| | | Bachelor of Technology (Computer Science & Engineering) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Credit BasedSchemeof Scheme of Studies/Examination | | | | | | | | |
| | | Semester V | | | | | | | | |
| S. No. | Course Code | Subject | L:T:P | Hours/ Week | Credits | Examination Schedule (Marks) | | | | Duration of Exam (Hrs) |
| | | | | | | Major Test | Minor Test | Practical | Total | |
| 1 | ES-301A | Microprocessor & Interfacing | 3:0:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 2 | PC-CS-301A | Database Management Systems | 3:0:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 3 | PC-CS-303A | Formal Language & Automata Theory | 3:0:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 4 | PC-CS-305A | Essential of Information Technology | 3:0:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 5 | PC-CS-307A | Computer Organization & Architecture | 2:0:0 | 2 | 2 | 75 | 25 | 0 | 100 | 3 |
| 6 | PEC | Elective-I | 3:0:0 | 3 | 3 | 75 | 25 | 0 | 100 | 3 |
| 7 | PC-CS-309LA | Database Management Systems Lab | 0:0:4 | 4 | 2 | 0 | 40 | 60 | 100 | 3 |
| 8 | PC-CS-311LA | Essential of Information Technology Lab | 0:0:4 | 4 | 2 | 0 | 40 | 60 | 100 | 3 |
| | | Total | | 25 | 21 | 450 | 230 | 120 | 800 | |
| 9 | MC-904A | Energy Resources & Management | 3:0:0 | 3 | 0 | 0 | 100 | 0 | 100 | 3 |
| 10 | SIM-301A* | Seminar on Summer Internship | 2:0:0 | 2 | 0 | 0 | 50 | 0 | 50 | |

# JMIETI, Radaur

Lesson Planning of Formal Language & Automata Theory Deptt. CSE 5th Semester w.e.f 29-08-2022

Name of Teacher     : Ms. Dimple Tamak

Designation         : AP

Subject with code    **:** PC-CS-303A

Objective of Course : To introduce formal language and automata theory and understand the challenges for theoretical computer science and its contribution to other sciences.

| Month | Topic / Chapter Covered | Academic Activity | Test/Assignment |
|---|---|---|---|
| **L 1** | Study and central concept of automata theory, application of finite automata(FA) | **LECTURE** | |
| **L 2** | Introduction of DFA and NFA | **LECTURE** | |
| **L 3** | FA with epsilon transition, regular expressions | **LECTURE** | Assignment |
| **L 4** | FA and Regular Expression(RE) | **LECTURE** | |
| **L 5** | Application of Regular expression and algebraic laws of regular expression. | **LECTURE** | |
| **L 6** | Closure properties of regular languages | **LECTURE** | |
| **L 7** | RE to NFA and DFA conversion and DFA to RE conversion. | **LECTURE** | |
| **L 8** | Equivalence of NFA and DFA automata. | **LECTURE** | |
| **L 9** | Minimization of NFA and DFA automata | **LECTURE** | Test |
| **L 10** | Parse trees , Context Sensitive Grammar | **LECTURE** | |

| L 11 | Context Free Grammar and Regular Grammar | **LECTURE** | |
|------|---|---|---|
| L 12 | Application of Context Free Grammar, Ambiguity in Grammar and Languages | **LECTURE** | |
| L 13 | Closure properties of CFL ,Chomsky theorem | **LECTURE** | |
| L 14 | Chomsky hierarchy, Normal form of Context Free Grammar | **LECTURE** | |
| L 15 | Chomsky Normal Form , Greibach Normal form | **LECTURE** | Assignment |
| L 16 | Introduction to Pumping Lemma | **LECTURE** | |
| L 17 | Pumping Lemma for Context Free Languages | **LECTURE** | |
| L 18 | Various applications of Pumping Lemma | **LECTURE** | |
| L 19 | Introduction to Pumping Lemma in FA | **LECTURE** | |
| L 20 | Minimization of FA | **LECTURE** | |
| L 21 | Minimization of Recursive Languages | **LECTURE** | Test |
| L 22 | Introduction to Mealey and Moore machine | **LECTURE** | |
| L 23 | Definitions and design of Mealey , Moore machine | **LECTURE** | |
| L 24 | Equivalence of Mealey and Moore machine | **LECTURE** | |
| L 25 | Differences and designing of Mealey and Moore machine | **LECTURE** | |
| L 26 | Introduction of Push down automata(PDA) | **LECTURE** | Assignment |
| L 27 | Languages of PDA | **LECTURE** | |
| L 28 | Equivalence of PDA and CFG | **LECTURE** | |
| L 29 | Deterministic PDA | **LECTURE** | |
| L 30 | Designing of PDA | **LECTURE** | |

