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

~30 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/8Wpjty1fqfmobhN18

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

Course Detail:

Dr. B. C. Roy Engineering College, Durgapur
Department of Mechanical Engineering

Add-on Course

Course Name: Industrial Fluid Movers (AC-ME01) Duration: 30 hrs

Industrial Fluid Movers (Manufacturing, Installation & Maintenance)

Course Objective:

The course is aimed to provide the knowledge of the basic three Mechanical devices namely Pumps, Compressors and Fans / Blowers in the advanced format. The course also aimed to provide knowledge of performance characteristics and standards for operations and inspections of rotating machinery. The course is intended for Heat and Power Engineering students. As the subject is basic, the fundamentals involved don't change much but are amplified. The students get motivated to learn these basic devices in a move detailed way and apply the skill as practicing engineer.

Course outcomes:

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

COs	
CO1	Understand functioning of internal elements of pumps and compressor and also obtain required knowledge design and operating characteristics of pumps and compressors.
CO2	Learn the common failure modes and troubleshooting methods and maintenance procedure for reliability of bearings and seals.
CO3	Comprehend cavitation-damage on an impeller and determine the root causes for pump cavitations and compressor surge.
CO4	Gather knowledge of theory and operation of special variants of pumps, namely regenerative turbine pumps, liquid ring vacuum pumps, jet pumps, air lift pumps.
CO5	Apply the knowledge of important technical aspects of pumping compressor systems as encountered in modern industrial applications.

Dr. B.C. Roy Engineering College, Durgapur

Department of Mechanical Engineering

Offering

ADD ON COURSE ON

Electric Vehicles

(AC-ME 02)

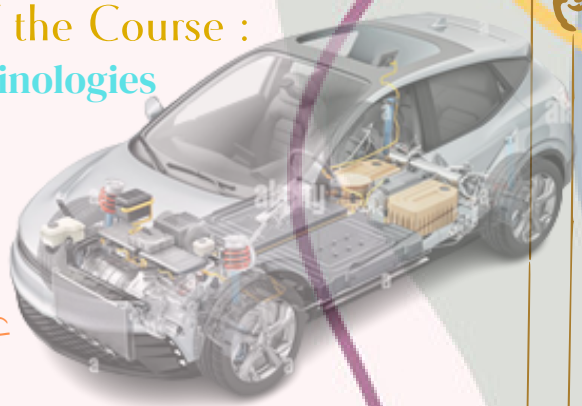
Session 2023-24 Odd Semester

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/pfnui7HY6chVPQ4E6

Course Coordinator :

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

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 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

Content available in 22 Indian languages

IIT Bombay

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THE C PROGRAMMING LANGUAGE

C++

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

Funded by MHRD, Government of India.

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.

LESSON PLAN:

Session	Topic	Subtopics	Duration
1	First C Program	- Header Files	1.5 hours
		- main() function	
		- Syntax and use of printf()	
		- Compiling a C program with gcc	
2	Tokens	- Data types, constants, identifiers	1.5 hours
		- Keywords	
		- Constants and data types	
3	Functions	- Function declaration and definition	1.5 hours
		- Passing arguments to functions	
		- Return types	
4	Scope of Variables	- Declaring and initializing variables	1.5 hours
		- Local vs global scope	
5	If and Else If Statements	- Syntax for if and if-else statements	1.5 hours
		- Handling conditional statements	
6	Nested If and Switch Statements	- Nested if statements	1.5 hours
		- Switch case statements	
		- Use of break statement	
7	Increment and Decrement Operators	- Prefix and postfix operators	1.5 hours
		- Increment (++) and decrement (--) operators	
8	Arithmetic Operators	- Addition, subtraction, multiplication, division	1.5 hours
		- Modulus (%) operator	
9	Relational Operators	- Comparison operators (==, !=, >, <, >=, <=)	1.5 hours
10	Logical Operators	- Logical AND (&&), OR (	
11	Loops	- Syntax and use of while, do-while, and for loops	Intermediate
		- Comparison and practical usage	
12	Arrays	- Syntax for 1-D arrays	Intermediate
		- Initializing and accessing elements	
13	Working with 2D Arrays	- Syntax for 2-D arrays	Intermediate
		- Manipulating elements	

Session	Topic	Subtopics	Duration
14	Strings	- Declaring and initializing strings	Intermediate
		- Input/output operations	
15	String Library Functions	- Functions like strcpy(), strlen(), strcmp()	Intermediate
16	Working with Structures	- Syntax and usage	Advanced
		- Declaration and initialization	
		- Accessing structure members	
17	Understanding Pointers	- Pointer syntax and declaration	Advanced
		- Pointer arithmetic	
18	Function Call	- Types of function calls	Advanced
		- Pass by value vs pass by reference	
19	File Handling in C	- Opening, reading, and closing files	Advanced
		- File handling functions (fopen(), fclose())	

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Lesson Plan:

Session	Topic	Subtopics	Duration
1	Classes and Objects	- Defining Classes	1.5 hours
		- Creating Objects	
		- Member Functions	
2	Constructor and Destructor	- Constructor Basics	1.5 hours
		- Destructors	
3	Static Members	- Static Keyword	1.5 hours
		- Static Variables	
		- Static Member Functions	
4	Inheritance	- Concept of Inheritance	1.5 hours
		- Types of Inheritance	
5	More on Inheritance	- Multiple Inheritance	1.5 hours
		- Hierarchical Inheritance	
6	Function Overloading and Overriding	- Function Overloading	1.5 hours
		- Function Overriding	
7	Polymorphism	- Polymorphism in C++	1.5 hours
		- Virtual Members	
		- Virtual Functions	
8	Abstract Class	- Abstract Class Concept	1.5 hours
		- Pure Virtual Functions	
9	Friend Function	- Friend Function Basics	1.5 hours
10	Exception Handling	- Introduction to Exception Handling	1.5 hours
		- Handling Exceptions	

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Spoken Tutorial

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HTML

IIT Bombay

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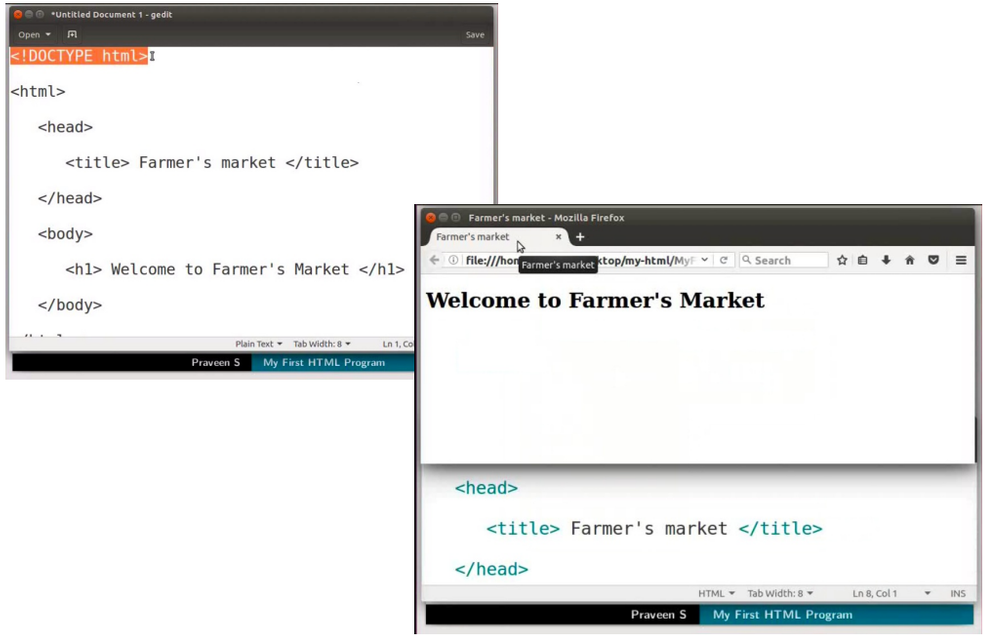
www.sakshat.ac.in

Funded by MHRD, Government of India.

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

Lesson Plan:

Session	Topic	Subtopics	Duration
1	Overview of HTML	- What is HTML	1 hour
		- HTML structure and syntax	
		- Basic HTML document structure	
2	My First HTML Program	- Structure of an HTML document	1 hour
		- Writing a basic HTML program	
		- Saving HTML files	
3	Elements, Tags, and Attributes	- Understanding HTML elements, tags, and attributes	1.5 hours
		- Empty elements, nested elements	
		- Attributes and their usage	
4	Formatting Tags in HTML	- Text formatting tags	1.5 hours
		- Paragraphs, headings, bold, italic, etc.	
		- Line breaks, horizontal ruler	
5	Styles and CSS in HTML	- Inline styles, style attribute	1.5 hours
		- Internal and external CSS	
		- Common style attributes	
6	Lists in HTML	- Ordered, unordered, and description lists	1 hour
		- List attributes and styles	
7	Tables in HTML	- Creating tables	1.5 hours
		- Table elements, attributes	
		- Table styling	
8	Phrase Tags in HTML	- Comments	1 hour
		- Strong, emphasized, marked, abbreviation tags	
		- Quote, cite, code, etc. tags	
9	Doctype and Head Section	- Doctype declaration	1 hour
		- Head section components	
		- Title, style, script, meta, link tags	
10	Embedding Images	- Using the img tag	1.5 hours
		- Image attributes and alternative text	
		- Sourcing images	
11	Embedding Audio and Video	- Embedding audio and video files	1.5 hours
		- Supported formats and attributes	
		- Providing fallback content	

Session	Topic	Subtopics	Duration
12	Block Elements and Layouts	- Block vs inline elements	1.5 hours
		- Using div, span tags	
		- HTML5 layout elements (header, footer, nav, article, etc.)	
13	Forms in HTML	- Creating HTML forms	1.5 hours
		- Form elements: input, label, button	
		- Form submission methods (GET and POST)	
14	More on Forms	- Additional form input types	1 hour
		- Select, datalist, fieldset	
		- Validation and usability considerations	

