

Sandip University

Neelam Vidya Vihar, Vill.: Sijoul. P.O. : Mailam, Dist.:Madhubani, Bihar -847235

Website : <http://www.sandipuniversity.edu.in>

Toll-Free No.- 1800-313-2714 Ph: 7549991044.

School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester -V
Course: Database Management System	Course Code:CS501T
Theory: 3 Hours/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam: 2.5 Hrs	Credit: 4

Objectives :

1	Explain the basic concept of database management system.
2	Illustrate the concept of Relational Model and Relational Algebra.
3	Demonstrate different ways of SQL query and its uses.
4	Describe various forms normalization and its multivalued dependency.
5	Describe Transaction processing and concurrency control in database.
6	Illustrate the database recovery protocol.

Unit Number	Details	Hours
1	Introduction to Databases: Introduction, Characteristics of database approach, Advantages of using the DBMS approach, History of database applications. Overview of Database Languages and Architectures: Data Models, Schemas, and Instances. Three schema architecture and data independence, database languages, and interfaces, The Database System environment. Conceptual Data Modelling using Entities and Relationships: Entity types, Entity sets, attributes, roles, and structural constraints, Weak entity types, ER diagrams, examples, Specialization and Generalization.	10
2	Relational Model: Relational Model Concepts, Relational Model Constraints and relational database schemas, Update operations, transactions, and dealing with constraint violations. Relational Algebra: Unary and Binary relational operations, additional relational operations (aggregate, grouping, etc.) Examples of Queries in relational algebra. Mapping Conceptual Design into a Logical Design: Relational Database Design using ER-to-Relational mapping. SQL: SQL data definition and data types, specifying constraints in SQL, retrieval que-	10

	ries in SQL, INSERT, DELETE, and UPDATE statements in SQL, Additional features of SQL.	
3	SQL : Advances Queries: More complex SQL retrieval queries, Specifying constraints as assertions and action triggers, Views in SQL, Schema change statements in SQL. Database Application Development: Accessing databases from applications, An introduction to JDBC, JDBC classes and interfaces, SQLJ, Stored procedures, Case study: The internet Bookshop. Internet Applications: The three-Tier application architecture, The presentation layer, The Middle Tier.	10
4	Normalization: Database Design Theory – Introduction to Normalization using Functional and Multivalued Dependencies: Informal design guidelines for relation schema, Functional Dependencies, Normal Forms based on Primary Keys, Second and Third Normal Forms, Boyce-Codd Normal Form, Multivalued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form. Normalization Algorithms: Inference Rules, Equivalence, and Minimal Cover, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Nulls, Dangling tuples, and alternate Relational Designs, Further discussion of Multivalued dependencies and 4NF, Other dependencies and Normal Forms.	10
5	Transaction Processing: Introduction to Transaction Processing, Transaction and System concepts, Desirable properties of Transactions, Characterizing schedules based on recoverability, Characterizing schedules based on Serializability, Transaction support in SQL. Concurrency Control in Databases: Two-phase locking techniques for Concurrency control, Concurrency control based on Timestamp ordering, Multiversion Concurrency control techniques, Validation Concurrency control techniques, Granularity of Data items and Multiple Granularity Locking. Introduction to Database Recovery Protocols: Recovery Concepts, NOUNDO/REDO recovery based on Deferred update, Recovery techniques based on immediate update, Shadow paging, Database backup and recovery from catastrophic failures.	10
Total (Hrs)		50

Course Outcome	
Student Should able to :	
CO1	Summarize the concepts of database objects; enforce integrity constraints on a database using RDBMS.
CO2	Use Structured Query Language (SQL) for database manipulation.
CO3	Design simple database systems.
CO4	Design code for some application to interact with databases.

Resources	
Recommended Books	<ol style="list-style-type: none"> 1. Fundamentals of Database Systems, Ramez Elmasri and Shamkant B. Navathe, 7th Edition, 2017, Pearson. 2. Database management systems, Ramakrishnan, and Gehrke, 3rd Edition, 2014, McGraw Hill.
Reference Books	<ol style="list-style-type: none"> 1. Silberschatz Korth and Sudharshan, Database System Concepts, 6th Edition, Mc-GrawHill, 2013. 2. Coronel, Morris, and Rob, Database Principles Fundamentals of Design, Implementation and Management, Cengage Learning 2012.
E-Resources	http://nptel.ac.in/

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester –V
Course: Data Communication & Computer Network	Course Code: CS502T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 3

Objectives :

1	A brief illustration about how networks work over the system.
2	To learn about various layers in the computer network.
3	Describe Application, Transport and network layer.
4	Illustrate the wireless and mobile network.