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|---|---|---|---|
| **L 31** | Applications of PDA | **LECTURE** | Test |
| **L 32** | Introduction to Turing Machine(TM) | **LECTURE** | |
| **L 33** | Programming techniques for TM | **LECTURE** | |
| **L 34** | Extension of TM | **LECTURE** | |
| **L 35** | Restricted TM | **LECTURE** | |
| **L 36** | Universal TM and Designing of TM | **LECTURE** | |
| **L 37** | Time and Tape complexity measure of TM | **LECTURE** | |
| **L 38** | Decidability post's correspondence problem(PCP) | **LECTURE** | Assignment |
| **L 39** | Rice's theorem | **LECTURE** | |
| **L 40** | Decidability and undecideability properties | **LECTURE** | |
| **L 41** | P-NP Class and completeness | **LECTURE** | |

Outcome of Course:

1. Understand the basic properties of formal languages and grammar.

2. Differentiate regular, context free , recursively enumerable languages.

3. Make grammars to produce string from a languages.

4. To develop method that analysis the dynamic behavior of discrete system.

(Sign. of HOD)                                        (Sign. of Teacher Concerned with date)

# JMIETI, Radaur

Lesson Planning of Computer Organization & Architecture CSE Deptt 5th Semester w.e.f 29-08-2022

Name of Teacher      : Ms. UpasanaSood

Designation            : ASSISTANT PROFESSOR & HEAD

Subject with code    : **PC-CS-307A**

Objective of Course :      1. Student will be able to understand the basic concepts of computer architecture and organization, and understand the key skills of constructing cost-effective computer systems.

2. To make students learn internal organization of various computer components

3. To make students aware about concepts of pipelining

| Month | Topic / Chapter Covered | Academic Activity | Test/Assignment |
|---|---|---|---|
| L 1 | Introduction to Computer Systems, | **LECTURE** | |
| L 2 | Organization and architecture, | **LECTURE** | |
| L 3 | Evolution and computer generations; | **LECTURE** | |
| L 4 | Fixed point representation of numbers, | **LECTURE** | |
| L 5 | digital arithmetic algorithms for Addition, Subtraction Booth's algorithm | **LECTURE** | |
| L 6 | digital arithmetic algorithms Multiplication using Booth's algorithm | **LECTURE** | |
| L 7 | Division using restoring and non-restoring algorithms. | **LECTURE** | ASSIGNMENT |
| L 8 | Floating point representation with IEEE standards and its arithmetic operations. | **LECTURE** | TEST |

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|---|---|---|---|
| **L 9** | Instruction codes, | **LECTURE** | |
| **L 10** | stored program organization, | **LECTURE** | |
| **L 11** | computer registers and common bus system, | **LECTURE** | |
| **L 12** | computer instructions, timing and control, | **LECTURE** | |
| **L 13** | instruction cycle: Fetch and Decode, | **LECTURE** | |
| **L 14** | Register reference instructions; Memory reference instructions. | **LECTURE** | |
| **L 15** | Input, output and Interrupt: configuration, instructions. | **LECTURE** | |
| **L 16** | Program interrupt, Interrupt cycle, | **LECTURE** | |
| **L 17** | Micro programmed Control organization | **LECTURE** | |
| **L 18** | address sequencing, | **LECTURE** | ASSIGNMENT |
| **L 19** | micro instruction format | **LECTURE** | |
| **L 20** | Micro program sequencer. | **LECTURE** | |
| **L 21** | Central Processing Unit: General register organization, | **LECTURE** | |
| **L 22** | stack organization, instruction formats, | **LECTURE** | |
| **L 23** | addressing modes, | **LECTURE** | |
| **L 24** | Data transfer and manipulation, Program control. | **LECTURE** | |
| **L 25** | CISC and RISC: features and comparison. | **LECTURE** | |
| **L 26** | Pipeline and vector Processing. | **LECTURE** | |
| **L 27** | Parallel Processing, Pipelining, | **LECTURE** | |
| **L 28** | Instruction Pipeline, | **LECTURE** | |
| **L 29** | Basics of vector processing and Array Processors. | **LECTURE** | ASSIGNMENT |
| **L 30** | Input-output organization**:** I/O interface. I/O Bus and interface | **LECTURE** | |