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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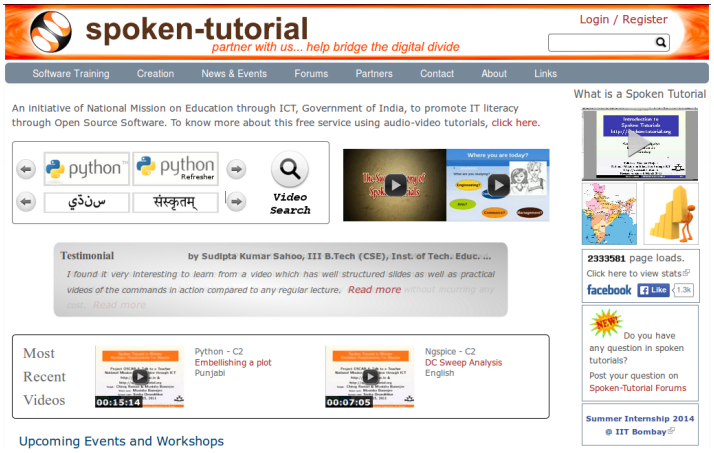
IIT BOMBAY

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:

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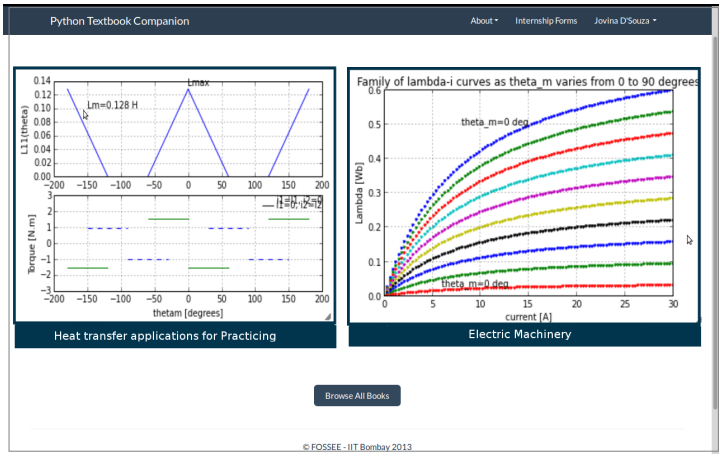
Completed Book : Approx 453 books

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

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LESSON PLAN:

Session	Topic	Subtopics	Duration
1	Getting Started with Python	- Overview of Python	1.5 hours
		- Invoking and quitting Python	
		- Navigation and basic commands	
2	Using Plot Command Interactively	- Starting Python with pylab	1.5 hours
		- Plotting with matplotlib	
		- Creating and clearing plots	
3	Embellishing a Plot	- Modifying plot attributes	1.5 hours
		- Adding titles and labels	
4	Saving Plots	- Using savefig() function	1.5 hours
		- Saving plots in different formats	
5	Multiple Plots	- Overlaying multiple plots	1.5 hours
		- Manipulating individual plots	
6	Subplots	- Creating and switching between subplots	1.5 hours
		- Using subplot command	
7	Additional Features of Python	- Retrieving command history	1.5 hours
		- Using %history command	
8	Loading Data from Files	- Reading data from files	1.5 hours
		- Using loadtxt() function	
9	Plotting Data	- Plotting data points	1.5 hours
		- Errorbars and customized markers	
10	Other Types of Plots	- Scatter plots and logarithmic plots	1.5 hours
		- Using linspace for data generation	

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 execution Setting up PLCs / Connecting CPU, I/O modules, Rack, Backplane and Communication bus Connecting Field devices to PLCs I/Os	06
3	Load /and /or/out / and Read / Write Compare / Add / Sub /And /Or – Blocks Edge / trailing edge instructions MOVE block application, Timer and Counter Blocks programming	08
4	Monitoring Arrays & Tags of User-Defined Data Types Editing 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. Sabyasachi Gupta
Lead Equipment maintenance Specialist
GE Power India Limited, Durgapur

10/07/23

Approved By: Dr. Susanta Dutta
HoD, EE

HEAD
DEPARTMENT OF ELECTRICAL ENGINEERING
Dr. B. C. ROY ENGINEERING COLLEGE

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

Dr. B. C. Roy Engineering College, Durgapur

Department of Civil Engineering

Presents

Add-On Course On:

Engineering Solutions for Challenges and Sustainable Development

Key Objectives of the Course:

A. Highlight the challenges and opportunities in the area of built infrastructure and environmentally sustainable system.

B. Introduction to smart cities, sustainable Resource management, waste management and climate-conducive design which inspires to plan and build facilities.

For B.Tech

1st YearStudents

Session:

2023-24

Duration:

30Hrs

Course Coordinators:

Prof. Md. Hamjala Alam

Prof. Arijit Kr. Banerji

Prof. Soumyadip Das

Mrs. Anindita Sengupta

Mr. Aditya Prasad Roy

Dr. B. C. Roy Engineering College, Durgapur
Department of Civil Engineering

Add-On Course

Engineering Solutions for Challenges and Sustainable Development

Duration: 30 Hrs

Course Objective: This course is aimed to highlight the students with challenges and opportunities in the areas of built infrastructure and environmentally sustainable systems. The course provides an introduction to the students towards smart cities, sustainable resource management (land, water, and energy), waste management, and climate-conducive design, inspiring them to plan and build facilities that preserve natural resources, are cost-effective, and support human and natural environments.

Course Outcome:
On successful completion of this course, student should be able to:
CO1: Build a comprehensive understanding of the Smart City concept and technology to design smart city considering economic aspect and sustainability.
CO2: Optimize land area, atmospheric water and renewable energy to improve overall productivity of the smart city.
CO3: Understand the problems associated with Solid & Hazardous Wastes, Wastewater and apply the engineering fundamentals for environment-friendly waste management.
CO4: Understand climate science impacts on engineering practice by studying the implications of climate change on the construction sector.

Course Co-ordinator(s):

1) Prof. Arijit Kumar Banerji
2) Prof. Md. Hamjala Alam
3) Prof. Soumyadip Das
4) Mrs. Anindita Sengupta
5) Mr. Aditya Prasad Roy

Course Content:

Lecture 1: Introduction to the concepts and ideas of Smart Infrastructures.
Lecture 2: A general overview of Smart Cities
Lecture 3: Planning and effectiveness of Smart Energy Systems
Lecture 4: Smart cities in the perspective of Environmental Sustainability
Lecture 5: Benefits of Smart Transportation Systems in the view of Environmental Sustainability
Lecture 6: Long term benefits and economic aspects of the smart cities
Lecture 7: Alternative Planning and Land Administration for Future Smart Cities
Lecture 8: Smart initiatives on land resource management.
Lecture 9: Understand atmospheric water resources and its use.
Lecture 10: Water Supply system in a smart city.
Lecture 11: Usage of various types of energy in a smart city
Lecture 12: Role of Smart Cities in Optimizing Water-Energy-Food Nexus
Lecture 13: Introduction to Municipal Solid Waste (MSW) generation, rate variation and characteristics.
Lecture 14: Hazardous Solid Waste generation, rate variation and characteristics.
Lecture 15: Basic definition of Wastewater, quantity estimation and classification of wastewater, sewerage system for domestic wastewater and storm water.
Lecture 16: Design and maintenance of sewerage systems, Physical, Chemical & Biological characteristics of wastewater.
Lecture 17: Transportation of Municipal Solid Waste (MSW), treatment and disposal techniques of MSW.
Lecture 18: Characterization, transportation, storage, landfill disposal of Hazardous waste.
Lecture 19: Various unit operations for Wastewater treatment.
Lecture 20: An overview of the global climate scenario and various climate models.
Lecture 21: Climate variability implications on the civil engineering sector.
Lecture 22: Risk-based planning and design, and discussion on engineering standards and regulations.
Lecture 23: Overview of infrastructure Vulnerable to Global Warming
Lecture 24: Infrastructure adaptation to heat waves, precipitation, coastal flooding and sea-level rise.
Lecture 25: Basic ideas on infrastructure resistance to cyclones and strong winds, and cold.
Lecture 26: Introduction to Smart City Economy and Economic Role of Cities
Lecture 27: Overview of Cost–Benefit Analysis process, and Smart Solutions.
Lecture 28: Analysis of Realized Smart Activities and smart solutions.
Lecture 29: Discussion on Primary Analytical Framework.
Lecture 30: Smart Cities Mission of India

Syllabus

Module 1	**Management of Smart Urban Infrastructures**: Introduction to Smart Infrastructures, overview of Smart Cities, Smart Energy Systems, Environmental Sustainability, Smart Transportation Systems, Benefits and economic aspects.
Module 2	**Optimization of sustainable resource management:** Future Smart Cities Planning, Land Administration, Smart land resource management, atmospheric water resources, Smart city water supply system, energy usage, Water-Energy-Food Nexus.
Module 3	**Various types of wastes and their associated problems:** Municipal Solid Waste (MSW) : Generation, Rate Variation, Characteristics (Physical, Chemical & Biological); Sources, types and properties of Hazardous Waste: Hazardous solid waste Generation, Rate Variation, Characteristics (Physical, Biological & Chemical); Essentials of Wastewater Engineering : Wastewater Quantity, Classification of wastewater, Sewerage system for domestic wastewater and storm water, Design and maintenance of sewerage systems, Physical, Chemical & Biological characteristics of wastewater.
Module 4	**Management of the various wastes:** Handling and disposal of solid waste : Transport of Municipal Solid Waste, Treatment and Disposal Techniques (Composting, Vermi-Composting, Incineration, Refuse Derived fuels, Landfilling); Hazardous waste management: Exposure and risk assessment, characterization, waste minimization, incineration, transportation, storage, landfill disposal; Wastewater treatment and disposal : Objectives of wastewater treatment, various Unit operations, Design of primary treatment System, biological treatment and removal mechanism, Design of suspended and attached growth processes, Alternative disposal methods.
Module 5	**Climate Science for Engineering Practice:** Overview of Global climate scenario, Climate models, Climate variability impacts on civil engineering sector, Risk-based planning and design, Engineering standards and regulations.
Module 6	**Climate Change resilient Infrastructure:** Overview of infrastructure resilience to heat waves, precipitation, coastal flooding and sea-level rise, cyclones and strong winds, cold.
Module 7	**Cost Benefit Analysis for the Concept of a Smart City** Smart City Economy, Economic Role of Cities, Cost–Benefit Analysis, Analysis of Realized Smart Activities and Smart Solutions, Primary Analytical Framework.

