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**STUDENT HAND BOOK**

**BACHELOR OF TECHNOLOGY**

**SEMESTER-6TH**

**STUDY SCHEME-2011**

**DEPARTMENT OF COMPUTER SCIENCE ENGINEERING**

**ASRA COLLEGE OF ENGINEERING & TECHNOLOGY, BHAWANIGARH**

**STUDY SCHEME**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Punjab Technical University** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |  | | |  |  |
| **Sixth Semester** | | | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **Contact Hours: 30 Hrs** | | | | | | | |  | | |  |
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|  | **Course Code** | |  | **Course Name** | |  | **Load Allocation** | | | | | | | | |  |  | **Marks Distribution** | | | | |  |  |  |  |  | **Total** | **Credits** | |  | | |  |
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|  | **BTCS601** | |  | Simulation and Modeling | | 3 | |  |  | - | |  | - | |  | 40 | | |  | 60 | | |  |  |  |  | 100 | | 3 | |  | | |  |
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|  | **BTCS602** | |  | RDBMS -II |  |  | 3 |  |  |  | 1 |  |  | - |  |  |  | 40 |  |  |  | 60 |  |  |  |  |  | 100 | 4 | |  | | |  |
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|  | **BTCS603** | |  | Software Engineering | | 3 | |  |  | - | |  | - | |  | 40 | | |  | 60 | | |  |  |  |  | 100 | | 3 | |  | | |  |
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|  | **BTCSXXX** | |  | Elective –I |  |  | 3 |  |  |  | 1 |  |  | - |  |  |  | 40 |  |  |  | 60 |  |  |  |  |  | 100 | 4 | |  | | |  |
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|  | **BT\*\*\*** | |  | Open Elective | | 3 | |  |  | 1 | |  | - | |  | 40 | | |  | 60 | | |  |  |  |  | 100 | | 4 | |  | | |  |
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|  | **BTCS604** | |  | RDBMS-II Lab |  |  | - |  |  |  | - |  |  | 4 |  |  |  | 30 |  |  |  | 20 |  |  |  |  |  | 50 | 2 | |  | | |  |
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|  | **BTCS605** | |  | Free/ Open Source Software Lab | | - | |  |  | - | |  | 4 | |  | 30 | | |  | 20 | | |  |  |  |  | 50 | | 2 | |  | | |  |
|  |  | |  |  | |  | |  | |  | |  |  | |  |  | | |  |  | | |  | | | |  | |  | |  | | |  |
|  | **BTCS606** | |  | Software Engineering Lab |  |  | - |  |  |  | - |  |  | 2 |  |  |  | 30 |  |  |  | 20 |  |  |  |  |  | 50 | 1 | |  | | |  |
|  | **BTCS607** | |  | Simulation and Modeling Lab | | - | |  |  | - | |  | 2 | |  | 30 | | |  | 20 | | |  |  |  |  | 50 | | 1 | |  | | |  |
|  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | |  |  | | |  | | | |  | |  | |  | | |  |
|  | **General Fitness** | | |  |  |  |  |  |  |  |  |  |  |  |  | 100 | | |  | **-** | | |  | | | | 100 | |  |  | | |  | |
|  |  | |  | **Total** |  |  | **15** |  |  |  | **3** |  |  | **12** |  |  |  | **420** |  |  |  | **380** |  |  |  |  |  | **800** | **24** | | |  | |  |
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**Elective –I BTXS XXX**

 BTCS 901 Web Technologies

 BTCS 902 Mobile Applications Development

 BTCS 903 Ethical Hacking

******BTCS 904 Information Security

*Syllabus*

**BTCS 601 Simulation and Modeling**

**Objectives:** This course should provide the students with good understanding of various techniques ofSimulation.

***Module1:***Introduction**-**When simulation is appropriate and when not, advantages and disadvantages ofsimulation, application areas in communication, computer and software design, systems and systems environment, components of a system, discrete and continuous systems, model of a system, types of models, discrete-event simulation, steps in a simulation study. Simulation Examples- Simulation of queuing systems, on-demand and inventory systems, simulation for reliability analysis etc

***Module 2:***General Principles**-**Concepts in discrete event simulation: event scheduling/time advancealgorithms, world views. List Processing: properties and operations, data structures and dynamic allocation, techniques;

***Module 3:***Simulation Software- Integrated environments. Examples and review of some existing softwarepopular and useful in the industry, e.g., Arena, AutoMod, Extend, Flexsim, Micro Saint, ProModel, Quest, SIMUL8, WITNESS etc. Simulation using languages and environments like C++/Java/GPSS/SSF etc. Experimentation and Statistical-Analysis Tools: common features and relevant current products.

***Module 4:***Statistical Models in Simulation- Terms and concepts. Statistical Models. Review of discreteand continuous distributions. Review of Poisson (stationary and non-stationary) processes. Empirical Distributions; Elementary Queueing Theory- Basic Structure of QueuingModels.Input Source (Calling Population).Queue, Queue Discipline, Service Mechanisms. Notations and relationships between *L, W,Lq,* and*Wq.* Little's Formula. Role of Exponential Distribution and Properties.Birth and Death Processes.M/M/s queues. Finite queue variation in M/M/s/K models with different s values. Finite Calling Population cases.Queueing Models involving Non-Exponential Distributions: M/G/1, M/D/s, M/Ek/s (involving Erlang distribution), Models without a Poisson Input, Models involving hyper exponential distributions, Priority Discipline Queueing Models: Preemptive and Non- Preemptive with results, properties and server number variations, QueueingNetworks:Equivalence Property. Infinite Queues in Series and Product Form Solutions. Jackson Networks,

***Module 5:***Application of Queueing Models- Review of Characteristics (calling population systemcapacity, arrival processes, behavior and disciplines, service times and mechanisms etc) and notations, Application of Long-Run Measures of Performance: Time average in system, average time spent per customer, Little's Formula and server utilization, costs. Steady State behavior of Infinite (M/G/1, M/M/c/infinity, M/M/c/N/infinity) and finite (M/M/c/K/K) Calling Population Models, Use of Network of Queues.