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|---|---|---|---|
| | modules, | | |
| **L 31** | I/O versus Memory Bus. | **LECTURE** | |
| **L 32** | I/O versus Memory Bus. | **LECTURE** | |
| **L 33** | Asynchronous data transfer: | **LECTURE** | |
| **L 34** | Strobe control, | **LECTURE** | |
| **L 35** | Handshaking, Asynchronous serial transfer. | **LECTURE** | |
| **L 36** | Modes of Transfer: Programmed I/O, | **LECTURE** | |
| **L 37** | Interrupt driven I/O, Priority interrupt; | **LECTURE** | |
| **L 38** | Daisy chaining, Parallel Priority interrupt. | **LECTURE** | |
| **L 39** | Direct memory Access, | **LECTURE** | |
| **L 40** | DMA controller and transfer. | **LECTURE** | |
| **L 41** | Input output Processor. | **LECTURE** | ASSIGNMENT |
| **L 42** | CPU-IOP communication, | **LECTURE** | TEST |
| **L 43** | I/O channel. | **LECTURE** | |

Outcome of Course:

1. Be familiar with the functional units of the processor such as the register file and arithmetic- logical unit, and with the basics of systems topics

2. Be familiar with the design trade- offs in designing and constructing a computer processor.

3.Be familiar with the CPU design including the RISC/CISC architectures.

4. Be familiar with the basic knowledge of I/O devices and interfacing of I/O devices    with computer

(Sign. of HOD)                              (Sign. of Teacher Concerned with date)

# JMIETI, Radaur

Lesson Planning of Digital Data Communication CSE Deptt 5th Semester w.e.f 29-08-2022

Name of Teacher : Ms. SonamKamboj

Designation : AP

Subject with code : **Digital Data Communication** PE-CS-T301A

Objective of Course : To provide the conceptual knowledge of data presentation and signal transmission methodologies used in data communication and networking.

| Month | Topic / Chapter Covered | Academic Activity | Test/Assignment |
|---|---|---|---|
| L 1 | Introduction to communication | **LECTURE** | |
| L 2 | Basic constituents of Communication Systems | **LECTURE** | |
| L 3 | Need of modulation | **LECTURE** | |
| L 4 | Amplitude modulation, | **LECTURE** | |
| L 5 | modulation index, | **LECTURE** | |
| L 6 | spectrum of AM wave, | **LECTURE** | Assignment |
| L 7 | DSBSC modulation, SSB Modulation, vestigial side band modulation | **LECTURE** | |
| L 8 | ANGLE MODULATION: Frequency modulation | **LECTURE** | |
| L 9 | Phase Modulation, spectrum of FM Wave, Modulation Index | **LECTURE** | Test |
| L 10 | Bandwidth of FM Signal, NBFM and WBFM. | **LECTURE** | |
| L 11 | **DATA ENCODING** Digital data, Digital signals: Encoding schemes: | **LECTURE** | |

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|---|---|---|---|
| | NRZ-L, NRZ-I, | | |
| L 12 | Manchester-Diff-Manchester- encoding, | **LECTURE** | |
| L 13 | Manchester-Diff-Manchester- encoding, | **LECTURE** | |
| L 14 | Pseudoternary-Bipolar-AMI,B8ZS- HDB3 | **LECTURE** | |
| L 15 | PCM-Delta modulation | **LECTURE** | |
| L 16 | Evaluation factors-Digital data, analog signals: Encoding Techniques | **LECTURE** | Assignment |
| L 17 | Performance comparison-Analog data, digital signals: Quantization- Sampling theorem- | **LECTURE** | |
| L 18 | Errors- comparison- Analog Data, analog signals | **LECTURE** | |
| L 19 | Need for modulation -0 Modulation methods – Amplitude modulation- Angle modulation- Comparison. | **LECTURE** | |
| L 20 | Comparison of Modulation | **LECTURE** | |
| L 21 | **DIGITAL DATA COMMUNICATION TECHNIQUES**<br><br>Asynchronous and synchronous transmission | **LECTURE** | |
| L 22 | Error Detection techniques: Parity checks – Cycle redundancy checks | **LECTURE** | |
| L 23 | Revision of Error Detection techniques: Parity checks – Cycle redundancy checks | **LECTURE** | |
| L 24 | Checksum-Error Correcting codes: Forwards and backward error corrections, | **LECTURE** | Test |
| L 25 | Transmission media. Communication Topologies. | **LECTURE** | |
| L 26 | DTE & DCE interface: Characteristics of DTE-DCE interface. | **LECTURE** | |
| L 27 | Interfaces: Rs-232-C, Rs-449/422, A/423-A. | **LECTURE** | |