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

Department of Civil Engineering

Presents

Add-OnCourse

On

Non-Conventional Energy Sources and Renewable Energy Systems

Session:2023-24

Duration:30Hrs

For B.Tech

2nd Year Students

Key Objectives of the Course:

- Knowledge of solar and wind energy and how to explore their applications.
- Overview on the energy conversion processes and applies the same skill as practicing engineer.

Course Coordinators:

Dr. Shovan Roy

Prof. Amit Kotal

Dr. Sayantan Dutta

Mr.Adityaprasad Roy

Mrs. Barnali Das

Mr.Ajitesh Bhattachrya

Dr. B. C. Roy Engineering College, Durgapur

Department of Civil Engineering

Add-On Course

Non-Conventional Energy Sources and Renewable Energy Systems

Duration: 30 Hrs

Course Objective: This course is aimed to provide students the knowledge of solar and wind energy 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 and wind energy and explore their applications.
CO2: Understand energy conversion processes.
CO3: Learn to harness energy from biomass.
CO4: Learn about availability and prospects of renewable energy sources.
CO5: Understand the effect of electric energy generation on the environment.
CO6: Understand the methods to harness solar, wind, biomass, hydro, geothermal, and ocean energy, and learning their applications in the society 4. Get familiar with the smart grid.

Course Content:

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

Lecture 5: Solar Cell principle, Semiconductor junctions, Conversion efficiency and power output, Basic photo-voltaic system for power generation.

Lecture 6: **Direct Energy Conversion Processes**: Magneto Hydro Dynamic Power Generation: Principles of MHD power generation.

Lecture 7: Open cycle systems, Closed cycle systems, Voltage and power output, Materials for MHD generators.

Lecture 8: Thermo-Electric Generation: Basic principles of thermo-electric power generation, Seebeck, Peltier, Thomson effects, Thermo Electric power generator, Analysis materials.

Lecture 9: Thermionic Generation: Thermionic emission and work function, Basic thermionic generator.

Lecture 10: Fuel Cells: H2, O2 cells, classification of fuel cells, types, Advantages, Electrodes, Polarization.

Lecture 11: Thermo Nuclear Fusion Energy: The basic Nuclear Fusion and Fission Reactions Plasma confinement, Thermo Nuclear function reactors.

Lecture 12: **Energy from Biomass**: Introduction: Biomass conversion technologies, photosynthesis, Bio-gas generation, types of bio-gas plants.

Lecture 13: Biomass as a Source of Energy: Methods for obtaining energy from Bio-mass, Bio-logical conversion of Solar energy.

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

Lecture 15: Nuclear power generation and environment, Green House Gas Effects, Global Environmental awareness, Energy options for Indian Economy.

Lecture 17: **Solar Energy:** Solar radiation estimation, Basic Principle of Solar Energy physical Principal of the conversion of solar radiation into heat.

Lecture 18: **Wind Energy:** Basic Principle of wind energy conversion, nature & Power of wind, site selection, wind energy conversion SYSTEM.
Lecture 19: Scheme for Electric Generation, Generator Control load control, Inter connected SYSTEM & applications.
Lecture 20: **Small Hydro Power:** General description, classification of schemes, siting and economic considerations.
Lecture 21: System components: weir/intake channel, desilting tank, forbay, spillway, penstock, turbine, generator, governor, control.
Lecture 22: **Biomass Energy:** Biomass conversion technologies bio mass generation, classification of Bio Gas Plants material used in Bio Gas Plants.
Lecture 23: Selection of site & applications. **Geothermal Energy:** Sources of Geothermal energy Estimation of Geothermal Power.
Lecture 24: Geothermal Power Plants, Geothermal energy in India and Prospects.
Lecture 25: **Ocean Energy:** Ocean thermal electric conversion, site selection, Power Plant, Prospects of ocean energy in India, tidal Power tidal Power Plant, Prospects in India.
Lecture 26: Basic Principle MHD SYSTEM, advantages, Power OUTPUT of MHD Generation, future Prospects.
Lecture 27: Principle and classification of fuel cell energy, hydrogen as alternative fuel for Generation of Electrical Energy.
Lecture 28: applications of alternative fuel generation from hydrogen.
Lecture 29: **Fuel Cell:** Fuel Cell, Management of Fuel, Thermionic power generation.
Lecture 30: water Resource Electricity divined scenario storage and handling, Introduction to smart grid**.**

Syllabus

Module 1	**Introduction to Energy Sources**: World energy futures, Conventional energy sources, Nonconventional energy sources, Prospects of Renewable energy sources.
Module 2	Energy Sources and their availability: renewable energy sources, Prospects of renewable energy sources, application of non-conventional and renewal energy sources, smart grid.
Module 3	**Solar Energy**: Introduction to solar radiation and its measurement, Introduction to Solar energy Collectors and Storage, Application of solar energy: Solar thermal electric conversion, Thermal electric conversion systems, Solar electric power generation, Solar photo-voltatics, Solar Cell principle, Semiconductor junctions, Conversion efficiency and power output, Basic photo-voltaic system for power generation.
Module 4	**Wind Energy**: Introduction to wind energy conversion, the nature of the wind, Power in the wind, Wind Energy Conversion: Wind data and energy estimation, Site Selection considerations, basic Components of a Wind energy conversion system, Classification of WEC Systems, Schemes for electric generation using synchronous generator and induction generator, wind energy storage.
Module 5	**Direct Energy Conversion Processes**: Magneto Hydro Dynamic Power Generation: Principles of MHD power generation, Open cycle systems, Closed cycle systems, Voltage and power output, Materials for MHD generators. Thermo-Electric Generation: Basic principles of thermo-electric power generation, Seebeck, Peltier, Thomson effects, Thermo Electric power generator, Analysis materials. Thermionic Generation: Thermionic emission and work function, Basic thermionic generator. Fuel Cells: H2, O2 cells, classification of fuel cells, types, Advantages, Electrodes, Polarization. Thermo Nuclear Fusion Energy: The basic Nuclear Fusion and Fission Reactions Plasma confinement, Thermo Nuclear function reactors.

Module 6	**Energy from Biomass**: Introduction: Biomass conversion technologies, photosynthesis, Bio-gas generation, types of bio-gas plants, Biomass as a Source of Energy: Methods for obtaining energy from Bio-mass, Bio-logical conversion of Solar energy.
Module 7	**Environmental Aspects of Electric Energy Generation:** Introduction Thermal pollution, Atmospheric pollution, Effects of Hydroelectric projects, nuclear power generation and environment, Green House Gas Effects, Global Environmental awareness, Energy options for Indian Economy.
Module 8	**Solar Energy:** Solar radiation estimation, Basic Principle of Solar Energy physical Principal of the conversion of solar radiation into heat, Collectors, Solar Energy storage system, solar thermal electric conversion, solar electric Power Plant & applications.
Module 9	**Wind Energy:** Basic Principle of wind energy conversion, nature & Power of wind, site selection, wind energy conversion SYSTEM. Scheme for Electric Generation, Generator Control load control, Inter connected SYSTEM & applications.
Module 10	**Small Hydro Power:** General description, classification of schemes, siting and economic considerations, system components: weir/intake channel, desilting tank, forbay, spillway, penstock, turbine, generator, governor, control.
Module 11	**Biomass Energy:** Biomass conversion technologies bio mass generation, classification of Bio Gas Plants material used in Bio Gas Plants., Selection of site & applications.
Module 12	**Geothermal Energy:** Sources of Geothermal energy Estimation of Geothermal Power, Geothermal Power Plants, Geothermal energy in India and Prospects.
Module 13	**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 14	**MHD & Hydrogen Energy:** Basic Principle MHD SYSTEM, advantages, Power OUTPUT of MHD Generation, future Prospects. Principle and classification of fuel cell energy, hydrogen as alternative fuel for Generation of Electrical Energy & applications.
Module 15	**Fuel Cell:** Fuel Cell, Management of Fuel, Thermionic power generation, water Resource Electricity divined scenario storage and handling, Introduction to smart grid.

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

Department of Civil Engineering

Presents

Add-On Course On:

Learning Civil Engineering through Latest Contemporary Software and Tools

Session: 2023-24

Duration: 30Hrs

B.Tech. 3rd Year Students

Key Objectives of the Course:

- Application of different software and tools used for the present industry practices in the field of Civil Engineering.
- Hands on experience on the software and tools and apply the same skill as practicing engineer.

Course Coordinators:

Prof. Dr. Sanjay Sengupta

Prof. Koydrik Bhattacharjee

Prof. Prannoy Roy

Mr. Surajit Sen

Mrs. Anindita Sengupta

Dr. B. C. Roy Engineering College, Durgapur

Department of Civil Engineering

Add-On Course

Learning Civil Engineering through Latest Contemporary Software and Tools

Duration: 30Hrs

Course Objective: This course is aimed to provide students 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.

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/roads/transport & traffic system using different available software, programming languages and tools

CO2:Manage civil engineering projects using software and tools

CO3: Perform 3D modelling of structures using building information modelling

CO4: Apply GIS in understanding and solving different civil engineering problems related to surveying and water resources.

