksEdge / trailing edge instructionsMOVE block application, Timer and Counter Blocks programming	08
4	Monitoring Arrays & Tags of User-Defined Data TypesEditing Ladder Logic Online Troubleshooting Controller Problems	06

Module:2

SL No	Description	Lecture Hours
1	Introduction – electrostatics – electromagnetism – stored energy – energy radiation and electromagnetic interference – Working principles of electrical equipment – Indian Electricity Act and Rules – statutory requirements from electrical inspectorate – international standards on electrical safety – first aid – cardio pulmonary resuscitation (CPR).	08
2	Primary and secondary hazards – Energy leakage – clearances and insulation – voltage classification – heating effects – electrical causes of fire and explosion – ionization – spark and arc-ignition energy – control – Lightning hazards – Fuse – circuit breakers and overload relays – protection against over voltage and under voltage – safe limits of amperage – voltage – safe distance from lines – capacity.	08
3	Earth fault protection – earthing standards – FRLS insulation – grounding – equipment grounding earth leakage circuit breaker (ELCB) – Role of environment in selection – safety aspects in application – protection and interlock self-diagnostic features and fail safe concepts – surge withstand capability test requirements – Classification of hazardous zones – intrinsically safe and explosion proof electrical apparatus – increase safe equipment – their selection for different zones – temperature classification – grouping of gases – use of barriers and isolators - equipment certifying agencies.	10

Prepared by:

Mr. Adhit Roy
AP, EE Department

Mr. Sabyasachi Gupta
Lead Equipment maintenance Specialist
GE Power India Limited, Durgapur

15/07/24

Approved By:
Dr.Susanta Dutta
HoD, EE, BCREC

Head
Dept. Electrical Engineering
Dr. B. C. Roy Engineering College
Durgapur

Reference:
1. Industrial automation solutions for PLC, SCADA, drive and field instruments: by Katariya Sanjay B
2. Programmable logic controllers and Industrial Automation: by Madhuchhanda Mitra & Samarjt Sengupta

3. Electricity Rules, 2005 along with allied Rules and Orders: by Bare Act Universal Law Publishers

4. Electrical Installation Estimating & Costing: by Gupta J. B

5. Safety Engineering: Principles and Applications: by Frank R. Spellman and Nancy E. Whiting

Course outcome:

After completion of this course students will be able to

CO1: Study and understand PLC

CO2: Ladder logic and programming of PLC

CO3: Understand the process technology and plant automation

CO4: Acquire the knowledge of Safety Engineering

CO5: Acquired the electrical installation service and maintenance

CO6: Study the Indian Electricity rules and ISI specifications

Mapping of course outcomes to module / course content

Module	CO1	CO2	CO3	CO4	CO5	CO6
M1.1	3	3	-	-	-	
M1.2	-	-	3	3	-	
M1.3	-	3	-	-	-	
M2.4	-	-	-	3	-	
M2.1	-	-	-	3		3
M2.2	-	-	-	3	3	
M2.3	-	-	-	-	3	

Mapping of the Course outcomes to Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	1	1	-	-	-	-	1
CO2	3	3	3	2	2	1	1	-	-	-	-	1
CO3	3	3	3	3	2	2	1	-	-	-	-	1
CO4	3	3	3	3	2	1	1	-	-	-	-	1
CO5	3	3	3	3	2	1	1	-	-	-	-	1

1. Mapping to PSO

	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1	1
CO2	3	3	1	2
CO3	3	2	1	2
CO4	3	2	1	1
CO5	3	2	1	2