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| **L 28** | Revision of Communication Topology | **LECTURE** | |
| **L 29** | **SATELITE COMMUNICATION** <br><br> **Multiplexing:** Advantages, Types of Multiplexing | **LECTURE** | |
| **L 30** | FDM, Synchronous TDM, Statistical TDM | **LECTURE** | Assignment |
| **L 31** | Asynchronous TDM, Study of their characteristics. | **LECTURE** | |
| **L 32** | **Satellite Communication Systems:** Satellite parameters and configurations | **LECTURE** | |
| **L 33** | Capacity allocation, Frequency Division FDMA; Time Division TDMA- | **LECTURE** | |
| **L 34** | Capacity allocation, Frequency Division FDMA; Time Division TDMA | **LECTURE** | |
| **L 35** | Fixed assigned multiple access (FAMA), | **LECTURE** | |
| **L 36** | assign multiple access (DAMA) | **LECTURE** | Test |
| **L 37** | The concept of spread spectrum: FHSS, DSSS | **LECTURE** | |
| **L 38** | CDMA – Transmission and reception. | **LECTURE** | |

Outcome of Course:

1. To study various analog communication techniques and with their characteristics.

2. To study and understand the requirements for analog/digital data to analog/digital signal conversion techniques.

3. To study the error and flow control techniques in communication and networking.

4. To study the concept of multiplexing and applied multiple access techniques specially in satellite communication.

(Sign. of HOD)                                        (Sign. of Teacher Concerned with date)

# JMIETI, Radaur

## Lesson Planning of Essential of Infromation Technology CSE Deptt 5th Semester w.e.f 29-08-2022

Name of Teacher     : Ms. PriyankaKamboj

Designation            : AP

Subject with code    **:** PC-CS-305A

Objective of Course : **To introduce the concepts of Advanced Java Programming**

| Month | Topic / Chapter Covered | Academic Activity | Test/Assignment |
|---|---|---|---|
| L 1 | Importance and features of Java, Concepts of Java Virtual machine (JVM) | **LECTURE** | |
| L 2 | Concepts of Java Virtual machine (JVM) | **LECTURE** | |
| L 3 | Keywords, Constants, Variables and data types, operators and expressions | **LECTURE** | |
| L 4 | operators and expressions | **LECTURE** | |
| L 5 | Control statements, Conditional statements, loops and iterations | **LECTURE** | Assignment |
| L 6 | loops and iterations | **LECTURE** | |
| L 7 | Class definition, adding variables and methods | **LECTURE** | |
| L 8 | creating objects, constructors | **LECTURE** | |
| L 9 | defining methods, calling methods | **LECTURE** | |
| L 10 | Method overloading | **LECTURE** | |
| L 11 | Creating an array, one and two dimensional array | **LECTURE** | |
| L 12 | one and two dimensional array | **LECTURE** | |

| L 13 | String array and methods String and String Buffer classes | **LECTURE** | |
|---|---|---|---|
| L 14 | Wrapper classes. Packages and Interfaces. | **LECTURE** | Test |
| L 15 | Exception handling | **LECTURE** | |
| L 16 | Swing, Applet, Icons and Labels | **LECTURE** | |
| L 17 | Text Fields, Buttons, button Class | **LECTURE** | |
| L 18 | Check Box, Radio Buttons | **LECTURE** | |
| L 19 | The Container, Panel | **LECTURE** | |
| L 20 | Revision of Unit 1 &2 | **LECTURE** | |
| L 21 | Windows, and Frame Classes | **LECTURE** | Assignment |
| L 22 | Combo Box, Tabbed Panes | **LECTURE** | |
| L 23 | Scroll Panes, Trees, Tables. | **LECTURE** | |
| L 24 | Introduction to Servlets | **LECTURE** | |
| L 25 | Life cycle of Servlets | **LECTURE** | |
| L 26 | Creating, Compiling and running servlet | **LECTURE** | |
| L 27 | Reading the servlet Parameters | **LECTURE** | |
| L 28 | Reading Initialization parameter | **LECTURE** | Test |
| L 29 | Packages- javax.servletPackage, | **LECTURE** | |
| L 30 | Handling HTTP Request | **LECTURE** | |
| L 31 | Response (GET / POST Request), | **LECTURE** | |
| L 32 | Cookies and Session Tracking. | **LECTURE** | |
| L 33 | Collection, list, Map | **LECTURE** | |
| L 34 | Tree. | **LECTURE** | Assignment |
| L 35 | Hashing | **LECTURE** | |
| L 36 | JDBC Fundamentals | **LECTURE** | |

