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B.Tech. CSE LNCT University
I Semester Syllabus

Engineering Chemistry& Life Sciences (CS-101)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Solve analytical problem of hard water
CO2	Assess quality of fuel.
CO3	Use lubricants in relevant fields
CO4	convey that all forms of life have the same building blocks and yet the manifestations are diverse
CO5	understanding molecular basis of DNA as a genetic material for information transfer

COURSE CONTENTS:

UNIT I WATER – ANALYSIS, TREATMENTS AND DISINFECTION METHODS:

Sources, Impurities, Hardness and its units, Determination of hardness by EDTA method, Alkalinity and its determination and related numerical problems. Boiler troubles- Sludge and Scale, Priming and foaming, Boiler Corrosion, Caustic embrittlement,
Softening methods - Lime- Soda process, Zeolite process, Ion Exchange process and related numerical problems.

UNIT II LUBRICANTS AND LUBRICATION:
Introduction, Mechanism of lubrication, Classification of lubricants, Significance and determination of Viscosity & Viscosity Index, Flash and Fire point, Cloud and Pour point, Carbon residue, Aniline point, Acid number, Saponification number, SEN.

UNIT III FUELS AND COMBUSTION:
Fossil fuels and classification, Calorific Value and its types, Determination of calorific value by Bomb Calorimeter, Calculation of calorific value by Dulong's formula, Proximate and Ultimate analysis of coal & their significance, Knocking, Relationship between knocking & structure of hydrocarbon, Octane number, Cetane number, Combustion and its related numerical problems.

UNIT IV BIOMOLECULES:
Molecules of life,Monomeric units and Polymeric structures: Sugars, Starch and Cellulose, Amino acids and Proteins, Nucleotides, DNA and RNA, Two carbon units : lipids.

UNIT V GENETIC ENGINEERING:

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Mendel's law of inheritance, Genes, Gene mapping, DNA as a genetic material. Hierarchy of DNA structure- from single stranded to double helix to nucleosomes. Concept of genetic code. Universality and degeneracy of genetic code. Recombinant DNA Technology, Genetic disorders in humans.

Reference Books: -

1. Chemistry for Environmental Engineering &Science,Sawyer, McCarty and ParkinMcGraw Hill, Education Pvt. Ltd., New Delhi.
2. Engineering Chemistry.B.K. Sharma.KrishnaPrakashan Media (P.) Ltd., Meerut.
3. Basics Engineering Chemistry.S.S Dara& A.K Singh.S.Chand& Company Ltd. Delhi.
4. Applied Chemistry.Theory and Practice, O.P. Viramani, A.K. Narula.New Age International Pvt. Ltd. Publishers, New Delhi.
5. Polymer Science.Ghosh.Tata McGraw Hill
6. Engineering Chemistry.ShashiChawla,Dhanpat Rai& Company Pvt. Ltd. New Delhi.
7. Engineering Chemistry. Jain&Jain,DhanpatRai& Company Pvt. Ltd. New Delhi.
8. A text book of Engineering Chemistry, Agrawal, C.V. Murthy, C.P. Naidu, ABS publication, Hyderabad.
9. Biology: A global approach, 10th edition, Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.;Jackson, R. B., Pearson Education Ltd. 2014.
10. Principles of Biochemistry,Nelson, D. L.; Lehninger, A. L.; and Cox, M. M., 8th edition, W.H. Freeman, 2020.

List of suggestive core experiments: -

1. **Water Testing**

i. Determination of total hardness by complexometric titration.

ii. Determination of mixed alkalinity : OH^- & $CO3^{2-}$ and $CO3^{2-}$ & $HCO3^-$

iii. Chloride ion estimation by Argentometric titration.

2. Fuels and Lubricant Testing

i. Flash and Fire Point determination by-
Abel's Apparatus, Cleveland Apparatus,Pensky Marten's Apparatus

ii. Viscosity& Viscosity index determination by –
Redwood viscometer-I&Redwood viscometer-II

iii. Determination of Cloud and Pour point of the given lubricating oil.

iv. Determination of Aniline point of the given lubricating oil.

3. Determination of percentage of moisture in the given sample of coal/solid lubricant by proximate analysis.
4. Determination of Calorific Value by Bomb Calorimeter.
5. Determination of protein concentration by ultraviolet spectroscopy
6. Determination of Gluten in different wheat samples.
7. Determination of Casein in different milk samples

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Advanced Calculus(CS-102)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO12.1	Analyze the Rolle's theorem that is fundamental to application of differentiation in Engineering problem.
CO12.2	Evaluate the idea of applying differential and integral calculus of curvature and to improve integral apart from some application it gives a basic introduction on Beta and Gamma function.
CO12.3	Apply effective mathematical tools for the solution of Ordinary Differential Equations.
CO12.4	Develop the Fuzzy logics MATLAB concept in most branches of engineering.
CO12.5	Create the essential tool of matrices in a comprehensive manners.