Course Content:

Lecture 1:Introduction to different software available in learning Civil Engineering.
Lecture 2: Structural analysis through software, e.g., StaadPro, ETabs etc.
Lecture 3: Hands-on on Staad Pro (creating 2D, 3D models and analyse).
Lecture 4: Hands-on on Staad Pro (analysis of structure for dynamic loads like Seismic and Wind load).
Lecture 5: Hands-on on Staad Pro (Design of RCC and Steel structure).
Lecture 6: Foundation design through Staad Foundation software.
Lecture 7: Introduction to ETabs
Lecture 8: Hands-on on ETabs
Lecture 9: Introduction to SAP
Lecture 10:Hands-on on SAP
Lecture 11: Introduction to drafting and modelling software like AutoCAD, Civil 3D etc.
Lecture 12: Introduction to programming language Python.
Lecture 13: Application of spreadsheet in Civil Engineering design and calculations
Lecture 14: Introduction to RCC design through spreadsheet
Lecture 15:Hands-on on RCC design through spreadsheet
Lecture 16:Introduction to Civil Engineering estimation and valuation through spreadsheet.
Lecture 17: Hands-on on estimation through spreadsheet.
Lecture 18: Hands-on on valuation through spreadsheet.
Lecture 19:Matrix analysis of structure using Matlab/Skylab.
Lecture 20: Hands-on Matlab for applying it in structural analysis problems
Lecture 21: Application of project management in Civil Engineering using MS Project.
Lecture 22: Hands-on on MS Project.
Lecture 23: Introduction to digital land survey using ArcGIS/QGIS
Lecture 24:Hands-on on ArcGIS/QGIS
Lecture 25: Basic ideas on Building Information and Modeling (BIM) using 3D modelling software likeRevit.
Lecture 26: Hands-on on Revit
Lecture 27: Application of Civil Engineering software in Transportation Engineering using Vissim/MX Road.
Lecture 28: Hands-on on Vissim/MX Road.
Lecture 29:Introduction to slope stability analysis through Plaxis2D & 3D software.
Lecture 30: Hands-on on Plaxis.

Syllabus

Module 1	Introduction: Basic concept of different types of software used in Civil Engineering for problem solving, e.g.Staad Pro, Staad Foundation, ETabs, SAP, AutoCAD, ArcGIS/QGIS, MX-Road, Vissim, MS Project, MS Office/Libre Office, Plaxis, Matlab/Skylab, Python etc. 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 and Modeling software: Learning widely used Civil Engineering software like Staad Pro, ETabs, SAP, Revit, AutoCAD, Civil 3D. Design and creating model of RCC/Steel structure, atleast one of such type.
Module 3	Use of Spreadsheet: Learning spreadsheet like MS Excel, Libre Office for quantity estimation of various Civil Engineering projects, and preparing optimized valuation chart.
Module 4	Use of MS Project/Primavera: 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 5	Use of GIS: Learning QGIS/ArcGIS to analyse and edit spatial information, in addition to composing and exporting graphical maps. Handling and analysing geographic information by visualizing geographical statistics through layer building maps like climate data or trade flows.
Module 6	Use of MX Road/Vissim: Learning software like MX Road, it is an excellent string-based modeling tool that enables the rapid and accurate design of all types of roads, and with the help of Vissim software, traffic simulation and transport planning can be done in an effective way.
Module 7	Use of Plaxis: Learning Plaxis 2D/3D software, it is globally accepted finite element software that are used to solve geotechnical problems like deformation and slope stability of soil and rocks.

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

Department of Civil Engineering

Presents

Add-On Course

On

RECENT TRENDS AND DEVELOPMENTS IN CEMENT AND CONCRETE TECHNOLOY

Session 2023-24

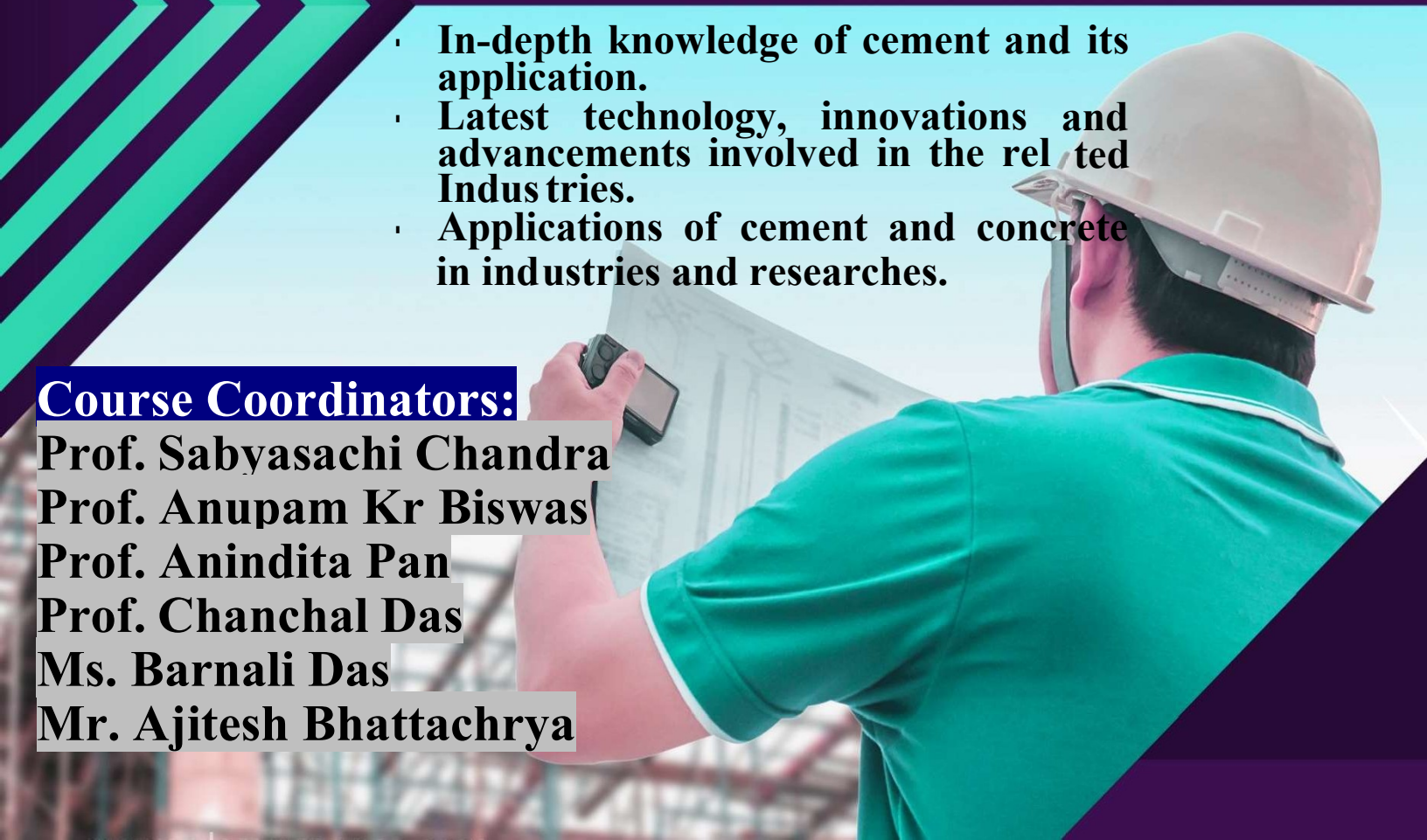
Duration: 30 Hrs

For B.Tech

3rd Yr. Students

Key Objectives of the Course:

- In-depth knowledge of cement and its application.
- Latest technology, innovations and advancements involved in the related Industries.
- Applications of cement and concrete in industries and researches.



Course Coordinators:

Prof. Sabyasachi Chandra
Prof. Anupam Kr Biswas
Prof. Anindita Pan
Prof. Chanchal Das
Ms. Barnali Das
Mr. Ajitesh Bhattachrya

Dr. B. C. Roy Engineering College, Durgapur

Department of Civil Engineering

Add-On Course

RECENT TRENDS AND DEVELOPMENTS IN CEMENT AND CONCRETE TECHNOLOGY

Duration: 30 Hrs

Course Objective: The course is aimed to provide students the in-depth knowledge of cement and its application in Civil Engineering. The course will give insight about the latest technological innovations, advancements, production technologies that have been adopted with applications of cement and concrete in industries and researches.

Course Outcome:

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

CO1: Understand Cement usages, applications and technological innovations and present status of cement industry.

CO2: Analyze different properties of cement from laboratory experiments.

CO3: Understand applications of high performance concrete and their properties.

CO4: Apply finite element techniques and software packages for modeling and analysis of RC structures.

Course Content:

Lecture 1: Introduction to Cement as a building material, application and present usage status of cement; scope of Civil Engineers in Cement Industries.

Lecture 2: New approach and recent advancement in cement production, significance in reducing greenhouse gas emissions, water consumption, addressing global warming, durable concrete, production cost etc.

Lecture 3: Special type of cements: Anti Rust Cement (ARC), Calcium Sulfoaluminate (CSA) cement, Water-Repellent Cement etc.

Lecture 4: Alternative fuels and raw materials (AFR) usage in the cement manufacturing process, Replacing high carbon fuel with low carbon fuel, waste used as fuels.

Lecture 5: Environmental and Health Impact of emissions VOCs, dioxins, heavy metals and other pollutants due to cement production and measures for its control, Green Technology and Low Carbon Footprint.

Lecture 6: World Business Council for Sustainable Development (WBCSD) sustainability initiative for the cement industry

Lecture 7: Basic properties of cement, composition, phase diagram, cement hydration, Calorimeter, Heat evaluation pattern

Lecture 8: Effect of w/c, effect, Dormant period, Aluminate reactions and optimum sulphate content, Evolution of paste properties, Evolution of hydration products

Lecture 9: Trends of new cementitious material development; Calcium sulfoaluminate cement-based binder: Properties and application

Lecture 10: Microstructural Characterisation of Cementitious Materials

Lecture 11: Life cycle assessment of cement and concrete

Lecture 12: Laboratory tests on cement

Lecture 13: High Performance Concretes (HPC): Part-I

Lecture 14: High Performance Concretes (HPC): Part-II

Lecture 15: High Performance Concretes (HPC): Part-III

Lecture 16: Chemical Admixtures in HPCs: Part-I

Lecture 17: Chemical Admixtures in HPCs: Part-II

Lecture 18: Mineral Admixtures in HPCs

Lecture 19: High Strength Concrete (M70) Mix Design as per IS 10262:2019

Lecture 20: High Strength Concrete (M70) Mix Design as per IS 10262:2019 (Contd.)