***Module 6:***Random Number Generation- Properties. Generation of Pseudo-Random Numbers, Techniquesfor Generation of Pseudo-Random Numbers: Linear Congruential, Combined Linear Congruential, Random Number Streams. Tests for Random Numbers: Frequency Tests and Tests for Autocorrelation. Random Variate Generation- Inverse Transform Techniques for Exponential, Uniform, Weibull, Triangular and for Empirical Continuous Distributions.

***Module 7:***Input Modeling- Data collection, Identifying the Distribution with Data: Histograms, Selectionof the Appropriate Family of Distributions, Quantile-Quantile Plots.100 Parameter Estimation: Sample Mean and Sample Variance and various biased and unbiased Estimators. Goodness of Fit Tests applied to Simulation inputs: Chi-Square and Chi-Square with Equal Probabilities, Kolmogorov-Smirnov Tests, p-Values and Best Fits.Verification and Validation of Simulation Models- Verification and Validation ofSimulation Models. Calibration and Validation: Face Validity, Validation of Assumptions, Input-Out Transformation Validation.

***Module 8:***Output Analysis of a Single Model- Output analysis and types of simulation. Stochastic Natureof the Output Data. Measures of Performance and Estimation: Point Estimation and Confidence-Interval Estimation. Output Analysis for Terminating Simulations and Estimation of Probabilities. Output Analysis of Steady State Simulations: Initialization Bias, Error Estimation, Replications, Sample Size and Batch Means for Interval Estimation.

***Module 9:***Comparison and Evaluation of Alternative System Designs- Comparison of Two SystemDesigns.; Sampling with Equal and Unequal Variances. Common Random Numbers.Confidence Intervals with Specified Precision. Comparison of Several System Designs: Bonferroni Approaches to Multiple Comparisons and to Screening and to Selection of the Best. Meta-modelingL Sample Linear Regression, Testing for Significance, Multiple Linear Regression. Random Number Assignment for Regression. Optimization via Simulation: Robust Heuristics.

***Module10:***Simulation of Computer Systems- Simulation Tools: Process Orientation and EventOrientation. Model Input: Modulated Poisson Process and Virtual-Memory Referencing. High-Level Simulation.CPU and Memory Simulations. Simulation of Computer Networks- Traffic Modeling, Media Access Control: Token-Passing Protocols and Ethernet, Data Link Layer, TCP, Model Construction.

**Simulation Languages:** Basic Introduction to Special Simulation Languages:-GPSS/ MATLAB/ NetworkSimulators.

**Suggested Readings/ Books:**

1. 1.Jerry Banks, John S. Carson II, Barry L. Nelson and David M. Nicol, *Discrete-Event Systemand Simulation,* Prentice Hall of India, New Delhi, 2005
2. Averill M. Law, *Simulation modeling and analysis (SIE),* Tata McGraw Hill India, 2007
3. David Cloud, Larry Rainey, A*pplied Modeling and Simulation,* Tata McGraw Hill, India.
4. Gabriel A. Wainer, *Discrete-event modeling and simulation: a practitioner's approach,* CRC Press, 2009.
5. Bernard P. Zeigler, Herbert Praehofer, Tag Gon Kim, *Theory of modeling and simulation:integrating discrete event and continuous complex dynamic systems,* Academic Press, 2000.
6. Walter J. Karplus, George A. Bekey, Boris YakobKogan, *Modeling and simulation: theory andpractice*, Springer, 2003.
7. Stanislaw Raczynski, *Modeling and simulation: the computer science of illusion,* Wiley, 2006.
8. Mohammad SalamehObaidat, Georgios I. Papadimitriou, *Applied system simulation:methodologies and application,* Springer, 2003.
9. vanDijk, Nico M.; Boucherie, Richard J. (Eds.) 2011. *Queueing Networks: A FundementalApproach*. 798 p. 148 illus. Springer.
10. Bhat, U. Narayan, *An Introduction to Queueing Theory: Modeling and Analysis in Applications,*Springer 2008 (Birkhäuser Boston).
11. James J. Nutaro, *Building software for simulation: theory and algorithms, with applications inC++*. Wiley, 2010.

**ASSIGNMENTS-BTCS 601 Simulation and Modeling**

**ASSIGNMENT 1**

1. What is simulation and when it is used.
2. Describe continuous and discrete system.
3. Define event scheduling.
4. Give examples of simulation of queuing system.
5. Define data structure and dynamic allocation.

**ASSIGNMENT 2**

1. Define SIMULA and SIMUL8.
2. Give brief introduction about simulation software.
3. Explain empirical distribution.
4. Explain priority discipline queuing model.
5. What is Lq and Wq and little’s formula.

**ASSIGNMENT 3**

1. What is the use of network of queues.
2. What are the applications of queuing models.
3. What do you mean by random number generation.
4. Difference between distribution and gamma distribution.
5. Explain Convolution method.

**ASSIGNMENT 4**

1. Explain the following for simulation input
2. Chi square test
3. Kolmogorov- smirnov test
4. Define validation and verification for simulation model.
5. What do you mean by stochastic nature of output data.
6. Explain briefly error estimation and replications.

**ASSIGNMENT 5**

1. Comparison sampling with equal and unequal variance.
2. What are random number assignment for regression.
3. What are the simulation tools.
4. What do mean by simulation in computer networks.
5. Explain high level simulation.

**BTCS 602 RDBMS–II**

**Objectives:** This course offers a good understanding of advanced database concepts and technologies. Itprepares the student to be in a position to use and design databases for a variety of applications.

**Introduction to Database Systems:** Database System Concepts and Architecture, Data Models, DataIndependence, SQL: DDL, DML, DCL, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF. (6)

**Query Processing and Optimization:**

Query Processing, Syntax Analyzer, Query Decomposition, Query Optimization, Heuristic Query Optimization, Cost Estimation, Cost Functions for Select, Join, Query Evaluation Plans.(6)

**Transaction Processing and Concurrency Control:**

Transaction Processing Concepts, Concurrency Control Techniques: Two-phase Locking, TimestampOrdering, Multiversion, Validation, Multiple Granularity Locking.(5)

**Object Oriented and Object Relational Databases:**

Object Oriented Concepts, Object Oriented Data Model,Object Definition Language, Object Query Language, Object Relational Systems, SQL3, ORDBMS Design. (5)

**Distributed Databases:**

Distributed Database Concepts, Advantages and Disadvantages, Types of Distributed Database Systems, Data Fragmentation, Replication and Allocation Techniques for Distributed Database Design, Five Level Schema Architecture, Query Processing, Concurrency Control and Recovery in Distributed Databases. (6)

**Backup and Recovery:**

Types of Database Failures, Types of Database Recovery, Recovery Techniques: Deferred Update,Immediate Update, Shadow Paging, Checkpoints, Buffer Management.