Course Contents:

Module 1: Calculus: (10 hours): Rolle's theorem, Mean Value theorems, Expansion of functions by Mc. Laurin's and Taylor's for one variable; Taylor's theorem for function of two variables, Partial Differentiation, Maxima & Minima (two and three variables).

Module 2: Calculus: (8 hours): Definite Integral as a limit of a sum and Its application in summation of series; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. Multiple Integral, Change the order of the integration, Applications of multiple integral for calculating area and volumes of thecurves.

Module 3: Ordinary Differential Equations I :(6 hours) : Differential Equations of First Order and First Degree (Leibnitz linear, Bernoulli's, Exact), Differential Equations of First Order and Higher Degree, Higher order differential equations with constants coefficients, Homogeneous Linear Differential equations, Simultaneous Differential Equations.

Module 4: Fuzzy (8hours): Operation of fuzzy sets, Fuzzy arithmetic and relation, Fuzzy relation equations, Fuzzy logics. MATLAB introduction, Programming in MATLAB scripts, Functions and their application.

Module 5: Matrices (8 hours): Rank of a Matrix, Solution of Simultaneous Linear Equations by Elementary Transformation, Consistency of Equation, Eigen Values and Eigen Vectors, Diagonalization of Matrices, Cayley-Hamilton theorem and its applications to find inverse.

REFERENCE BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, New Delhi,2015.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition,Pearson, Reprint, 2002.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

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List of experiments

1. Define a class Student with attributes name and marks. Include methods to assign marks and display the student's name and marks. Write a Python script to create multiple student objects, assign marks to each, and display their information.
2. Define a class Animal with a method speak(). Create two subclasses Dog and Cat, each with its own implementation of the speak() method. Write a Python script to demonstrate polymorphism by calling the speak() method on objects of both subclasses.
3. Create a Django project with an app that includes a form for user registration (username, email, password). Define a template to display the form and handle form submission in a view. Display a success message upon successful form submission.
4. Write a Python script to create a GUI inwdow with a Label and a Button. When the button is clicked, display a message box with the text from the Label.
5. Define a simple model Book with fields title and author in the MyApp app. Create and apply migrations for the model. Document the commands used and verify the changes in the database.
6. Create a Django template in MyApp that displays a list of books. Define a view that passes a list of book titles to the template. Map the view to a URL and display the list in the browser.
7. Create a custom template tag that returns the current date and time. Create a custom template filter that converts text to uppercase. Use these custom tags and filters in a template and test them in the browser.
8. Add custom validation to the Post form to ensure that the title is at least 10 characters long. Display appropriate error messages for invalid input. Test the validation by submitting the form with various inputs.
9. Modify the Article serializer to include a method field that returns the word count of the article content. Customize the viewset to filter articles based on the author's name. Test the customized API endpoints.
10. Create a Django project and app named FrontendApp. Develop a simple HTML form that allows users to submit their names. Use Django views to process the form and display a greeting message with the submitted name. Style the form using CSS and add basic JavaScript validation.
11. Define a class named Circle with an attribute radius. Include methods to calculate the area and circumference of the circle. Write a Python script to create an instance of the class, set the radius, and display the area and circumference.
12. Define a class Book with a constructor that initializes the attributes title, author, and price. Write a Python script to create multiple book objects and display their details.
13. Write a Python script to create a GUI window with a button. When the button is clicked, display a message "Button Clicked!" in the console.
14. Write a Python script to create a GUI window with three buttons arranged using the pack(), grid(), and place() geometry methods. Experiment with each method to understand their behavior.
15. Define a simple model Book with fields title and author in the MyApp app. Create and apply migrations for the model. Document the commands used and verify the changes in the database.
16. Define a view in MyApp that returns a simple HttpResponse with the text "Hello, Django!". Map this view to a URL in the urls.py file of MyApp. Test the URL mapping by running the Django development server and accessing the URL in a browser.
17. Create a Django project and app named MyApp. Define a function-based view that returns a simple HttpResponse with the text "Welcome to Function-Based Views!". Connect this view to a URL and test it in the browser.
18. Define a custom view that filters posts based on a keyword passed as a URL parameter. Display the filtered list of posts. Connect this view to a URL and test it in the browser.
19. Create a form for the Post model using Django's forms.ModelForm. Define a view to handle form submission and save the data to the database. Connect the view to a URL and test the form in the browser.
20. Create a custom middleware that logs the URL of each request to the console. Add this middleware to the MIDDLEWARE setting and test it by accessing different URLs in the browser.