Lecture 21: Slump Based Test.

Lecture 22: Permeability Tests.

Lecture 23: Compressive Strength Test.
Lecture 24: Non-Destructive Tests of High Strength Concrete.
Lecture 25: Introduction to commonly used finite element softwares such as ABAQUS, ANSYS for the modeling and analysis of concrete members; Basics of FEA technique.
Lecture 26: Hands on with ANSYS: Basic concepts of the Workbench Analysis, Component Systems, Workbench Framework, Toolbox and GUI.
Lecture 27: Hands on with ANSYS: link all system components together to form a complete simulation workflow with simple RC structure examples; linear and non-linear analysis.
Lecture 28: Hands on with ANSYS: Reinforced Concrete T-Joint using CPT215 Elements with Reinforcement
Lecture 29: Hands on with ANSYS: Numerical Modeling of Reinforced Concrete Beam Behavior under Different Collapsed Mechanisms
Lecture 30: Hands on with ANSYS: Numerical Modeling of Reinforced Concrete Slab Behavior under Different Collapsed Mechanisms

Syllabus

Module 1	Recent trends and developments in cement technology; Current status of cement usages, applications and technological innovations; Current status of cement industry – global status and Indian status; Cement Production Technology: Principles and Practices; Scope of Civil Engineers in the cement industry; Environmental Impact due to Cement Manufacturing.
Module 2	Properties of cement; Laboratory Tests & Demonstrations.
Module 3	Recent trends and developments in concrete technology; Current status of concrete usages, applications and technological innovations, High Performance Concrete (HPC), Chemical Admixtures in HPC, Mineral Admixtures in HPC.
Module 4	Mix Design of High Strength Concrete as per IS 10262:2019; Properties of High Performance Concretes; Laboratory Tests & Demonstrations.
Module 5	Modelling and analysis of RC structural members with FEA software such as ANSYS/ ABACUS.

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)

Spoken-tutorial Project, IIT Bombay

E-Brochure

Name of FOSS	Applications	Commercial equivalent	Employability	Department
Linux-Ubuntu	Virus free, robust, Operating System	Windows	Technician or System administrator for Computer Vendors (SME's), Indian Railways, Municipal Corporations, Air India and many SME's	Computer Science, IT, ECE, Electronics
LibreOffice -	Basic computer usage Office suite for documents, spreadsheets, presentations, database etc.	MS-Office	Administration, Data entry personnel, Travel Agency Assistant, Indian Railways, Municipal corporations, Govt. offices	All the departments including Schools
Writer	Word Processing, Documentation	Word		
Calc	Spreadsheets	Excel		
Impress	Presentations	Powerpoint		
Base	Managing Databases	Access		
Draw	Drawing	Windows-based Visio		
Math	Mathematical Operations	MathType		
PHP&MySQL	Web development and Database Management	.NET	Website Developer in all types of small and large enterprises, popular companies hiring PHP & MySQL trained persons are Air-India, Bridge & Roof Co., Media channels, agencies etc.	Computer Science and IT
C/C++, Java, Netbeans and Python	Programming language		Programmer in SMEs working in C, Java, Netbeans and Python, Lab- Assistant in colleges, Popular companies requiring programmers on C / C++, Java and Python are HCL technologies, Wipro, L&T, TCS	Computer Science and IT
Scilab	Scientific computation package for numerical computations	Matlab	Value addition in technical problem solving via use computational methods for engineering problems, Applicable in Chemical, ECE, Electrical, Electronics, Civil, Mechanical, Mathematics, etc.	Computer science, IT, ECE, Electronics, Mechanical
LaTeX	Document markup language and preparation system for Tex typesetting	MS-Word	Value addition to academic Skills set. Essential for International paper presentation and scientific journals.	All the departments
OpenFOAM	For Fluid Mechanics to solve and create fluid movies	Fluent	Companies like AUDI,Tata Steel, Volkswagen, etc. have started using it. Also Indian Govt. agencies like BARC (Babha Atomic Research Center) are making use of this free software	Mechanical

Name of FOSS	Applications	Commercial equivalent	Employability	Department
Oscad - now eSIM	EDA tool for circuit design, simulation, analysis and PCB design. It is an integrated tool built using open source software such as KiCad, Ngspice and Scilab.	Orcad	PCB designer in SME's and academic institutions, Lab assistant for Electronic Circuit Lab, Electronic network designer.	ECE, Electronics, EEE, Electrical
Firefox	Web browser	Internet Explorer	System Administrator and Lab assistant in SME's and academic institutes.	All the departments
GIMP	Image Editing and Graphic Design	Photoshop	Self employed photo editor, editor in photostudios, graphic design job in gift stores, advertising agencies, etc.	Arts and Textile designing, Fashion designing, Architecture
Q-CAD	Basic 2D design and drafting	AutoCAD		
Blender	Animation and Computer Graphics	Maya 3D	Animator in graphic and animation media, film etc. Sectors, such as advertising computer games, TV, education, interiordecoration, etc.	Arts, Design
Ruby	Programming language		Ruby was used to implemented the reactive control part for the Siemens service robot. Ruby Web Dialogs based app to manage and track oncall and on-site support for the IT help desk and IT operations teams.	Simulations, 3D Modeling, Business, Robotics, Networking, System Administration, etc.
Perl	High-level programming language		Perl has been called the system administrator's best friend for its ability to make common tasks easy. Perl's process, file, and text manipulation facilities make it particularly well suited for tasks involving quick prototyping, system utilities, software tools, system management tasks, database access, graphical programming, networking, and web programming.	Web developers, system administrators. Mathematicians, geneticists, journalists, managers, etc.
Jmol Application	Jmol applet is used to explore the structure of molecules. Jmol applet is used to depict X-ray structures.		Jmol returns a 3D representation of a molecule that may be used as a teaching tool, or for research e.g. in chemistry and biochemistry. There is a standalone application and a development tool kit that can be integrated into other Java applications.	Chemistry, Biochemistry
CellDesigner	Software for Planning & Designing Wireless Communication Systems, Modeling tool		CellDesigner has fully implemented the Korowajczuk 3D model, capable of performing simultaneously outdoor and indoor multi-floor predictions.	BioScience and Biotechnology

Name of FOSS	Applications	Commercial equivalent	Employability	Department
GChemPaint	GChemPaint is an editor for 2D chemical structures with a multiple document interface.		GChemPaint is currently being developed as part of The Chemistry Development Kit, and a Standard Widget Tool kit-based GChemPaint application is being developed, as part of Bioclipse.	School level Chemistry
Inkscape	Graphic Designing	Adobe Illustrator, Coreldraw	Photo editing, Photo Manipulation and Graphic Design	All the departments including Schools
Bash	Bash is a “Unix shell” commandline interface for interacting with the operating system. Bash has the ability to run an entire script of commands, known as a “Bash Shell script” or “Shell script”.		Familiarity with GNU/Linux command lines, and familiarity with basic programming concepts is a prerequisite for learning BASH. System administrators will greatly benefit by learning to automate common tasks using BASH.	System Administrators
Ascend	ASCEND is a free, open source, mathematical modelling system.		Its main uses have been in the field of chemical process modelling, with its novel modelling language conventions and powerful solver.	Chemical Engineering
Joomla	Content Management System		To build Website.	All the Departments
Biopython	Tool for Computational Biology and Bioinformatics.		To access online database such as NCBI. It can perform common operations such as transcription, translation, obtain complements, reverse complements, parsing, running BLAST.	Biology, Biochemistry and Dept. of Bioinformatics.
Java Business Application	To create a business application from scratch. Example : Library Management System		To built the business application and provide domain expertise	Computer Science and IT
Kturtle	An educational programming environment which helps in learning how to build logic and how to program, in an easy manner.		Some of its features are : intuitive syntax highlighting, simple error messages, integrated canvas to make drawings on, integrated help function, slowmotion or step execution, and more.	School level
Ktouch	Typing tutor teaches how to type using an online interactive keyboard		Learn typing at your own pace. Gradually increase your typing speed and along with it, your accuracy.	
FrontAccounting	FrontAccounting (FA) is a free and open source accounting software.	Alternative to Tally	FrontAccounting (FA) is a professional web-based Accounting system, written in PHP.	Commerce, Management

Name of FOSS	Applications	Commercial equivalent	Employability	Department
Avogadro	Avogadro is a free and open source, advanced molecule editor and visualizer designed for cross-platform use in computational chemistry, molecular modeling, material science, bioinformatics, etc.	ChemDraw	Academic positions in Chemistry involving teaching as well as R & D.	Chemistry and Bio-Chemistry
Drupal	Drupal is a free and open source content management system (CMS) written in PHP and distributed under the GNU General Public License		Web developer, Web architect, Computer solutions provider, Web technologies, Information systems, Content Managers, Digital solutions.	MCA, MBA, B.Comm., B.Comm. IT, any Engineering dept.
DWSIM	DWSIM is an open-source CAPE-OPEN compliant chemical process simulator. It allows us to conduct experiments and analyze data using advanced models and operations.	ASPEN Plus, CHEMCAD, PRO/II	As engineer in Power, Petrochemicals, Pharmaceutical, Chemical industry.	Chemical Engineering
Open Modelica	OpenModelica is an open source modelling and simulation environment intended for industrial and academic usage.It is an object oriented declarative multi domain modelling Language for complex systems.	Dymola	As engineer in Power, Automotive, Aerospace industry.	Chemical Engineering, Mechanical, Aerospace.
UCSF Chimera	UCSF Chimera is a program for interactive visualization and analysis of molecular structures and related data. Using Chimera, one can generate high-quality images and animations.	ChemDraw	Academic positions in Chemistry involving teaching as well as R&D. Also in chemical industry R&D.	Chemistry
Arduino	Arduino is open-source hardware, open-source software and microcontroller based kit.		Microcontroller and embedded system manufacturing industry, Robotics.	Electrical, Electronics Physics, and Computer Engineering