**Introduction to Data Warehousing and Data Mining:**

Introduction to OLAP, OLTP, Data Warehouse, Data Marts, Data Mining, Data Mining Process, Big Data.(5)

**Enterprise Database Products:**

Enterprise Database Products, Familiarity with IBM DB2 Universal Database, Oracle, Microsoft SQLServer, MySQL, their features. (7)

**Suggested Readings/ Books:**

1. RamezElmasri, ShamkantNavathe, Fundamentals of Database Systems, Fifth Edition, Pearson Education, 2007.
2. Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill.
3. C.J. Date, An Introduction to Database Systems, Eighth Edition, Pearson Education.
4. Alexis Leon, Mathews Leon, Database Management Systems, Leon Press.
5. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, Tata McGraw-Hill.
6. S. K. Singh, Database Systems Concepts, Design and Applications, Pearson Education.
7. Chris Eaton, Paul Zikopoulos, Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data.

**ASSIGNMENTS-BTCS 602 RDBMS–II**

**ASSIGNMENT-1**

1. Describe in detail the architecture of Database Systems?
2. What is Data Independence?
3. Explain Normal Forms with example?
4. Explain the phases of query processing?
5. Explain the technique of Query Optimization?

**ASSIGNMENT-2**

1. ORDBMS Design in detail?
2. Explain Object oriented Data model with example?
3. Explain Relational databases?
4. Define SQL3?
5. Explain Functions in SQL?

**ASSIGNMENT-3**

1. Explain Distributed Databases with example?
2. Explain different types of Distributed Databases?
3. Explain data Fragmentation and Replication?
4. How concurrency control is done in distributed databases?
5. Define security and recovery in Distributed Databases?

**ASSIGNMENT-4**

1. What is Query optimization? How an Query is Optimized?
2. What are the different types of failures in DBMS?
3. Explain log based recovery?
4. What is Shadow paging?
5. What are Buffers and checkpoints in RDBMS?

**ASSIGNMENT-5**

1. What is Data warehousing and Data mining?
2. Difference between Data Warehousing and Data mining?
3. What is OLAP? Also describe its types?
4. What are data marts?
5. Research on Big Data?

**TUTORIAL SHEETS-BTCS 602 RDBMS–II**

**TUTORIAL SHEET- 1 Unit- I(Introduction to Database Systems)**

**1. Data base is a collection of\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.**

a. Data b. module

c. programs d. none of these.

**2.\_\_\_\_\_\_\_\_\_\_\_ is a collection of interrelated data and set of programs to access them.**

a. Data structures b. database management system

c. database d. programming language

**3. DBMS should provide following features:**

a. safety of information stored b. authorized access

c. protected data from system crash. D.all of these.

**4. Which of the following consider as DBMS.**

a. oracle b. Foxpro

c. all of these d. access

**5. Before use of information was storing using \_\_\_\_\_\_\_\_\_\_\_\_\_**

a. file management system b. cloud storage

c. data system d. none of these

**6. The DBMS act as interface between two components of an database system**.

a. database and user b. database and SQL

c. data and database d. database application and database

**7. Long form of DBA is:**

a. database administrator b. database admin

c. none of these d. database application

**8. DBMS stands for:**

a. database management system b. none of these

c. database basic management system d. database administrator

**9. A database is a complex type of :**

a. manager b. application

c. data structures d. none of these

10. What is Data Independence? Explain different types of Data Independence?

11. Explain Normalization with suitable example?

12. DDL, DCL and DML stands for?

13. Why we use DBMS?

14. Define Data Models?

15. Define architecture of DBMS.?

16. What are the different types of users in RDBMS?

17. List out the duties of DBA.?

18. What is mapping? Why we need mapping in database architecture?

**TUTORIAL SHEET-2 Unit- II (Transaction Processing and Concurrency Control)**

1**. Which of the following is not a logical data-base structure?**  
a. tree  
b. relational  
c. network  
d. chain  
**2. Which of the following is a database administrator’s function?**  
a. database design  
b. backing up the database  
c. performance monitoring  
d all of the above

**3. Each of data files has a \_\_\_\_\_ that describe the way the data is stored in the file.**  
a. file structure

b. records  
c. fields  
d. database  
**4. A locked file can be**  
a. accessed by only one user  
b. modified by users with the correct password  
c. is used to hide sensitive information  
d. both (b) and (c)

**5. The data dictionary tells the DBMS**  
a. what files are in the database  
b. what attribute are possessed by the data  
c. what these files contain  
d. all of the above

1. **Which of the following operations is conflicting?**
2. Read-write
3. Write-read
4. Write-write
5. All of the above
6. None of these.
7. **Which of the following problems occurs due to concurrent access of data?**
8. Lost update
9. Fuzzy read
10. Phantom read
11. All of the above.
12. **A schedule is said to be serializable**
13. If the result is the same as in serial execution of the same set of transactions
14. If the result is the same as in non-serial execution of the same set of transactions
15. If the result is the same as in serial execution of a different set of transactions
16. None of these.

**9. Which of the following concurrency control algorithms is deadlock free?**

1. Pessimistic algorithms
2. Optimistic algorithms
3. Both optimistic and pessimistic algorithms
4. Hybrid algorithms.

**10.Which of the following is not a classification of optimistic concurrency control algorithms?**

1. Locking-based algorithms
2. Timestamp-based algorithms
3. Hybrid algorithms
4. None of the above.

**11.Which of the following concurrency control algorithms is used in DDBMSs?**

1. Lock-based algorithms
2. Timestamp-based algorithms
3. Hybrid algorithms
4. All of these.

**12. The granularity of lock represents**

1. The size of the data item locked
2. The total number of sharable locks obtained by a transaction
3. The total number of exclusive locks obtained by a transaction
4. The sum of b. and c.