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Computer Architecture (CS-103)

COURSE OUTCOMES:
After Completing the course student should be able to

CO1	Analyze instruction execution cycle and addressing modes for computer processor.
CO2	Analyze computer arithmetic and types of micro-processor.
CO3	Describe i/o subsystems
CO4	Explain memory architecture with diagram
CO5	Interpret the use of parallel processing in uniprocessor system & multiprocessor architecture.

Course contents

Basic Structure of Computer: Structure of Desktop Computers, CPU: General RegisterOrganization-Memory Register, Instruction Register, Control Word, Stack Organization,Instruction Format, ALU, I/O System, bus,CPU and Memory Program Counter, BusStructure, Register Transfer Language-Bus and Memory Transfer, addressing modes.Control Unit Organization: Basic Concept of Instruction, Instruction Types, MicroInstruction Formats, Fetch and Execution cycle, Hardwired control unit, Microprogrammed Control unit microprogram sequencer Control Memory, Sequencing andExecution of Micro Instruction.

Computer Arithmetic: Addition and Subtraction, Tools Compliment Representation,Signed addition and Subtraction, Multiplication and division, Booths Algorithm,Division Operation, Floating Point Arithmetic Operation. design of Arithmetic unit

I/O Organization:I/O Interface –PCI Bus, SCSI Bus, USB, Data Transfer: Serial,Parallel, Synchronous, Asynchronous Modes of Data Transfer, Direct MemoryAccess(DMA), I/O Processor.

Memory Organization: Main memory-RAM, ROM, Secondary Memory –MagneticTape, Disk, Optical Storage, Cache Memory: Cache Structure and Design, MappingScheme, Replacement Algorithm, Improving Cache Performance, Virtual Memory,memory management hardware

Multiprocessors: Characteristics of Multiprocessor, Structure of Multiprocessor-Interprocessor
Arbitration, Inter-Processor Communication and Synchronization. Memoryin Multiprocessor System, Concept of Pipelining, Vector Processing, Array Processing,RISC And CISC, Study of Multicore Processor –Intel, AMD.

Reference Books:

1. Morris Mano , “Computer System Organization ”PHI
2. Alan Clements: “Computer Organization and Architecture”, Cengage Learning
3. SubrataGhosal: “Computer Architecture and Organization”, Pearson
4. William stalling ,“Computer Architecture and Organization” PHI

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5. M. Usha, T.S. Shrikant: “Computer System Architecture and Organization”, Willey India
6. Chaudhuri, P.Pal: “Computer Organization and Design”, PHI
7. Sarangi: “Computer Organization and Architecture”,Mc-Graw Hills

Suggested List of Experiments

- Study of Multiplexer and Demultiplexer
- Study of Half Adder and Subtractor
- Study of Full Adder and Subtractor
- WAP to add two 8 bit numbers and store the result at memory location 2000
- WAP to multiply two 8 bit numbers stored at memory location 2000 and 2001 and stores the result at memory location 2000 and 2001.
- WAP to add two 16-bit numbers. Store the result at memory address starting from 2000.
- WAP which tests if any bit is '0' in a data byte specified at an address 2000. If it is so, 00 would be stored at address 2001 and if not so then FF should be storedat the same address.
- Assume that 3 bytes of data are stored at consecutive memory addresses of the data memory starting at 2000. Write a program which loads register C with (2000), i.e. with data contained at memory address2000, D with (2001), E with (2002) and A with (2001).
- Sixteen bytes of data are specified at consecutive data-memory locations starting at 2000. Write a program which increments the value of all sixteen bytes by 01.
- WAP to add t 10 bytes stored at memory location starting from 3000. Store the result at memory location 300A

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Programming and Problem solving with C++(CS-104)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Understand the basics of Computer system organization and number system.
CO2	Write and Understand algorithms to solve various computational problems.
CO3	Use of data types, operators, control statements and type conversions in C.
CO4	Write programs using arrays, functions, structures, and use of dynamic memory allocation and file handling concept in C programming language.
CO5	Understand the basic of data types, operators, functions, list, tuple and dictionaries in python programming.

Course Contents:

Unit- 1
Introduction: C and C++ language tokens, Data types. Type Conversion, Control Statement, Loops, Arrays and string. Object oriented programming Introduction, Application, characteristics, difference between object oriented and procedure programming, Comparison of C and C++, Cout, Cin, Operators , Function, returning values from functions, Reference arguments, Inline function, Default arguments, Returning by reference.