| L 37 | Establishing Connectivity | **LECTURE** | |
|------|---------------------------|-------------|---|
| L 38 | Working with connection interface | **LECTURE** | |
| L 39 | Working with statements | **LECTURE** | |
| L 40 | Creating and Executing SQL statements | **LECTURE** | |
| L 41 | Working with Result Set Object & Result Set Meta Data. | **LECTURE** | Test |

Outcome of Course:

1Study fundamental concepts of Java.

2 Design of user interfaces using Java applets

3  To study and implement JDBC and Jbeans

4 To study concepts of servlets and its applications

(Sign. of HOD)                                    (Sign. of Teacher Concerned with date)

# JMIETI, Radaur

Lesson Planning of Database Management System CSE Deptt 5th

Semester w.e.f 29-08-2022

Name of Teacher     : Dr. Vishal Garg

Designation           :  AP

Subject with code    :  PC-CS-301A

Objective of Course : To familiarize the students with database and management system.

| Month | Topic / Chapter Covered | Academic Activity | Test/Assignment |
|---|---|---|---|
| L 1 | Concept & Overview of DBMS, Data Models-, Network, Hierarchical and Relational Model | **LECTURE** | |
| L 2 | Levels of abstraction | **LECTURE** | |
| L 3 | Administrator, Database Users | **LECTURE** | Assignment |
| L 4 | Three Schema architecture of DBMS, Application | **LECTURE** | |
| L 5 | Entities, Attributes and Entity Sets | **LECTURE** | |
| L 6 | Relation and Relationships sets | **LECTURE** | |
| L 7 | Mapping Constraints | **LECTURE** | |
| L 8 | Keys | **LECTURE** | |
| L 9 | Entity-Relationship Diagram, Weak Entity Sets, Extended E-R features. | **LECTURE** | Test |
| L 10 | Structure of relational Databases | **LECTURE** | |
| L 11 | Relational Algebra and Relational Calculus | **LECTURE** | |
| L 12 | Operations on Relational Algebra | **LECTURE** | |

| L 13 | Tuple Relational Calculus, Domain Relational Calculus. | **LECTURE** | |
|------|------|------|------|
| L 14 | Concept of DDL, DML, DCL. Basic Structure | **LECTURE** | |
| L 15 | Set operations, Aggregate Functions , Null Values | **LECTURE** | Assignment |
| L 16 | Domain Constraints, Referential Integrity Constraints, assertions | **LECTURE** | |
| L 17 | Introduction to views, | **LECTURE** | |
| L 18 | Querying, Nested Sub queries, | **LECTURE** | |
| L 19 | Database security application development using SQL | **LECTURE** | |
| L 20 | Stored procedures and triggers. | **LECTURE** | |
| L 21 | Functional Dependency, Different anomalies in designing a Database | **LECTURE** | Test |
| L 22 | Normalization using functional dependencies, Decomposition, | **LECTURE** | |
| L 23 | Boyce-Codd Normal Form, 3NF, Normalization using multi-valued dependencies, 4NF, 5NF. | **LECTURE** | |
| L 24 | 4NF, 5NF | **LECTURE** | |
| L 25 | Physical data structures, Query optimization | **LECTURE** | |
| L 26 | join algorithm, statistics and cost base optimization. | **LECTURE** | Assignment |
| L 27 | Transaction processing | **LECTURE** | |
| L 28 | Concurrency control and Recovery Management | **LECTURE** | |
| L 29 | Transaction model properties | | |
| L 30 | State serializability, lock base protocols, two phase locking. | **LECTURE** | |
| L 31 | Types of Failures, Recovery Techniques, ARIES. | **LECTURE** | Test |