**13.Cascading rollback is**

1. The occurrence of a series of rollbacks owing to the rollback of a single transaction
2. The occurrence of the rollback of a single transaction owing to a series of rollbacks
3. Both a. and b.
4. None of the above.

14. Define different types of locks in RDBMS?

15. What is serialiaziability ?Explain Serial and Non- Serial Schedule?

16. Define multiversion concurrency control.?

17. What is Validation.?

18. Define multiple granularity locking.

**TUTORIAL SHEET-3 UNIT-III(Object Oriented and Object Relational databases)**

**Q1. The ability to change the conceptual schema without affecting the external schemas or application programs is known as\_\_\_\_\_\_\_\_.**

a. Program-data independence

b. Logical data independence

c. Physical data independence

d. Data abstraction

**Q2. Which of these levels deals with the physical representation of the database on the computer?**

a. External level

b. Conceptual level

c. Internal level

d. None of these

**Q3. Which of these is not a representational data model?**

a. Entity-relationship model

b. Hierarchical data model

c. Relational data model

d. Network data model

**Q4. Which of these is not a feature of Hierarchical model?**

a. Organizes the data in tree-like structure

b. Parent node can have any number of child nodes

c. Root node does not have any parent

d. Child node can have any number of parent nodes

**Q5. Which of these data models is an extension of relational data model?**

a. Object-oriented data model

b. Object-relational data model

c. Semi structured data model

d. None of these

**Q6. The information about data in a database is called \_\_\_\_\_\_\_.**

a. Metadata

b. Hyper data

c. Tera data

d. None of these

**Q7.The relational database environment has all of the following components except**

a. users

b. separate files

c. database

d. query languages

**Q8. DBMS are intended to**

a. eliminate data redundancy

b. establish relationship among records in different files

c. manage file access

d. maintain data integrity

e. all of the above

**Q9. The language used application programs to request data from the DBMS is referred to as the**

a. DML

b. DDL

c. query language

e. none of the above

**Q10. The highest level in the hierarchy of data organization is called**

a. data bank

b. data base

c. data file

d. data record

**Q11. Report generators are used to**

a. store data input by a user

b. retrieve information from files

c. answer queries

d. both b and c

**Q12. A top-to-bottom relationship among the items in a database is established by a**

a. hierarchical schema

b. network schema

c. relational schema

d. all of the above

**Q13. The management information system (MIS) structure with one main computer system is called a**

a. hierarchical MIS structure

b. distributed MIS structure

c. centralized MIS structure

d. decentralized MIS structure

**Q14. A data dictionary is a special file that contains?**

a. the names of all fields in all files

b. the data types of all fields in all files

c. the widths of all fields in all files

d. All of above

e. None of above

15. Write the object oriented concepts.

16. Define data abstraction.

17. What does ORDBMS mean?

18. What is object oriented data model?

**TUTORIAL SHEET-4 Unit: IV (Distributed Databases)**

**1. The file once created cannot be changed is called**  
a) immutable file  
b) Mutex file  
c) mutable file  
d) none of the mentioned

**2. \_\_\_\_\_\_ of the distributed file system are dispersed among various machines of distributed system.**  
a) Clients  
b) Servers  
c) Storage devices  
d) all of the mentioned

**3. \_\_\_\_\_\_\_ is not possible in distributed file system.**a) File replication  
b) Migration  
c) Client interface  
d) Remote access

**4. Which one of the following hides the location where in the network the file is stored?**a) Transparent distributed file system  
b) hidden distributed file system  
c) escaped distribution file system  
d) spy distributed file system

**5. In distributed file system, when a file’s physical storage location changes**a) file name need to be changed  
b) file name need not to be changed  
c) file’s host name need to be changed  
d) file’s local name need to be changed

**6. In distributed file system, \_\_\_\_\_\_\_ is mapping between logical and physical objects.**  
a) client interfacing  
b) naming  
c) migration  
d) hetrogeneity

**7. In distributed file system, a file is uniquely identified by**a) host name  
b) local name  
c) the combination of host name and local name  
d) none of the mentioned

**8. There is no need to establish and terminate a connection through open and close operation in**a) stateless file service  
b) Stateful file service  
c) both (a) and (b)  
d) none of the mentioned

**9. In distributed file system, file name does not reveal the file’s**  
a) local name  
b) physical storage location  
c) both (a) and (b)  
d) none of the mentioned

**10. Which one of the following is a distributed file system?**a) Andrew file system  
b) network file system  
c) novel network  
d) all of the mentioned

11. List three properties of distributed system? Give one live example?

12. Define distributed database system.?

13. What is heterogeneous distributed database in RDBMS?

14. What is query processing?

15. What is Data fragmentation?

16. How the replication of data is removed in DBMS?

17. Architecture of Distributed Databases?

18. How recovery is done in distributed Databases?

**TUTORIAL SHEET-5 Unit V (Backup and Recovery)**

**1.   Which is one of the major important components of the relational database:**

a.   Query execution

b.   Query process

c.   Query optimizer

d.   Query transaction

**2.   Which is refers to the process of restoring the data that has been stored in a computer:**

a.    Retrieve

b.    Backup

c.    Recovery

d.   Deadlock

**3.   Query processing refers to technique of maintaining managing and manipulating data stored with in the computer system by using\_\_\_\_ queries:**

a.    DBMS

b.    RDBMS

c.    SQL

d.    None of these

**4.    How many major stages of query processing:**

a.    1

b.    2

c.    3

d.    4

**5.    Which are the major stages of query processing:**

a.     Query execution

b.     Query optimizer

c.     Both

d.     None

**6.    In query processor which ordering is related to hash joins by SQL server 7.0:**

a.    Interesting ordering

b.    Index intersection

c.    Index joins

d.    Parallel queries

**7.    Which server can joins the indexes when only multiple indexes combined can cover the query:**

a.    SQL

b.    DBMS

c.    RDBMS

d.    All of these

**8.  Which is refers to a stalemate situation due to which no further progress is possible as computer await response of each other:**

a.     Concurrency

b.     Deadlock

c.     Backup

d.     Recovery

**9.  Which is a duplicate copy of a file program that is stored on a different storage media than the original location:**

a.     Concurrency

b.     Deadlock

c.     Backup

d.     Recovery

**10.  Which is duplication of computer operations and routine backups to combat any unforeseen problems:**

a.   Concurrency

b.   Deadlock

c.   Backup

d.   Recovery

**11.  Optimization that is basically related to the rewriter module is termed as\_\_\_\_\_\_\_\_\_\_:**

a.    Semantic query optimization

b.    Global query optimization

c.    Both

d.    None  
**12.  Database security helps organizations to protect data from\_\_\_\_\_:**

a.    Internal users

b.    External users

c.    Non-external users

d.    Non internal users

13.What is Deferred Update recovery?