Dr. B.C. Roy Engineering College

Dept. of Electrical Engineering

Proposed Add-on Course on Power System Suggested by: Prof (Dr.) Sumit Banerjee

Name of the Course: Recent Trends in Power System Operation

Semester: 6 **Contact: 2L+0T** **Credit: 02**

Syllabus

Module No	Topic Description	Lecture Hours
1	**Introduction to Power System Operation and Control** Introduction, Operating States of a Power System, Objectives of Power System Control, Key Concepts for Reliable Operation, Preventive and Emergency Controls, Energy Management Centers, Indian Power Sector.	[3]
2	**Economic Operation and Unit Commitment** Introduction, Simple Enumeration (Brute Force), Constraints in Unit Commitment (Spinning Reserve, Network Constraints, Emission Constraints, Fuel Constraints, Security Constraints), Priority List Method, Dynamic Programming, Expert System for Unit Commitment.	[6]
3	**Load Forecasting** Introduction, Time Series Data, Forecast Accuracy, Simple Forecast using Mean, Smoothing Methods, Simple Regression: Least Squares Estimation, ARIMA Models, State Space Model for Forecasting, Kalman Filter, Issues in Load Forecasting.	[4]
4	**Introduction to State Estimation of Power System** Introduction, Linear Least Squares Estimation, DC State Estimator, Nonlinear Measurements, AC State Estimation of Power Systems, Tracking State Estimation, Ill- Conditioning, Bad Data Detection, Real Time State Estimation.	[4]
5	**Supervisory Control and Data Acquisition** Introduction to SCADA, Components of SCADA, Standard SCADA Configurations, Functionality, SCADA Protocols, Users of Power System SCADA, Data for a Supervisory Power System, RTUs for Power System SCADA, Common Communication channels for SCADA in Power Systems, sequencing of Events, Challenges for Implementation of SCADA in Power Systems, Security of Power System SCADA.	[4]
6	**Recent Trends in Power System Operation and Control** Demand Side Management, Availability Based Tariff, Smart Grid, Distributed Generation, Electric vehicles, Energy Storage System, Energy Conservation, Distribution Automation.	[8]
7	**Application of Optimization Techniques in Power System** Particle Swarm Optimization (PSO), Teaching-Learning-Based Optimization (TLBO), Genetic Algorithm (GA), Biogeography-Based Optimization (BBO).	[5]
Total		[34]

References:

1. Power System Stability And Control-P. Kundur, Tata Mack Graw Hill Pub.
2. Power System Operation and Control-N.V.Ramana, Pearson India
3. S.S.Rao, Engineering Optimization, 3rd Edition, New Age International (P) Ltd.
4. Stuart A Boyer, SCADA: Supervisory Control and Data Acquisition, Fourth Edition, Kindle Edition
5. Genetic Algorithm – D. E. Goldberg
6. Soft computing Technique and its application in electrical Engineering by Chaturvedi, 5. Optimization on Power system Operation by Jizhong Zhu Wiley-IEEE Press.
7. An Introduction to Optimization, 3rd Edition by K.P. Chong, Stanislaw H. Zak.
8. Rafal Weron, Modeling and Forecasting Electricity Loads and Prices: A Statistical Approach, Wiley

Course Outcomes

After completion of this course a student will be able to	
CO1	Study and analyze the power system operation and control.
CO2	Understand the economic operation and unit commitment and solve problems.
CO3	Estimate the loads using forecasting
CO4	Acquire the knowledge of State Estimation of Power System
CO5	Understand the SCADA
CO6	Study the Recent Trends in power system operation and control
CO7	Apply the optimization techniques to solve problem in power system

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	2	2								2
CO2	1	2	2	2								2
CO3	1	2	2	2	2	2						2
CO4	1	2	2	2								2
CO5	1	2	2	2	2	3						2
CO6	1	2	2	2								2
CO7	1	2	2	2	2	3						2

QCad

From Script | Spoken-Tutorial

QCAD is an application for computer aided drafting in two dimensions (2d). It is a simple 2D CAD system for everyone. Using QCAD you can create technical drawings such as plans for buildings, interiors, mechanical parts or schemas and diagrams. QCAD works on Windows, Mac OS X and many Linux and Unix Systems. The source code of the QCAD community edition is released under the GPL (Open Source).

Learners: UG/PG architecture students.

Contents

Basic Level

1. Introduction to QCAD
   - Menu Items and Toolbar
   - Drawing Objects
   - Snapping Tools
   - Using Layers
2. Drawing Methods in QCAD
   - Cartesian Coordinate System
   - Using Command line to Draw Objects
   - Drawing Methods
3. Using Modification Tools
   - Trim
   - Copy
   - Move
   - Rotate
4. Modification Tools to Stretch and Mirror in QCAD
   - Stretch
   - Mirror
5. Modification Tools to Scale and Rotate in QCAD
   - Scale
   - Rotate Two

Contributors and Content Editors

Minal, PoojaMoolya, Pratik kamble

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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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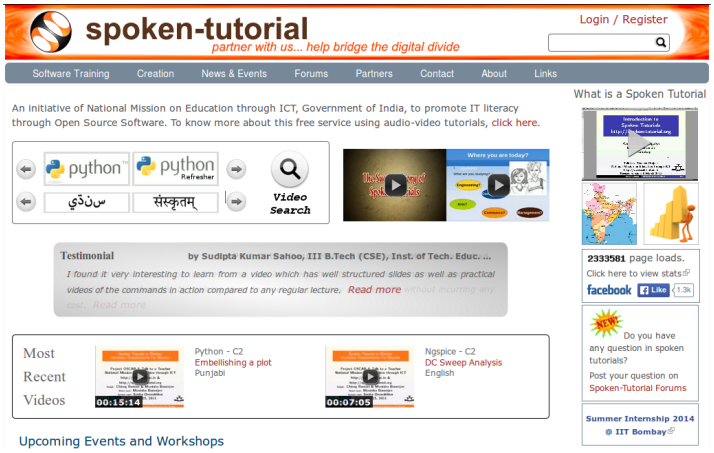
  python.fossee.in/spoken-tutorials



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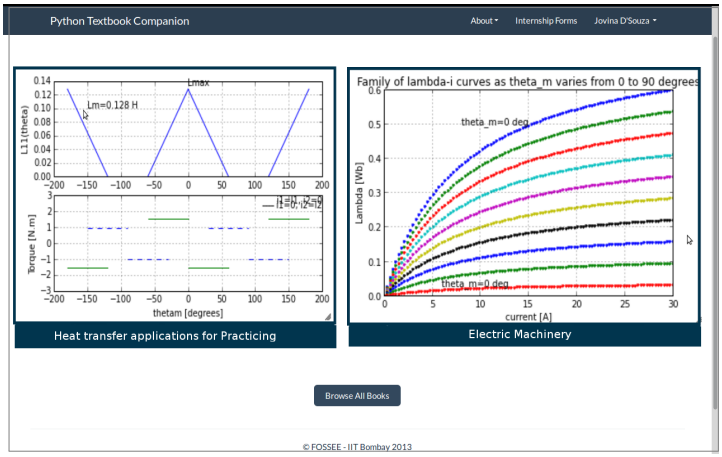
Completed Book : Approx 453 books

Under Progress : Approx 113 books



Python Textbook Companion website

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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

- High School
- Undergraduates
- Post Graduates and Researchers in any field

Workshops

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

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 https://forums.spoken-tutorial.org.

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Introduction

- QGIS is a free and open-source cross-platform desktop geographic information system application that supports viewing, editing, and analysis of geospatial data.
- QGIS easily integrates with other open-source GIS packages, including PostGIS, GRASS GIS, and MapServer.
- QGIS is the leading alternative to any proprietary GIS software

Download and Installation

Please use the link given below for download and installation

https://www.qgis.org/en/site/forusers/download.html

Or

https://spoken-tutorial.org/watch/QGIS/Installation+of+QGIS/English/

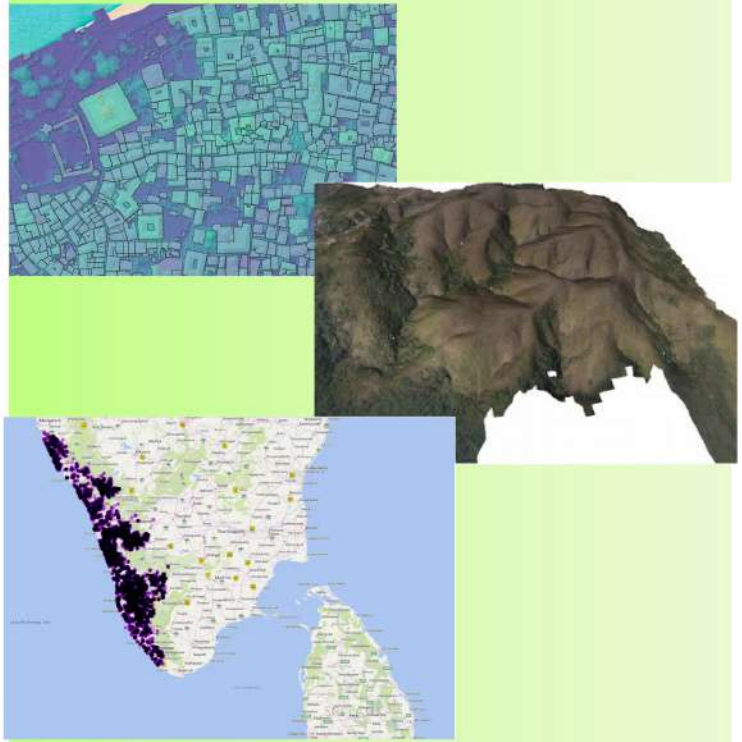
QGIS Spoken Tutorials

Please use the link below to view and download QGIS Spoken Tutorials.