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|---|---|---|---|
| **L 32** | Serial and Serializable Schedules-Conflict Serializability | **LECTURE** | |
| **L 33** | Enforcing Serializability by Locks-Locking Systems with Several Lock Modes | **LECTURE** | |
| **L 34** | Concurrency Control by Timestamps, validation. | **LECTURE** | |
| **L 35** | ACID Properties, Transaction states | **LECTURE** | |
| **L 36** | Serializability and Recoverability-View, Serializability | **LECTURE** | |
| **L 37** | Resolving Deadlocks-Distributed Databases: Commit and Lock | **LECTURE** | |

Outcome of Course:

1 To provide introduction to relational model and ER diagrams.

2 To realize about Query Processing and Transaction Processing.

3  To comprehend about the concept of functional dependencies

4 To learn the concept of failure recovery and concurrency control.

 (Sign. of HOD)                                       (Sign. of Teacher Concerned with date)

| PC-CS-309LA | Database Management Systems Lab | | | | | | |
|---|---|---|---|---|---|---|---|
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Minor Test** | **Practical** | **Total** | **Time** |
| **0** | **0** | **4** | **2** | **40** | **60** | **100** | **3 Hours** |
| **Purpose** | **To familiarize the students with the basics of Data base management system.** | | | | | | |
| **Course Outcomes** | | | | | | | |
| CO1 | To understand basic DDL commands | | | | | | |
| CO 2 | To learn about DML and DCL commands | | | | | | |
| CO 3 | To understand the SQL queries using SQL operators | | | | | | |
| CO 4 | To understand the concept of relational algebra | | | | | | |
| CO5 | To learn various queries using date and group functions | | | | | | |
| CO6 | To understand the nested queries | | | | | | |
| CO7 | To learn view, cursors and triggers. | | | | | | |

1. Write the queries for Data Definition Language (DDL) in RDBMS.
2. Write the queries for Data Manipulation Language (DML) in RDBMS.
3. Write the queries for Data Control Language (DCL) in RDBMS.
4. To perform various integrity constraints on relational database.
5. Create a database and perform the following operations:-
    a. Arithmetic and Relational operations
    b. Group by & having clauses
    c. Like predicate for pattern matching in database
6. Write SQL queries for relational algebra
7. Write SQL queries for extracting data from more than one table
8. Write SQL queries for sub queries, nested queries
9. Concepts for ROLL BACK, COMMIT & CHECK POINTS
10. Using two tables create a view, which shall perform natural join, equi join, outer joins.
11. Write a procedure for computing income tax of employee on the basic of following conditions:-
    a. if gross pay<=40,000 then I.T rate is 0%.
    b. if gross pay>40,000 but <60000 then I.T rate is 10%.
    c. if gross pay>60,000 but <1,00,0000 then I.T rate is 20%.
    d. if gross pay>1,00,0000 then I.T rate is 30%.
    For this purpose create a table with name, ssn, gross salary and income tax of the employee.
12. Write trigger for before and after insertion, deletion and updation process.

| PC-CS-311LA | Essential of Information Technology Lab | | | | | | |
|---|---|---|---|---|---|---|---|
| **Lecture** | **Tutorial** | **Practical** | **Credit** | **Minor Test** | **Practical** | **Total** | **Time** |
| **0** | **0** | **4** | **2** | **40** | **60** | **100** | **3 Hrs.** |
| **Purpose** | To introduce the concepts of Advanced Java Programming | | | | | | |
| **Course Outcomes (CO)** | | | | | | | |
| **CO1** | Study fundamental concepts of Java. | | | | | | |
| **CO2** | Design of user interfaces using Java applets. | | | | | | |
| **CO3** | To study and implement JDBC and Jbeans. | | | | | | |
| **CO4** | To study concepts of servlets and its applications. | | | | | | |

1. Write a Java Package with Stack and queue classes.
2. Design a class for Complex numbers in Java .In addition to methods for basic operations on complex numbers, provide a method to return the number of active objects created.
3. Develop with suitable hierarchy, class for point, shape rectangle, square, circle, ellipse, triangle, polygenetic.
4. Design a simple test application to demonstrate dynamic polymorphism.
5. Design a java interface for ADT Stack.
6. Develop two different classes that implement this interface. One using array and other using linked list.
7. Develop a simple paint like program that can draw basic graphical primitives
8. Develop a scientific calculator using event driven programming.
9. Develop a template for linked list class along with its members in Java.
10. Write a program to insert and view data using Servlets