14.Explain Shadow Paging?

15.Difference between Immediate and Deferred Update?

16. What are the different types of Failures in RDBMS?

17. How checkpoints are used in DBMS? Give suitable example?

18.Why Buffer Management is useful in RDBMS?

**TUTORIAL SHEET-6 Unit- VI (Introduction to data Warehousing and Data Mining)**

1.Which of the following is the most important when deciding on the data structure of a data mart?  
(a) XML data exchange standards  
(b) Data access tools to be used  
(c) Metadata naming conventions  
(d) Extract, Transform, and Load (ETL) tool to be used

(e) All (a), (b), (c) and (d) above.

**2. The process of removing the deficiencies and loopholes in the data is called as**  
(a) Aggregation of data  
(b) Extracting of data  
(c) Cleaning up of data.  
(d) Loading of data  
(e) Compression of data.  
  
**3. Which one manages both current and historic transactions?**  
(a) OLTP  
(b) OLAP  
(c) Spread sheet  
(d) XML  
(e) All (a), (b), (c) and (d) above.  
**4. Which of the following is the collection of data objects that are similar to one another within the same group?**  
(a) Partitioning  
(b) Grid  
(c) Cluster  
(d) Table  
(e) Data source.  
**5. Which of the following employees data mining techniques to analyze the intent of a user query, provided additional generalized or associated information relevant to the query?**  
(a) Iceberg query method  
(b) Data analyzer  
(c) Intelligent query answering   
(d) DBA  
(e) Query parser.  
**6. Which of the following process includes data cleaning, data integration, data selection, data transformation, data mining, pattern evolution and knowledge presentation?**  
(a) KDD process  
(b) ETL process  
(c) KTL process  
(d) MDX process  
(e) None of the above.  
**7. At which level we can create dimensional models?**  
(a) Business requirements level  
(b) Architecture models level  
(c) Detailed models level  
(d) Implementation level  
(e) Testing level.  
**8. Which of the following is not related to dimension table attributes?**  
(a) Verbose  
(b) Descriptive  
(c) Equally unavailable  
(d) Complete  
(e) Indexed.  
  
**9. Data warehouse bus matrix is a combination of**  
(a) Dimensions and data marts  
(b) Dimensions and facts  
(c) Facts and data marts  
(d) Dimensions and detailed facts  
(e) All (a), (b), (c) and (d) above.  
**10. Which of the following is not the managing issue in the modeling process?**  
(a) Content of primary units column   
(b) Document each candidate data source  
(c) Do regions report to zones  
(d) Walk through business scenarios  
(e) Ensure that the transaction edit flat is used for analysis.

11. Define data mining.?

12. Mention some of the data mining techniques.

13. How is a Data Warehouse is different from database?

14. Define OLTP?

15. How a database design is represented in OLAP system?

16. Difference between Data Warehousing and Data mining?

17. Define Data Warehousing?

18. What is Big Data? How it is useful in RDBMS?

**BTCS 603 Software Engineering**

***Module1:***Evolution and impact of Software engineering, software life cycle models: Waterfall,prototyping, Evolutionary, and Spiral models.Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis and specification.

***Module2:***Basic issues in software design, modularity, cohesion, coupling and layering, function-orientedsoftware design: DFD and Structure chart, object modeling using UML, Object-oriented software development, user interface design. Coding standards and Code review techniques.

***Module3:***Fundamentals of testing, White-box, and black-box testing, Test coverage analysis and test casedesign techniques, mutation testing, Static and dynamic analysis, Software reliability metrics, reliability growth modeling.

***Module4:***Software project management, Project planning and control, cost estimation, project schedulingusing PERT and GANTT charts, cost-time relations: Rayleigh-Norden results, quality management, ISO and SEI CMMI, PSP and Six Sigma. Computer aided software engineering, software maintenance, software reuse, Component-based software development.

**Suggested Readings/ Books:**

1. Roger Pressman, **“Software Engineering: A Practitioners Approach,**(6th Edition), McGraw Hill, 1997.
2. Sommerville,”**Software Engineering, 7th edition**”, Adison Wesley, 1996.
3. Watts Humphrey,**” Managing software process**”, Pearson education, 2003.
4. James F. Peters and WitoldPedrycz, **“ SoftwareEngineering– An Engineering Approach”**, Wiley.
5. Mouratidis and Giorgini. **“Integrating Security and Software Engineering–Advances and Future”**, IGP. ISBN – 1-59904-148-0.
6. PankajJalote, **“An integrated approach to Software Engineering”**, Springer/Narosa.

**ASSIGNMENTS-BTCS 603 Software Engineering**

**ASSIGNMENT-1**

1. Explain SDLC of a software.
2. Differentiate between various Life cycle models.
3. What is RAD model?
4. Why Software engineering is called a “Layered Technology”?

**ASSIGNMENT-2**

1. How Feasibility Study is different from requirement analysis and specification?
2. What is Cost-Benefit Analysis? Why the project team conduct the cost benefit analysis?
3. Write about various Cost-Benefit analysis techniques.
4. Write about various types of feasibility study and types of cost and benefits.

**ASSIGNMENT-3**

1. Explain the design concepts.
2. Differentiate between functional and object oriented Design.
3. What is component based design?
4. What is User Interface design?
5. What are various diagrams designed in OOD?

**ASSIGNMENT-4**

1. Explain Software testing fundamentals.
2. What is Cyclomatic complexity?
3. Differentiate between White Box and Black box testing techniques.
4. What is Software Re-engineering?
5. Explain various metrics for Software reliability?