Unit Number	Details	Hours
1	Introduction to Data Communication and Networking: Uses of Computer Networks, Network Hardware, Network Software Internet Reference Models (OSI and TCP/IP)	10
2	Physical Layer: Basis for Data Communication, Guided Transmission Media, Wireless Transmission Medium, Circuit Switching and Telephone Network, High Speed Digital Access. Data Link Layer: Data Link Layer Design Issues, Error Detection and Correction, Data Link Control and Protocols, Example Data Link Protocol.	10
3	Medium Access Layer: Channel Allocation Problem, Multiple Access, CSMA, CSMA/CD, CSMA/CA Local Area Network: Ethernet, Fast Ethernet, Gigabit Ethernet, Wireless LAN, Blue tooth, Connecting devices:-Repeaters, Hub, Bridges, Switch, Router, Gateways, Virtual LAN, Example Networks: X.25, Frame Relay, ATM, ISDN	10
4	Network Layer: Network Layer Design Issues, Routing Algorithms (Optimality principle, Static Routing Algorithms, Shortest Path, Flooding,	10

	Dynamic routing Algorithms, Distance Vector, Link State routing.), Congestion control Algorithms (Principles, Policies, Algorithms), Quality of Service (Requirements, Techniques, Integrated Services & Differentiated Services), Network Layer Protocols (IP Addressing , CIDR & NAT, IP layer protocols (ICMP, ARP, RARP, DHCP, BOOTP), IPv6) Transport layer: Transport Layer Service, Elements of Transport protocols, Internet protocols (UDP and TCP)	
5	Application Layer: DNS- Domain Name System, Electronic Mail, World Wide Web, Multimedia (Audio Compression, Streaming Audio, Voice over IP, Video Compression, Video on Demand) Network Security: Cryptography, Symmetric key Algorithms (DES, AES), Public key Algorithms-RSA, Digital Signatures, IPsec ,Firewall	10
Total (Hrs)		50

Course Outcome

Student Should able to :

CO1	Describe the components and infrastructure that form the basis for most computer networks
CO2	Describe the technical aspects of data communications on the Internet
CO3	Write networking programs in the C/C++ (or other programming language)
CO4	Propose network designs based on case studies in colleges or other institutions

Resources

Recommended Books	1. Muhammad Ali Mazidi, Janice Gillispie Mazidi, Danny Causey, The x86 PC Assembly Language Design and Interfacing, 5th Edition, Pearson, 2013. 2. ARM system developers guide, Andrew N Sloss, Dominic Symes and Chris Wright, Elsevier, Morgan Kaufman publishers, 2008.
Reference Books	1. Douglas V. Hall: Microprocessors and Interfacing, Revised 2nd Edition, TMH, 2006. 2. K. Udaya Kumar & B.S. Umashankar : Advanced Microprocessors & IBM-PC Assembly Language Programming, TMH 2003. 3. Ayala : The 8086 Microprocessor: programming and interfacing - 1st edition, Cengage Learning 4. The Definitive Guide to the ARM Cortex-M3, by Joseph Yiu, 2nd Edition , Newnes, 2009
E-Resources	http://nptel.ac.in/

Tutorials:

Tutorial assessment shall be conducted for the Project, Tutorials, Industrial Visit report and Seminar. Tutorial is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by subject teacher of the school. At the end of the semester, the final grade for a Tutorial shall be assigned based on the performance of the student and is to be submitted to the University.

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester –V
Course: Software Engineering	Course Code: CS503T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 3

Objectives :

1	Learn about the full description about software.
2	Learn about software requirement, software development and software testing.
3	The main requirement about software processes and its design part.
4	To learn about project planning and quality management.
5	To learn about software testing and software evolution.

Unit Number	Details	Hours
1	<p>Introduction: Software Crisis, Need for Software Engineering. Professional Software Development, Software Engineering Ethics. Case Studies.</p> <p>Software Processes: Models: Waterfall Model, Incremental Model and Spiral Model. Process activities.</p> <p>Requirements Engineering: Requirements Engineering Processes Requirements Elicitation and Analysis. Functional and non-functional requirements. The software Requirements Document .Requirements Specification. Requirements validation .Requirements Management</p>	12
2	<p>System Models: Context models. Interaction models. Structural models. Behavioral models. Model-driven engineering.</p> <p>Design and Implementation: Introduction to RUP, Design Principles. Object-oriented design using the UML. Design patterns .Implementation issues. Open source development.</p>	11
	<p>Software Testing: Development testing, Test-driven development, Release</p>	