https://spoken-tutorial.org/tutorial-search/?search_foss=QGIS&search_language=English

Features

- Versatility: Platform independent, works on any operating systems. QGIS is subject to the GNU General Public License
- Advanced data creation and editing techniques
- Interoperability between many spatial data formats
- Regularly updated on community collaborations and user demands
- Powerful network analysis library
- No license levels in QGIS, completely free and open-source platform



Benefits of QGIS

- Improved spatial strategic analysis
- QGIS has a powerful Processing Toolbox,integrated with GRASS and SAGA algorithms
- Can automate work-flows with batch processing and to create graphical models.
- Ability to add custom plugins to extend functionality
- Render and create 3D maps with ease
- Integrated core functionalities in every software updates
- Can be used for complex analysis to map composition
- Styling GIS data, from creating custom symbols and color ramps to using blending modes.
- Easy to run Python and integrate data processing scripts
- Capable of Interactive webGIS functionalities
- Used for major scientific analysis
- Ability to add heat maps, live layer effects and labels to your maps

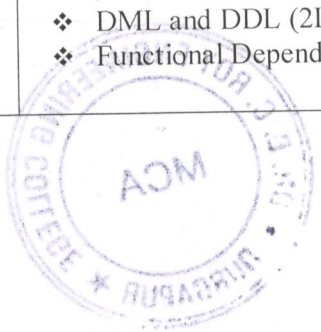
DR. B. C. ROY ENGINEERING COLLEGE, DURGAPUR

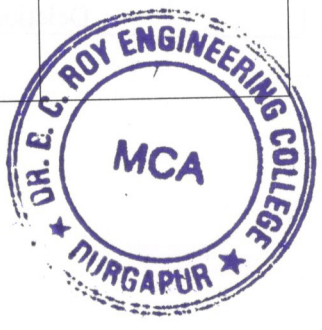
DEPARTMENT OF COMPUTER APPLICATIONS

COURSE STRUCTURE ON CARRIER ADVANCEMENT

COURSE DURATION: 40 HOURS (40 Lectures)

TOPIC	Description	No. of Lecture
1	**Verbal&Non-verbalReasoning**	**6L**
	❖ Numericalseries. ❖ Distance andDirectionsenseTest. ❖ MathematicalOperations ❖ Number,Ranking&Time SequenceTest. ❖ AssignArtificialValuestoMathematicalDigit. ❖ InsertingCorrectMathematicalsign. ❖ Humanrelation. ❖ Coding&Decoding ❖ Oddmanout. ❖ Mutualrelationproblems. ❖ Tallest,youngestrelations. ❖ Dictionarywoods. ❖ Analogy. ❖ Non-Verbalreasoning. ❖ Numbercoding. ❖ NumberPuzzle.	
2	**Elementary Mathematics**	**6L**
	❖ Ratio and Proportion. ❖ Average. ❖ LCM & HCF. ❖ Profit and Loss. ❖ Time, Distance and Speed. ❖ Percentage. ❖ Simplifications of Numbers. ❖ Fractions. ❖ Area of triangle, Square and Rectangle. ❖ Surface Area and volume of Cuboids, Cylinder, Cone and Sphere. ❖ Probability. ❖ Simple Trigonometry.	
3	**DBMSBasic**	**6L**
	❖ Introduction to DBMS, Three level architecture, Relational data model ,database design, Keys,Relational integrity ,constraints ,Referential integrity (2L) ❖ DML and DDL (2L) ❖ Functional Dependency, normalization (2L)	





4	**ComputerProgramming**	**6L**
	❖ Introduction to the C Language – Algorithm, Flow chart, Identifiers, Data Types, Variables, Constants, Input / Output, Type conversions.(1L) ❖ Statements- Selection Statements (making decisions) – if and switch statements, Repetition statements (loops)-while, for, do-while statements, Loop examples, other statements related to looping – break, continue (2L) ❖ Functions- Introduction to Structured Programming, Functions- basics, user defined functions (1L) ❖ Arrays– Basic concepts, one-dimensional arrays, two – dimensional arrays, multidimensional arrays (1L) ❖ Pointers – Introduction (Basic Concepts), pointers to pointers, compatibility, Pointer Applications, (1L)	
5	**ObjectOrientedProgramming**	**4L**
	❖ Object-oriented concepts such as classes, objects, data abstraction, methods, method overloading, inheritance and polymorphism. Operator overloading, Virtual Function.	
6	**Networking**	**2L**
	❖ Networking & TCP/IP: Communication protocols, Network architecture, TCP & IP headers, IPv4 & v6 address structures, Internet protocols: Application layer, Transport layer, Network layer, Data-link layer protocols, Chat, Email, Web server working method & programming.	
7	**OperatingSystem**	**4L**
	❖ Overview of Operating Systems. What is an OS. Brief history. ❖ Background and Basics. Computer System review. Architecture. ... ❖ Processes. Definition. Process States. ... ❖ CPU Scheduling. I/O burst cycle. ... ❖ Process Synchronization. Critical Section Problem. ... ❖ Deadlocks. System Model. ... ❖ Memory Management. Address Binding. ... ❖ Storage. Files.	
8	**DataStructure**	**6L**
	❖ Introduction to Data Structures, abstract data types, Linear list – singly linked list implementation, insertion, deletion and searching operations on linear list, Stacks- Operations, array and linked representations of stacks, stack applications, Queues- operations, array and linked representations. ❖ Search Trees: Binary Search Trees, Definition, Implementation, Operations- Searching, Insertion and Deletion, AVL Trees, Graph.	

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Advanced Database Lab

Pre-Requisite Knowledge/Skills

- Basic programming knowledge and Logical skills

Course Outcomes

- Upon successful completion of the course, participants should be able to:
  - Work with different types of SQL Statements as (DQL, DDL, DML) and Understand types of constraints in SQL
  - Work with Joins and sub-queries
  - Write PL/SQL code to interface with the database and Design PL/SQL program units that execute efficiently
  - Use PL/SQL programming constructs and conditional control statements
  - Work with Stored Procedures and Functions
  - Understand Triggers and Cursor concepts

Detailed Syllabus

Module 1: SQL **[8 Hrs.]**

- SQL fundamentals
- Retrieving data with SELECT
- Executing queries
- Implementing various types of joins
- Writing self joins
- Combining queries with set operators
- Summarizing data with aggregate functions
- Grouping data
- Extending group queries
- Self-contained sub-queries
- Correlated sub-queries
- Common table expressions

Module 2: PL/SQL **[22 Hrs.]**

- ***Introduction to PL/SQL*** **[2 Hrs.]**
- ***Declaring PL/SQL Variables***
- ***Writing Executable Statements***
- ***Using SQL Statements within a PL/SQL Block***
  - Identify and use the SQL Statements in PL/SQL
  - Retrieve Data in PL/SQL with the SELECT statement
  - Avoid Errors by Using Naming Conventions When Using Retrieval and DML Statements
  - Manipulate Data in the Server Using PL/SQL
  - The SQL Cursor concept
  - Use SQL Cursor Attributes to Obtain Feedback on DML
  - Save and Discard Transactions

- ***Writing Control Structures*** **[2 Hrs.]**
  - Control PL/SQL Flow of Execution
  - Conditional processing Using IF and CASE Statements
  - Handle Nulls to Avoid Common Mistakes
  - Build Boolean Conditions with Logical Operators
  - Use Iterative Control with Looping Statements

- ***Working with Composite Data Types*** **[2 Hrs.]**
  - Learn the Composite Data Types of PL/SQL Records and Tables
  - Use PL/SQL Records to Hold Multiple Values of Different Type
  - Inserting and Updating with PL/SQL Records
  - Use INDEX BY Tables to Hold Multiple Values of the Same Data Type

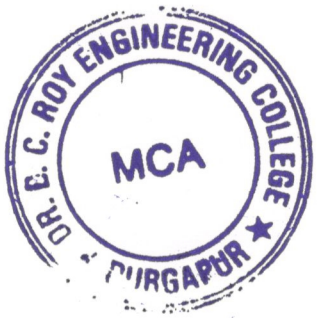
- ***Using Explicit Cursors*** **[5 Hrs.]**
  - Define Cursors
  - Explain Explicit Cursor Operations
  - Controlling Explicit Cursors
  - Use Explicit Cursors to Process Rows
  - Cursors and Records
  - Cursor FOR Loops Using Sub-queries
  - Explicit Cursor Attributes
  - The %NOTFOUND and %ROWCOUNT Attributes

- ***Handling Exceptions*** **[4 Hrs.]**
  - Define Exception
  - Handling Exceptions with PL/SQL
  - Predefined Exceptions
  - Trapping Predefined and Non-predefined Oracle Server Errors
  - Functions that Return Information on Encountered Exceptions

- Trapping User-Defined Exceptions
- Propagate Exceptions
- Basic RAISE Statement

- ***Creating Stored Procedures and Functions*** **[4 Hrs.]**
  - Overview of Stored Procedures and Functions
  - Differentiate between anonymous blocks and subprograms
  - Show the CREATE OR REPLACE PROCEDURE | FUNCTION
  - Understand the Header Area of a Stored Procedure and Function
  - Create Simple Procedures and Functions
  - Create a Simple Procedure with an IN Parameter
  - Execute a Procedure and a Function

- ***Triggers*** **[3 Hrs.]**
  - Introduction To Triggers
  - Creating DML Triggers
  - Creating DDL and Database Event Triggers
  - Managing Triggers



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Fundamental Programming Lab

Course Outcomes

- Upon successful completion of the course, participants should be able to:
  - Formulate simple algorithms for arithmetic and logical problems.
  - Implement conditional branching, iteration and recursion.
  - Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
  - Use arrays, pointers and structures to formulate algorithms and programs.
  - Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.