**ASSIGNMENT-5**

1. Explain Software Configuration management in detail.
2. Explain various Project estimation techniques.
3. What is Risk Analysis and Management?
4. What is Software Quality Assurance?
5. What is Software reverse-engineering?

***Elective-I (*BTCS 904 Information Security*)***

**Objectives:** Upon completion of this course, students will have gained knowledge of information securityconcepts and understanding of Information Security principles and approaches.

***Module1:***Symmetric Ciphers**-**Overview: Services, Mechanisms and Attacks, The OSI SecurityArchitecture, A Model of Network Security. Classical Encryption Techniques: Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Rotor Machines, Steganography. Block Cipher and the Data Encryption Standard: Simplified DES, Block Cipher Principles, The DES, The Strength of DES, Differential and Linear Cryptanalysis. Symmetric Ciphers: Triple DES, Blowfish. Confidentiality using Conventional Encryption: Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.

***Module2:***Public Key Encryption, Digital Signatures**-**Number Theory, Prime Numbers Format’s and Euler’s Theorems, Testing for Primality. Public Key Cryptography and RSA: Principles of Public Key Cryptosystems, The RSA Algorithms, Key Management, Diffie Hellman Key Exchange.

***Module3:***Authentication Protocols**-**Message Authentication: Authentication Requirements,Authentication Functions, Message Authentication Codes, MD5 Message Digest Algorithms, Digital Signatures and Authentication Protocols: Digital Signatures, Authentication Protocols, Digital Signature Standards.

***Module4:***Network Security**-**Authentication Applications: Kerberos, X.509 Directory AuthenticationService. Electronic Mail Security: Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload. Web Security: Web Security Requirements, Secure Sockets Layer and Transport Layer Security, Secure Electronic Transaction.

***Module5:***System Security**-**Intruders, Malicious Software, Viruses and Related Threats, CounterMeasures, Firewalls and its Design Principles.

**Suggested / Readings & Books**

1. William Stallings, Network Security Essentials, Applications and Standards Pearson Education.
2. William Stallings, Cryptography and Network Security Principles and practice. 2/e,Pearson Education.
3. Bishop, Matt, **Introduction to Computer Security***.* Addison-Wesley, Pearson Education, Inc. ISBN: 0-321-24744-2. (2005)
4. Michael. E. Whitman and Herbert J. Mattord Principles of Information Security, Cengage Learning
5. **AtulKahate Cryptography & Network Security, TMH, 2nd Edition**
6. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security: Private Communication in Public World, 2nd Edition, 2011, Pearson Education.

**ASSIGNMENTS-BTCS 904 Information Security**

**ASSIGNMENT- 1**

1. Explain OSI Security Architecture in detail?
2. Explain Security Services in detail?
3. Explain Security Attacks in detail?
4. Explain Security Mechanisms in detail?
5. Explain Model of Network Security?

**ASSIGNMENT- 2**

1. Write a short note on Symmetric Cipher Model?
2. Discuss various Substitution Techniques in detail?
3. Explain Rotor Machines in brief.
4. Explain the concept of Transposition Techniques.
5. Explain Steganography in brief.

**ASSIGNMENT- 3**

1. Write a short note on Simplified DES?
2. Discuss the Block Cipher Principles?
3. Differentiate between Differential and Linear Cryptanalysis.
4. Give a DES example and explain the Strength of DES.

**ASSIGNMENT 4**

1. Write a short note on Triple DES and Blowfish.
2. DiscussPlacement of Encryption Function.
3. Write a short note on Traffic Confidentiality.
4. Explain Key Distribution in brief.
5. Explain Random Number Generation in brief.

**ASSIGNMENT-5**

1. ExplainNumber Theory and Prime Numbers Format’s in brief.
2. Explain Euler’s Theorems and Testing for Primality in brief.
3. Explain Principles of Public Key Cryptosystems.
4. Explainthe RSA Algorithmsin brief.
5. Explain Key Management and Diffie Hellman Key Exchangein brief.

**TUTORIAL SHEETS-BTCS 904 Information Security**

**TUTORIAL SHEET-1**

1. Explain Message Authentication Requirementsin detail?
2. Explain Message Authentication Functionsin detail?
3. Explain Message Authentication Codesin detail?
4. Explain MD5 Message Digest Algorithmsin detail?
5. Explain Digital Signatures, Authentication Protocols and Digital Signature Standards?

**TUTORIAL SHEET-2**

1. Explain Kerberos and X.509 Directory Authentication Service in detail?
2. Write a short note on Pretty Good Privacy?
3. Explain IP Security Architecture,
4. Explain Authentication Header and Encapsulation Security Payload.
5. Explain Web Security Requirements, Secure Sockets Layer and Transport Layer Security and Secure Electronic Transaction.

**TUTORIAL SHEET-3**

1. Explain different type of Intruders and Malicious Software.
2. Write a short note on Viruses and Related Threats and its Counter Measures?
3. Explain Firewalls and its Design Principles.

***Open Elective* (HU-251 Human Resource Management)**

**Introduction:** Introduction to Human Resource Management and its definition, functions of Human Resource Management & its relation to other managerial functions. Nature, Scope and Importance of Human Resource Management in Industry, Role & position of Personnel function in the organization.

**Procurement and Placement:** Need for Human Resource Planning; Process of Human Resource Planning; Methods of Recruitment; Psychological tests and interviewing; Meaning and Importance of Placement and Induction, Employment Exchanges (Compulsory Notification of vacancies) Act 1959, The Contract Labour (Regulation & Abolition) Act 1970.

**Training & Development**: Difference between training and Development; Principles of Training; Employee Development; Promotion-Merit v/s seniority Performance Appraisal, Career Development & Planning.

Job analysis & Design: Job Analysis: Job Description & Job Description, Job Specification.

**Job Satisfaction**: Job satisfaction and its importance; Motivation, Factors affecting motivation, introduction to Motivation Theory; Workers ' Participation, Quality of work life.