3	testing, User testing. Test Automation. Software Evolution: Evolution processes. Program evolution dynamics. Software maintenance. Legacy system management.	9
4	Project Planning: Software pricing. Plan-driven development .Project scheduling: Estimation techniques. Quality management: Software quality. Reviews and inspections. Software measurement and metrics. Software standards.	10
5	Agile Software Development: Coping with Change , The Agile Manifesto: Values and Principles. Agile methods: SCRUM. And Extreme Programming. Plan-driven and agile development. Agile project management, Scaling agile methods.	8
Total (Hrs)		50

Course Outcome

Later effective conclusion of course, a Student Should able to :

CO1	Design a software system, component, or process to meet desired needs within realistic constraints.
CO2	Assess professional and ethical responsibility.
CO3	Function on multi-disciplinary teams.
CO4	Make use of techniques, skills, and modern engineering tools necessary for engineering practice.
CO5	Comprehend software systems or parts of software systems.

Resources

Recommended Books	<ol style="list-style-type: none"> 1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education, 2012. 2. The SCRUM Primer, Ver 2.0, http://www.goodagile.com/scrumprimer/scrumprimer20.pdf
Reference Books	<ol style="list-style-type: none"> 1. Roger S. Pressman: Software Engineering-A Practitioners approach, 7th Edition, Tata McGraw Hill. 2. Pankaj Jalote: An Integrated Approach to Software Engineering, Wiley India
E-Resources	http://nptel.ac.in/ Web Reference for eBooks on Agile: <ol style="list-style-type: none"> 1. http://agilemanifesto.org/ 2. http://www.jamesshore.com/Agile-Book/

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester –V
Course: Operating System	Course Code: CS504T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 4

Objectives :

1	To make the computer system convenient to use in an efficient manner.
2	To hide the details of the hardware resources from the users.
3	To provide users a convenient interface to use the computer system.
4	To act as an intermediary between the hardware and its users, making it easier for the users to access and use other resources.

Unit Number	Details	Hours
1	Introduction to operating systems, System structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and Security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating system design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot. Process Management Process concept; Process scheduling; Operations on processes; Inter process communication	10
2	Multi-threaded Programming: Overview; Multithreading models; Thread Libraries; Threading issues. Process Scheduling: Basic concepts; Scheduling Criteria; Scheduling Algorithms; Multiple-processor scheduling; Thread scheduling. Process Synchronization: Synchronization: The critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors.	10

3	Deadlocks : Deadlocks; System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. Memory Management: Memory management strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation.	10
4	Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. File System, Implementation of File System: File system: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection: Implementing File system: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management.	10
5	Secondary Storage Structures, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection: Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability- Based systems. Case Study: The Linux Operating System: Linux history; Design principles; Kernel modules; Process management; Scheduling; Memory Management; File systems, Input and output; Inter-process communication.	10
Total (Hrs)		50

Course Outcome	
Student Should able to :	
CO1	Demonstrate need for OS and different types of OS
CO2	Discuss suitable techniques for management of different resources
CO3	Illustrate processor, memory, storage and file system commands
CO4	Explain the different concepts of OS in platform of usage through case studies

Resources	
Recommended Books	1.Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, Operating System Principles 7 th edition, Wiley-India, 2006.edition, Wiley-India, 2006. 2.Tanenbaum A.S., “Operating System Design & Implementation”, Practice Hall NJ.
Reference Books	1 Ann McHoes Ida M Fylnn, Understanding Operating System, Cengage Learning, 6 th Edition 2.D.M Dhamdhare, Operating Systems: A Concept Based Approach 3 rd Ed, McGraw- Hill,2013. 3.P.C.P. Bhatt, An Introduction to Operating Systems: Concepts and Practice 4 th Edition,PHI(EEE), 2014. 4.William Stallings Operating Systems: Internals and Design Principles, 6 th Edition, Pearson.
E-Resources	http://nptel.ac.in/

Tutorials:

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester –V
Course : Operation Research	Course Code: CS505T
Theory : 3 Hrs/Week	Max. University Theory Examination: 60 Marks
Tutorial : 1 Hrs/Week	Continuous Internal Assessment: 40 Marks
Max. Time for Theory Exam.: 2.5 Hrs	Credit: 4

Objectives :

1	Illustrate the linear programming and its problem.
2	Introduction about simplex method I and II.
3	Detail explanation about Duality theory and its problem.
4	Illustrate transportation and assignment problems.
5	Examine the game theory and metaheuristics.