Detailed Syllabus

Introduction to Programming **[3 Hrs.]**

- Introduction, Art of Programming through Algorithms and Flowcharts
- Overview of C: History and importance of C, Basic structure of C program, executing a C program.
- Constants, Variable and Data Types: Introduction, Character Set, C Tokens, Keywords and
- Identifiers, Constants, Variables, Data Types, Declaration of Variables, Assigning Values to
- Variables, Defining Symbolic Constants.

Conditional Branching and Loops **[4 Hrs.]**

- Introduction, Decision Making with IF Statement, Simple IF Statement, the IF-ELSE Statement, Nesting of IF-ELSE Statements, The ELSE IF Ladder,
- The Switch statement, The ? : Operator,
- The goto statement Iteration and loops.

Arrays **[6 Hrs.]**

- One-dimensional Arrays, Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Example programs- Bubble sort, Selection sort, Linear search, Binary search, Two-dimensional Arrays, Declaration of Two-dimensional Arrays, Initialization of Two-dimensional Arrays, Example programs-Matrix Multiplication, Transpose of a matrix
- Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions)

Function **[7 Hrs.]**

- Need for functions, Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, No Arguments and no Return Values, Arguments but no Return values, Arguments with Return Values, No Arguments but Returns a Value, Passing Arrays to Functions, Recursion, The Scope, Visibility and Lifetime of variables.

Structure **[2 Hrs.]**

Structures, Defining structures and Array of Structures

Pointers **[6 Hrs.]**

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list.

File Handling **[2 Hrs.]**

Introduction, Defining and opening a file, closing a file, Input/output and Error Handling on Files.

python™

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- Web development
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- NASA
- IBM
- YouTube
- nVIDIA
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- Games - Battle field 2 by EA sports, Crystal space 3D, etc.

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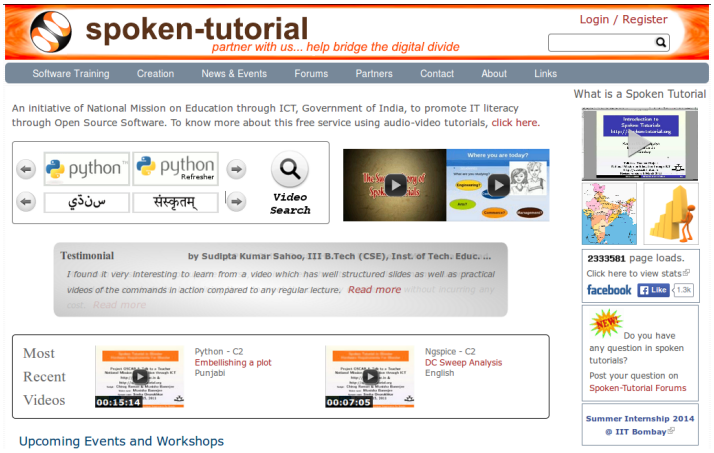

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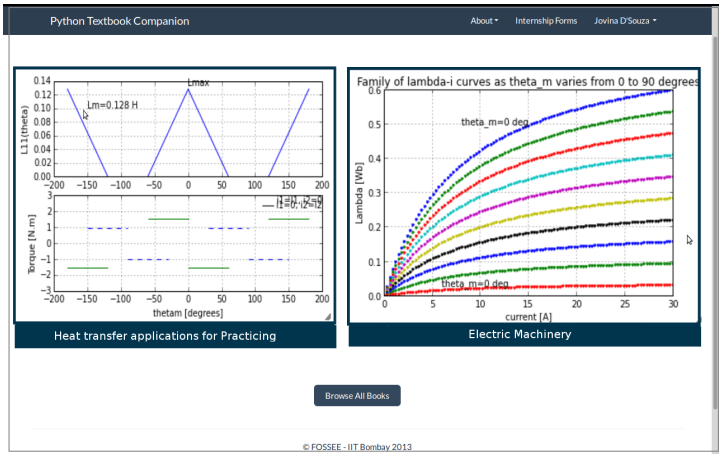

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Participate and earn attractive honorarium for your efforts.

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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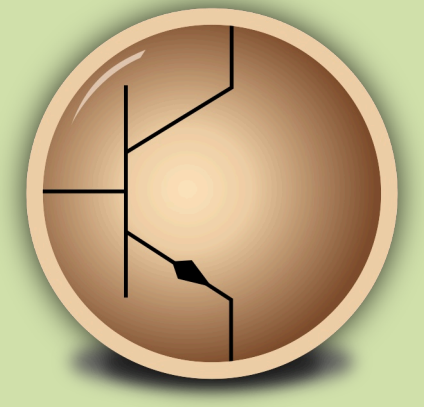
http://sakshat.ac.in



eSim

A Free and Open Source EDA Tool

https://esim.fossee.in

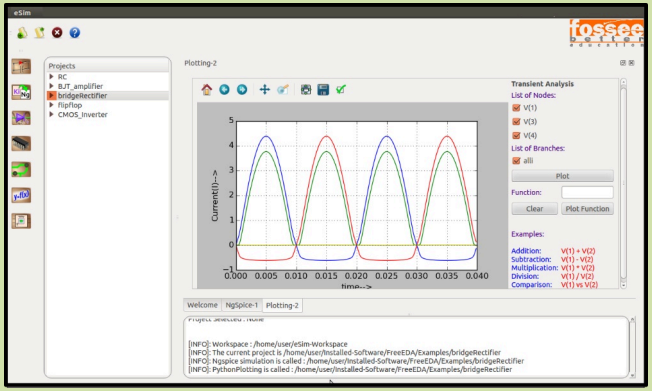
fossee better education

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.

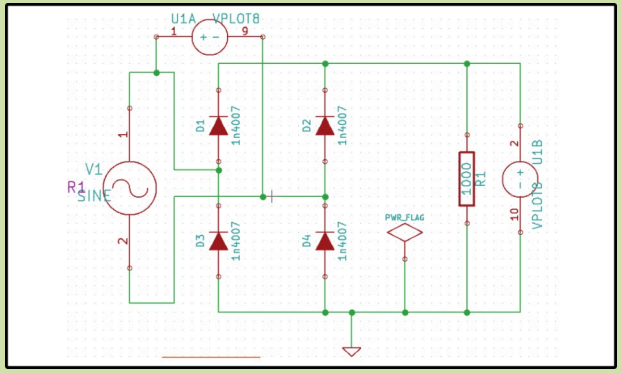
It is an integrated tool built using free/libre and open source software such as KiCad *(http://www.kicad-pcb.org)*, Ngspice *(http://ngspice.sourceforge.net/)* and GHDL *(http://ghdl.free.fr/)*. eSim is released under GNU GPL License and runs on Ubuntu Linux OS, Windows 7 and above versions of Windows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



Features

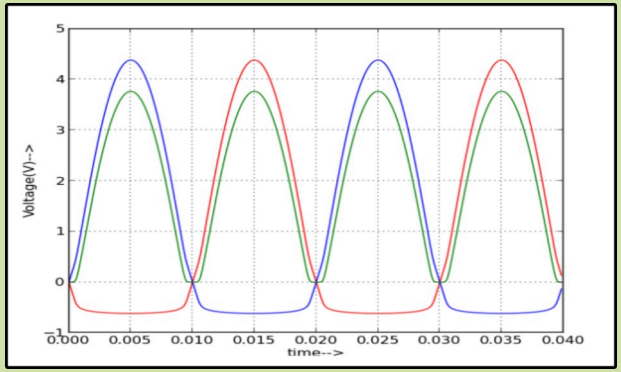
Create Circuit Schematic

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



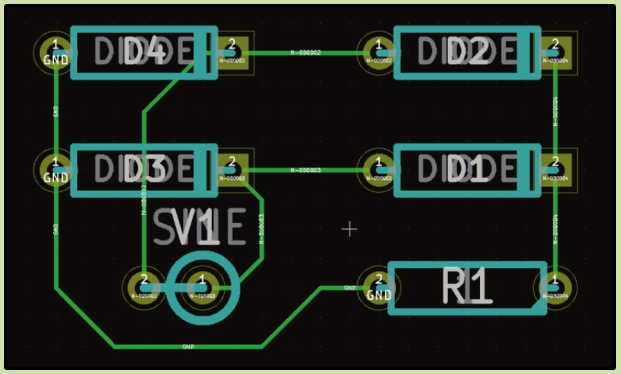
Perform Circuit Simulation

- 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
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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

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Target Group

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

Workshops

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Java

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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.

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

- 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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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

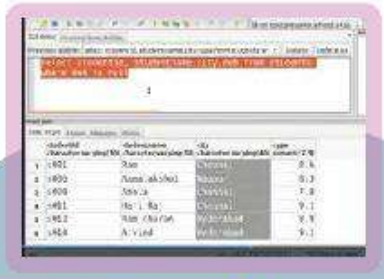
Features

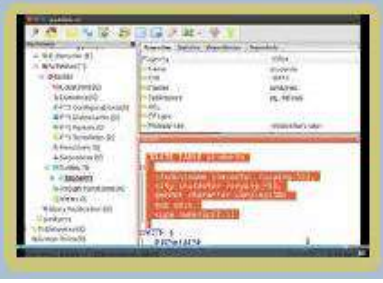
- PostgreSQL works on Linux, Windows and Mac operating system
- It is easy to learn for the beginners
- It supports client-server network architecture
- It allows to add custom functions developed using different programming languages such as C/C++, Java, etc.
- In PostgreSQL, we can define our own data 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





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Target Group

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- Community at large

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THE C PROGRAMMING LANGUAGE

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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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*Research scholars

*Community at large

Workshops

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Spoken Tutorial

LaTeX

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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

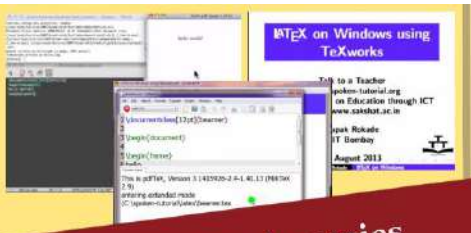
Benefits of LaTeX:

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.