**The Compensation Function:** Basic concepts in wage administration, company’s wage policy, Job Evaluation, Issues in wage administration, Bonus & Incentives, Payment of Wages Act-1936, Minimum Wages Act-1961

**Integration:** Human Relations and Industrial Relations; Difference between Human Relations and Industrial Relations, Factors required for good Human Relation Policy in Industry; Employee Employer relationship Causes and Effects of Industrial disputes; Employees Grievances & their Redressal, Administration of Discipline, Communication in organization, Absenteeism, Labour Turnover, Changing face of the Indian work force and their environment, Importance of collective Bargaining; Role of trader unions in maintaining cordial Industrial Relations.

**Maintenance:** Fringe & retirement terminal benefits, administration of welfare amenities, Meaning and Importance of Employee Safety, Accidents-Causes & their Prevention, Safety Previsions under the Factories Act 1948; Welfare of Employees and its Importance, Social security, Family Pension Scheme, ESI act 1948, Workmen’s Gratuity Act 1972, Future challenges for Human Resource Management.

**ASSIGNMENTS-HU-251 Human Resource Management**

**ASSIGNMENT-1**

1. Differentiate between Human Resource Management and Personal Management.
2. What are the various activities involved in Human resources planning and recruitment?
3. How does HRM provide effective use of human resources in order to enhance organizational performance?
4. Why is it important for a company to make its human resources into a competitive advantage? How can Human Resources contribute in doing so?
5. Define HRM. Outline its objectives and the functional responsibilities of a HR Manager.
6. Mention the main methods of recruitment of human resources.
7. Explain the role and position of personnel function in the organization?
8. Explain the importance of HRM.
9. Explain the process of human resource planning.

**ASSIGNMENT-2**

1. Write a note on Career Development and planning.
2. Discuss the different methods of Recruitment. What are the sources available for recruitment in an organization?
3. Distinguish between Job Description and Job specialization with examples. How job analysis information can be used for different purposes of an organization.
4. Write a note on job description.

**ASSIGNMENT-3**

1. What is the need of having Minimum wages Act? Give brief outline of Min. wages Act-1961.
2. Write various pertinent issues regarding wages under Minimum Wages Act 1961.
3. Explain the salient features of Payment of Wages Act 1936. What are the Key issues in Wage administration?
4. What do you understand by Worker’s Participation in management? Will it necessarily improve the relation between employees and employers?
5. Explain the main issues involved in wage administration.
6. Discuss the various factors affecting motivation.

**ASSIGNMENT-4**

1. What are the various ways by which employee grievances can be addresses?
2. Explain the role of trade unions in maintaining cordial relations.
3. Explain the variety of factors, which influence the industrial Relation System of an Organization.
4. Explain Behaviorally Anchored Rating Scales (BARS) method of performance appraisal.
5. Explain the elements of Quality of Work Life.

**ASSIGNMENT-5**

1. What is achieved by Workmen’s Gratuity Act 1972? Analyze some pitfalls of the Act.
2. What do understand by Family pension scheme? Explain with illustrations.
3. What do understand by accidents and the safety provisions under the factories Act 1948?
4. Why is it important to conduct pre-employment background investigations? Explain how would you handle the problem of former employers being unwilling to give bad references on their former employees?
5. Mention the various provisions enacted by factories act, 1948 for the safety of workers.

**TUTORIAL SHEETS-HU-251 Human Resource Management**

**TUTORIAL SHEET-1**

1. What is the relation of HRM with other managerial functions?
2. Mention two main functions of human resource management.
3. Differentiate between Human Resource Management and Personal Management.
4. What are the barriers to Human Resource Planning
5. Differentiate between placement and induction.
6. Discuss the major causes of industrial disputes in India.
7. Explain the scope and importance of HRM with its relevance to an industry.
8. Recruitment and selection
9. Enumerate the benefits by adopting personal policies.
10. Placement and Induction
11. Discuss the need for human resource planning. ,
12. Mention two future challenges for human resource management.
13. Mention the objective The Contract Labour Act, 1970.

**TUTORIAL SHEET-2**

1. What do you understand by placement?
2. What is a stress interview?
3. What are promotion criteria?
4. Define job description.
5. What do you understand by Job Evaluation?
6. Differentiate between ‘Job Description’ and ‘Job Specification’.
7. Which training technique do you recommend for a fresh graduate engineer and why?
8. Job Evaluation
9. An Employee, enters into a contract with his employer B to accept his wages in kind and not in money. Can A later on demand his wages in cash? Explain.
10. What do you mean by job analysis?
11. Mention two factors affecting motivation.
12. What is vestibule training?
13. Differentiate between merit and seniority in promotion.

**TUTORIAL SHEET-3**

1. What is Bonus?
2. Understanding about the concept of Social Security.
3. Give four ways of administration of Discipline.
4. What is Performance Appraisal?
5. Definition of Bonus and incentives.
6. “Motivation is the key to management in action”. Justify the statement.
7. Employee Grievances
8. Labour Turnover
9. Name various fringe and retirement terminal benefits.
10. What do you mean by job design?
11. Discuss the importance of job satisfaction.
12. Discuss the objective of payment of wages act, 1936.

**TUTORIAL SHEET-4**

1. What are the disadvantages of labour turnover?
2. Define collective bargaining
3. Differentiate between human relations and industrial relations.
4. Relationship between Absenteeism and Labour Turnover
5. Define Industrial Dispute.
6. Why ‘Collective Bargaining’ is not so successful in India?
7. Trade union
8. Mention the objective of the Minimum wages act.
9. Mention two factors required for good human relation policy in industry
10. What do you understand by collective bargaining?
11. Mention two causes of industrial disputes.

**TUTORIAL SHEET-5**

1. Define factory.
2. What is the scope of social security measures?
3. Classify accidents according to causes of events, nature of events and nature of injury
4. Effects of Industrial Disputes.
5. Fringe Benefits
6. Name various fringe and retirement terminal benefits.
7. Explainvariousprovisions ofthe ContractLabour(Regulations andAbolition)Act,l970.
8. Define workers'participation in management. Discuss its forms.
9. Describe the ways in which Human Resource Management practices are likely to change in changing business scenario.
10. Causes of Absenteeism and Labour turnover and their control.
11. Explain the concept of “Employee Training and Development”. Discuss the principle of any Training Program in an organization.