Unit Number	Details	Hours
1	Introduction, Linear Programming: Introduction: The origin, nature and impact of OR; Defining the problem and gathering data; Formulating a mathematical model; Deriving solutions from the model; Testing the model; Preparing to apply the model; Implementation . Introduction to Linear Programming Problem (LPP): Prototype example, Assumptions of LPP, Formulation of LPP and Graphical method various examples.	8
2	Simplex Method – 1: The essence of the simplex method; Setting up the simplex method; Types of variables, Algebra of the simplex method; the simplex method in tabular form; Tie breaking in the simplex method, Big M method, Two phase method.	8
3	Simplex Method – 2: Duality Theory - The essence of duality theory, Primal-dual relationship, conversion of primal to dual problem and vice versa. The dual simplex method.	8
	Transportation and Assignment Problems: The transportation problem, Ini-	

4	tial Basic Feasible Solution (IBFS) by North West Corner Rule method, Matrix Minima Method, Vogel's Approximation Method. Optimal solution by Modified Distribution Method (MODI). The Assignment problem; A Hungarian algorithm for the assignment problem. Minimization and Maximization varieties in transportation and assignment problems.	8
5	Game Theory: Game Theory: The formulation of twopersons, zero sum games; saddle point, maximin and minimax principle, Solving simple games- a prototype example; Games with mixed strategies; Graphical solution procedure. Metaheuristics: The nature of Metaheuristics, Tabu Search, SimulatedAnnealing, Genetic Algorithms.	8
Total (Hrs)		40

Course Outcome	
Student Should able to :	
CO1	Explain optimization techniques for various problems.
CO2	Understand the given problem as transportation and assignment problem and solve.
CO3	Illustrate game theory for decision support system.

Resources	
Recommended Books	D.S. Hira and P.K. Gupta, Operations Research, (Revised Edition), Published by S. Chand & Company Ltd, 2014
Reference Books	1. S Kalavathy, Operation Research, Vikas Publishing House Pvt Limited, 01-Aug-2002 2. S D Sharma, Operation Research, KedarNath Ram Nath Publishers.
E-Resources	http://nptel.ac.in/

Tutorials:
Tutorial assessment shall be conducted for the Project, Tutorials, Industrial Visit report and Seminar. Tutorial is continuous assessment based on work done, submission of work in the form of report/journal, timely completion, attendance, and understanding. It should be assessed by subject teacher of the school. At the end of the semester, the final grade for a Tutorial shall be assigned based on the performance of the student and is to be submitted to the University.

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester –V
Course: Database Management System Lab	Course Code:CS506P
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
	Term Work : 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Description (If any):

- Design, develop, and implement the specified queries for the following problems using Oracle, MySQL, MS SQL Server, or any other DBMS under LINUX/Windows environment.
- Create Schema and insert at least 5 records for each table. Add appropriate database constraints.

Sr. No.	Practical Description
Part A: SQL Programming	
1	<p>Consider the following schema for a Library Database:</p> <p>BOOK(Book_id, Title, Publisher_Name, Pub_Year) BOOK_AUTHORS(Book_id, Author_Name) PUBLISHER(Name, Address, Phone) BOOK_COPIES(Book_id, Branch_id, No-of_Copies) BOOK_LENDING(Book_id, Branch_id, Card_No, Date_Out, Due_Date) LIBRARY_BRANCH(Branch_id, Branch_Name, Address)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> 1. Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each branch, etc. 2. Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017. 3. Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation. 4. Partition the BOOK table based on year of publication. Demonstrate its working with a simple query. 5. Create a view of all books and its number of copies that are currently available in the Library.
2	Consider the following schema for Order Database:

	<p>SALESMAN(Salesman_id, Name, City, Commission) CUSTOMER(Customer_id, Cust_Name, City, Grade, Salesman_id) ORDERS(Ord_No, Purchase_Amt, Ord_Date, Customer_id, Salesman_id)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> Count the customers with grades above Bangalore's average. Find the name and numbers of all salesman who had more than one customer. List all the salesman and indicate those who have and don't have customers in their cities (Use UNION operation.) Create a view that finds the salesman who has the customer with the highest order of a day. Demonstrate the DELETE operation by removing salesman with id 1000. All his orders must also be deleted.
3	<p>Consider the schema for Movie Database:</p> <p>ACTOR(Act_id, Act_Name, Act_Gender) DIRECTOR(Dir_id, Dir_Name, Dir_Phone) MOVIES(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id) MOVIE_CAST(Act_id, Mov_id, Role) RATING(Mov_id, Rev_Stars)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> List the titles of all movies directed by 'Hitchcock'. Find the movie names where one or more actors acted in two or more movies. List all actors who acted in a movie before 2000 and also in a movie after 2015 (use JOIN operation). Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title. Update rating of all movies directed by 'Steven Spielberg' to 5.
4	<p>Consider the schema for College Database:</p> <p>STUDENT(USN, SName, Address, Phone, Gender) SEMSEC(SSID, Sem, Sec) CLASS(USN, SSID) SUBJECT(Subcode, Title, Sem, Credits) IAMARKS(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)</p> <p>Write SQL queries to</p> <ol style="list-style-type: none"> List all the student details studying in fourth semester 'C' section. Compute the total number of male and female students in each semester and in each section. Create a view of Test1 marks of student USN '1BI17CS101' in all subjects. Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students. Categorize students based on the following criterion: <ul style="list-style-type: none"> If FinalIA = 17 to 20 then CAT = 'Outstanding' If FinalIA = 12 to 16 then CAT = 'Average' If FinalIA < 12 then CAT = 'Weak' <p>Give these details only for 8th semester A, B, and C section students.</p>
5	<p>Consider the schema for Company Database:</p>

EMPLOYEE(SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
 DEPARTMENT(DNo, DName, MgrSSN, MgrStartDate)
 DLOCATION(DNo,DLoc)
 PROJECT(PNo, PName, PLocation, DNo)
 WORKS_ON(SSN, PNo, Hours)

Write SQL queries to

1. Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
2. Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise.
3. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department
4. Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
5. For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000.

Part B: Mini project

6	For any problem selected, write the ER Diagram, apply ER-mapping rules, normalize the relations, and follow the application development process.
7	Make sure that the application should have five or more tables, at least one trigger and one stored procedure, using suitable frontend tool.
8	Indicative areas include; health care, education, industry, transport, supply chain,etc.

Practical/Oral/Presentation:

Practical/Oral/Presentation shall be conducted and assessed jointly by internal and external examiners. The performance in the Practical/Oral/Presentation examination shall be assessed by at least a pair of examiners appointed as examiners by the University. The examiners will prepare the mark/grade sheet in the format as specified by the University.

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester –V
Course: Operating System Lab	Course Code: CS507P
Practical : 3 Hrs/Week	Max. University Practical Examination: 25 Marks
	Term Work : 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

1.	Write a C program to simulate the following non-preemptive CPU scheduling algorithms to find turnaround time and waiting time. a) FCFS b) SJF c) Round Robin (pre-emptive) d) Priority
2.	Write a C program to simulate multi-level queue scheduling algorithm considering the following scenario. All the processes in the system are divided into two categories – system processes and user processes. System processes are to be given higher priority than user processes. Use FCFS scheduling for the processes in each queue.
3.	Write a C program to simulate the following file allocation strategies. a) Sequential b) Indexed c) Linked
4.	Write a C program to simulate the MVT and MFT memory management techniques.
5.	*Write a C program to simulate the following contiguous memory allocation techniques a) Worst-fit b) Best-fit c) First-fit
6.	Write a C program to simulate paging technique of memory management.
7.	Write a C program to simulate the following file organization techniques a) Single level directory b) Two level directory c) Hierarchical
8.	Write a C program to simulate Bankers algorithm for the purpose of deadlock avoidance.
9	Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN
10	Write a C program to simulate page replacement algorithms a) FIFO b) LRU c) LFU
11	Write a C program to simulate page replacement algorithms a) Optimal
12	Write a C program to simulate producer-consumer problem using semaphores.
13	Write a C program to simulate the concept of Dining-Philosophers problem.

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School: Engineering & Technology	Programme: B.Tech (Computer Science & Engg.)
Year: Third Year	Semester –V
Course: Data Communication & Computer Network Lab	Course Code: CS508P
Practical : 3 Hrs/Week	Max. University Practical Examination: 25Marks
	Term Work : 25 Marks
Max. Time for Exam.: 3 Hrs	Credit: 1

Practical Objectives :

1	To demonstrate the network analysis system and to observe how it works on real based application.
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S. No.	Name of The Experiment
1.	To study different types of transmission media.
2.	To study quadrature phase shift keying modulation.
3.	Study & analysis of QAM modulation.
4.	To study serial interface RS– 232.
5.	To study pc to pc communication using parallel port.
6.	To study LAN using star topology.
7.	To study LAN using bus topology.
8.	To study LAN using tree topology.
9.	To study configure modem of computer
10.	To configure hub/switch.
11.	To study interconnections of cables for data communication.
12.	To study fiber optic communication.
13.	To study wireless communication.
14.	To study pc-pc communication using LAN.