Unit-2
Object and Classes: Implementation of class and object in C++, access modifiers, object as data type, constructor, destructor, Object as function arguments, default copy constructor, parameterized constructor, returning object from function, Structures and classes, Classes objects and memory, static class data, Arrays of object, Arrays as class Member Data, the standard C++ String class, Run time and Compile time polymorphism.

Unit-3
Operator overloading and Inheritance: Overloading unary operators, Overloading binary operators, data conversion, pitfalls of operators overloading, Concept of inheritance, Derived class and base class, access modifiers, types of inheritance, Derived class constructors, member function, public and private inheritance.

Unit- 4
Pointer and Virtual Function: Addresses and pointers, the address-of operator & pointer and arrays, Pointer and Function pointer, Memory management: New and Delete, pointers to objects, debugging pointers, Virtual Function, friend function, Static function, friend class, Assignment and copy initialization, this pointer, dynamic type information.

Unit- 5
Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line arguments, printer output, Function templates, Class templates Exceptions, Containers, exception handling.

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Reference Books:-

1. Object Oriented Analysis and Design with Applications. by Grady Booch Pearson/PHI.
2. Harold Abelson and Gerald, Structure and Interpretation of Computer Programs,1985,MIT Press.
3. Y Kanetkar.Let us C.,5thedition.BPB.
4. Byron Gotfried, Schaum‟s outline of programming with C.1st edition Schaum‟s series
5. Y Kanetkar.Let us C++.,5thedition.BPB

Suggested List of Experiments

- Formulate simple algorithms for arithmetic and logical problems
- Translate the algorithms to programs (in C language)
- Test and execute the programs and correct syntax and logical errors
- Implement conditional branching, iteration and recursion
- Decompose a problem into functions and synthesize a complete program using divide and conquer approach
- WAP to illustrate various arithmetic functions using functions like add(),sub(),multi(), div() etc.
- WAP to take 10 numbers in any array and print sum of that numbers.
- WAP to add two numbers using function.
- WAP using class to illustrate concept of Constructor and Destructor. Also try to use scope resolution program.
- WAP to implement operator overloading like “+” operator.
- WAP to implement runtime polymorphism

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Mechanical Engineering(CS-204)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	An ability to analyze basic properties of material its applications in industry, design and conduct experiments, as well as to analyze and interpret data.
CO2	Prepare simple composite components and joining different materials.
CO3	Student will be able to apply concept of thermodynamics in modern engineering.
CO4	An ability to formulate, analyze properties of fluids, applying principles of fluid mechanics.
CO5	Examine the different characteristics of instruments like accuracy, precision etc

Course Contents:

Unit I: **Engineering Materials**: Classification of engineering materials, Composition of Cast iron and Carbon steels, Iron Carbon diagram. Alloy steels their applications. Mechanical properties like strength, hardness, toughness, ductility, brittleness, malleability etc. of materials, tensile & compressive test, Stress-strain diagram of ductile and brittle materials, Hooks law and modulus of elasticity.

Unit II: **Introduction to Manufacturing**: Introduction to manufacturing processes, casting, forming, machining and joining process. Casting process, Types of casting process, different types of forming process and their application, machine tools, working principle of lathe and drilling machine. Principle of working of arc and gas welding.

Unit III: **Thermodynamics**: Thermodynamic system, properties, state, process, Zeroth, First and second law of thermodynamics, thermodynamic processes at constant pressure, volume, enthalpy & entropy for closed system. Steam formation, Steam properties, calculation of heat value, and use of steam tables.

Unit IV: **Fluids**: Fluid properties, pressure, density and viscosity etc. Types of fluids, Newton's law of viscosity, Pascal's law, Bernoulli's equation.

Unit V: **Measurement:** Concept of measurements, errors in measurement, Temperature, Pressure, Velocity, Flow strain, Force and torque measurement, Vernier caliper, Micrometer, Dial gauge, Slip gauge, Sine-bar.

Reference Books:

1- Agrawal C M, Basic Mechanical Engineering, Wiley Publication.
2- Production Technology – Hajara & Choudhary
3- Manufacturing Process - Bagman
4- Nag P.K, Engineering Thermodynamics,TMH .
5- AchuthanM , , Engineering Thermodynamics ,PHI.
6- Kothandaraman &Rudramoorthy, Fluid Mechanics & Machinery, New Age.
7- Nakra &Chaudhary , Instrumentation and Measurements, TMH

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List of Suggestive Core Experiments:

Theory related Eight to Ten experiments including core experiments as follows:

1- Study of Universal Testing machines.
2- Linear and Angular measurement using, Micrometer, Slip Gauges, Dial Gauge and Sine-bar.
3- Study of Lathe Machine.
4- Study of Drilling Machines.
5- Verification of Bernoulli's Theorem.
6- Study of various types of Boilers.
7- Study of different IC Engines.
8- Study of different types of Boilers Mountings and accessories.
9- Computer Aided Drafting (CAD),software's basic commands of drafting entities like line, circle, polygon, polyhedron, cylinders
10- Case study of E vehicle

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Electrical and Electronic Engineering(CS-106)

COURSE OUTCOMES:
After Completing the course student should be able to:

CO1	Remember laws of electrical circuits, theorems and transformation in various DC electrical circuits.
CO2	Describe single and three phase elementary AC electrical circuits.
CO3	Execute the concept related to magnetic circuits and single phase transformer for its functionality.
CO4	Analyze the concepts related to DC and AC machines.
CO5	Assess the elementary digital system and semiconductor components for its operation and findings.

Course Contents:
UNIT-1 D.C. CIRCUITS:
Voltage and current sources, type of independent sources, Source Transformation, Kirchhoff's Law, Superposition theorem, Thevenin's theorem and its numerical using series and parallel resistive circuits excited by independent sources only, Power & Energy in such circuits. Mesh & nodal analysis.

UNIT – II: 1- PHASE AND 3 PHASE AC CIRCUITS:
Generation of sinusoidal AC voltage, definition of average value, R.M.S. value, form factor and peak factor of AC quantity , Concept of phasor, Concept of Power factor, Concept of impedance and admittance, Active, reactive and apparent power, analysis of R-L, R-C, R-L-C series circuit. Necessity and advantages of three phase systems, Meaning of Phase sequence, balanced and unbalanced supply and loads. Relationship between line and phase values for balanced star and delta connections.

UNIT – III: MAGNETIC CIRCUITS &BASIC OF 1 PHASE TRANSFORMER:
Basic definitions related to magnetic circuit, similarity and dissimilarity between electric and magnetic circuit. magnetic field produced by current carrying conductor, AC excitation in magnetic circuits, Concept of self and mutual inducted voltage in brief, Concept of B-H loop of magnetic materials, explain hysteresis and eddy current loss in brief,laws of electromagnetic Induction, direction of induced E.M.F. **Single phase transformer**- Explain different parts of transformer with diagram, working principle for ideal transformer, e.m.f. equation, transformation ratio with numerical.

UNIT IV: ROTATING ELECTRICAL MACHINES:
Working Principle, classification and different parts of DC machines. Working Principle and parts of single phase and three phase Induction motor.Concept of slip and Torque slip characteristics of three phase Induction motor.Applications of DC and AC machines.

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UNIT V: BASIC ELECTRONICS:

Number systems (Binary,Octal,Decimal,Hexadecimal)&their conversion. Binary addition and subtraction. De morgan's theorem,All logic Gates and its truth table, R-S Latch, R-S flip flop, J-K flip flop. Working of Diodes and its,V-I characteristics, Bipolar junction transistors (BJT) and their working, introduction to CC, CB & CEtransistor configurations,

REFERENCES BOOKS:

1. B.L. Theraja& A.K Theraja Textbook of Electrical Technology - Vol. 1, S. Chand Publication
2. S.N. Singh , Basic Electrical Engineering, P.H.I.,2013
3. Rajendra Prasad, Fundamentals of Electrical Engineering, Prentice Hall,2014
4. M.S. Sukhija, T. K. Nagsarkar, Basic Electrical and electronics engineering, Oxford University press,2012
5. C.L. Wadhwa, Basic Electrical Engineering. New Age International.
6. D.P. Kothari & I.J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, latest edition.
7. E. Hughes & I.M. Smith Hughes Electrical Technology Pearson
8. Vincent Del Toro Electrical Engineering Fundamentals

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Tentative list of experiments/demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
2. Measuring the steady-state and transient time-response of R-L, R-C, and R-L-C circuits to astep change in voltage (transient may be observed on a storage oscilloscope). Sinusoidal steadystate response of R-L, and R-C circuits – impedance calculation and verification. Observationof phase differences between current and voltage.
3. To verify KVL and KCL.
4. Transformers: measurement of primary and secondary voltages andcurrents, and power.
5. Construction of transformer.
6. To perform open circuit and short circuit test on single phase transformer.
7. Demonstration of cut-out sections of machines: single-phase induction machine.
8. Study of V-I Characteristics of Diodes.
9. Applications of Diodes and their verification.
10.12. Verification of truth table for various gates and RS/JK flip flop.
11. Realizations of Various gates, RS Flip-Flops etc.
12. Verification of De Morgan's theorems.