**PTU COURSE CONTENTS- BTCS 604 RDBMS-II Lab**

1. Case studies on normalization
2. Study and usage of query optimization techniques
3. Study and usage of backup and recovery features of database management software
4. Server administration of any database management software
5. Study and usage of any object oriented or object relational database management software
6. Study and usage of open source data mining tool: Weka
7. Study of web databases
8. Development of a project by making use of tools studied above

**LAB EXPERIMENT DESCRIPTION**

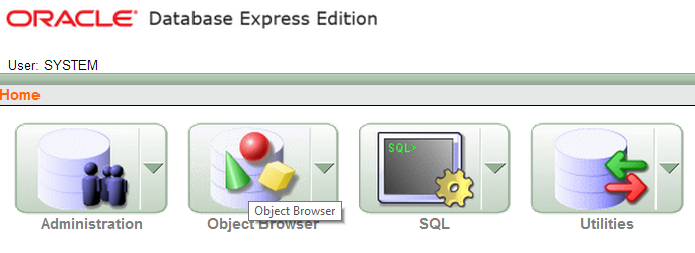
|  |  |
| --- | --- |
| **Exp.No** | **Experiment Description** |
| 1 | Case studies on normalization |
| 2 | Study and usage of query optimization techniques |
| 3 | Study and usage of backup and recovery features of database management software |
| 4 | Server administration of any database management software |
| 5 | Study and usage of any object oriented or object relational database management software |
| 6 | Study and usage of open source data mining tool: Weka |
| 7 | Study of web databases |
| 8 | Development of a project by making use of tools studied above |

**WORKFLOW FOR PERFORMING EXPERIMENTS**

All the experiments of RDBMS II Lab will be performed using Oracle 9i, Microsoft SQL Server 2005 and WEKA (a tool for Data mining). Work Flow will be as follows:

* 1. Introduction about the experiment to be performed.
  2. Tools required.
  3. Software and Hardware Requirements.
  4. Case study of the experiments with example.
  5. Performing the experiments using Tools.
  6. Results of Query in the experiment will be noted down or saved in the system.
  7. 2 - 5 questions related to the experiment for practice.

**INTERFACE TO BE USED- Oracle 9i**

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**PTU COURSE CONTENTS- BTCS 606 Software Engineering Lab**

1. Study and usage of OpenProj or similar software to draft a project plan
2. Study and usage of OpenProj or similar software to track the progress of a project
3. Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents for some problems
4. Preparation of Software Configuration Management and Risk Management related documents
5. Study and usage of any Design phase CASE tool
6. To perform unit testing and integration testing
7. To perform various white box and black box testing techniques

**Suggested Tools -** Visual Paradigm, Rational Software Architect.Visio, Argo UML, RationalApplication Developer etc. platforms.

**PTU COURSE CONTENTS- BTCS 607 Simulation and Modeling Lab**

1. **Programming in MATLAB:** Introduction, Branching statements, loops, functions, additionaldata types, plots, arrays, inputs/outputs etc.
2. Introduction regarding usage of any Network Simulator.
3. Practical Implementation of Queuing Models using C/C++.

**Department Teachers**

|  |  |  |  |
| --- | --- | --- | --- |
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**PTU COURSE CONTENTS- BTCS 605 Free/Open Source Software Lab**

Students will be doing the practical related to the **Elective-I** opted by them by using open source technologies available in the area of the subject.

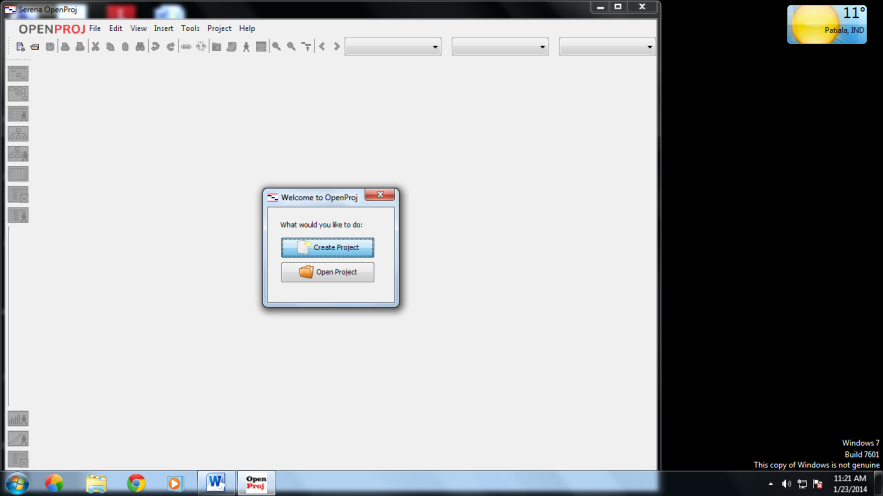
**BTCS 606 Software Engineering Lab**

|  |  |
| --- | --- |
| **S.No.** | **Experiment Description** |
| 1 | Study and usage of OpenProj or similar software to draft a project plan |
| 2 | Study and usage of OpenProj or similar software to track the progress of a project |
| 3 | Preparation of Software Requirement Specification Document, Design Documents and Testing Phase related documents for some problems |
| 4 | Preparation of Software Configuration Management and Risk Management related documents |
| 5 | Study and usage of any Design phase CASE tool |
| 6 | To perform unit testing and integration testing |
| 7 | To perform various white box and black box testing techniques |

**WORKFLOW FOR PERFORMING EXPERIMENTS**

* 1. First define the project.
  2. Enter the different tasks to be performed and create summary task using Work Break Down Structure.
  3. Plan the Resource Allocation and Scheduling and also estimate cost of the project using various cost estimation techniques.
  4. Prepare design and test cases using UML.
  5. Perform testing and prepare Reports.

**INTERFACE TO BE USED- OpenProj**



**BTCS 607 Simulation and Modeling Lab**

|  |  |
| --- | --- |
| **S.No** | **Experiment Description** |
| 1 | Programming in MATLAB: Introduction, Branching statements, loops, functions, additional data types, plots, arrays, inputs/outputs etc. |
| 2 | Introduction regarding usage of any Network Simulator. |
| 3 | Practical Implementation of Queuing Models using C/C++. |

**INTERFACE TO BE USED**