RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Computer Science and Engineering V-Semester

CS-5001 Data Communication

RATIONALE: The purpose of this subject is to cover the underlying concepts and techniques used in Data communication. In this subject, various principles, standards for communication over different type of Communication Media are discussed.

PREREQUISITE :- The students should have general idea about the analog and digital communication.

UNIT :- I

Data Communication: Introduction, Components, data representation, data flow and basic model , Serial & Parallel transmission , Modes of data transmission, Encoding: Unipolar, Polar, Bipolar, Line & Block codes. Data compression: Lossy & Lossless techniques. Review of analog & digital transmission methods.

UNIT:-2

Multiplexing: Introduction & History, FDM, TDM, WDM, Synchronous & Statistical TDM. Spread spectrum: Frequency Hopping & Direct Sequence. Terminal handling & Polling. Network Switching Techniques: Circuit, Message, Packet & Hybrid. X.25, ISDN.

UNIT:-3

Physical Layer: Introduction, Interface, Standards, EIA-232-D, RJ-45, RJ-11, BNC connector & EIA-449 digital Interface: Connection, specifications & configuration. Modem: Types, features, signal constellation, block schematic. Connecting Devices: Active and Passive Hubs, Repeaters, Bridges, Two & Three layer switches & Gateway. Network Topologies and their comparative study.

UNIT:-4

Transmission Media: Transmission line characteristics, distortions, Crosstalk. Guided Media: Twisted Pair, Baseband & Broadband Coaxial, Fiber Optic Cable. Unguided media: Electromagnetic polarization , Rays and waves front , Electromagnetic spectrum, Radiation & Propagation of Waves, Inverse square law , Wave attenuation and absorption, Terrestrial Propagation, Skip distance , Radio waves, Microwave , Infrared & Satellite Communication system . Telephone Network: Components, LATAs, signaling and Services, Digital Subscriber Line: ADSL, HDSL, SDSL, VDSL, Cable TV network for data transfer.

UNIT:-5

Transmission Errors : Content Error , Flow integrity error , Error detection ,Error correction , Bit error rate. Error detection & Correction methods: Parity checking, Checksum Error Detection, Cyclic Redundancy Check , Hamming Distance , Interleaved codes , Block Parity , Convolution code, Hardware Implementation, Checksum .

Suggested Text Books:

1. Gupta Prakash C. "Data communication", PHI Learning

2. Forouzan, "Data communication and Networking", 5e, TATA Mc Graw

3. Godbole A., "Data Communication & Network" , TMH

4. Miller, " Data Network and Communication", Cengage Delmar Learning

5. Stallings William, "Data & Computer Communication", Pearson Education

Suggested Reference Books:

1. Tanenbum A.S. "Computer Network", Pearson Education.

2. Kennedy G., "Communication Systems" MGH

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Computer Science and Engineering V-Semester

CS-5002 (Operating System)

RATIONALE: The purpose of this subject is to cover the underlying concepts Operating System .This syllabus provides a comprehensive introduction of Operating System, Process Management, Memory Management, File Management and I/O management.

PREREQUISITE:- The students should have general idea about Operating System Concept, types of Operating System and their functionality.

Unit I

Introduction to System Programs & Operating Systems, Evolution of Operating System (mainframe, desktop, multiprocessor, Distributed, Network Operating System, Clustered & Handheld System), Operating system services, Operating system structure, System Call & System Boots, Operating system design & Implementations, System protection, Buffering & Spooling . Types of Operating System: Bare machine, Batch Processing, Real Time, Multitasking & Multiprogramming, time-sharing system.

Unit II

File: concepts, access methods, free space managements, allocation methods, directory systems, protection, organization ,sharing & implementation issues, Disk & Drum Scheduling, I/0 devices organization, I/0 devices organization, I/0 buffering, I/O Hardware, Kernel I/O subsystem, Transforming I/O request to hardware operations. Device Driver: Path managements, Sub module, Procedure, Scheduler, Handler, Interrupt Service Routine. File system in Linux & Windows

Unit III

Process: Concept, Process Control Blocks(PCB), Scheduling criteria Preemptive & non Preemptive process scheduling, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling, operations on processes, threads, inter process communication, precedence graphs, critical section problem, semaphores, classical problems of synchronization. Deadlock: Characterization, Methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Process Management in Linux.

Unit IV

Memory Hierarchy, Concepts of memory management, MFT & MVT, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation. Structure & implementation of Page table.Concepts of virtual memory, Cache Memory Organization, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation.

Unit V

Distributed operating system:-Types, Design issues, File system, Remote file access, RPC, RMI, Distributed Shared Memory(DSM), Basic Concept of Parallel Processing & Concurent Programming Security & threats protection: Security violation through Parameter, Computer Worms & Virus, Security Design Principle, Authentications, Protection Mechanisms. introduction to Sensor network and parallel operating system. Case study of Unix, Linux & Windows,

List of Experiment
1. Write a program to implement FCFS CPU scheduling algorithm.
2. Write a program to implement SJF CPU scheduling algorithm.
3. Write a program to implement Priority CPU Scheduling algorithm.
4. Write a program to implement Round Robin CPU scheduling algorithm.
5. Write a program to compare various CPU Scheduling Algorithms over different Scheduling Criteria.
6. Write a program to implement classical inter process communication problem(producer consumer).
7. Write a program to implement classical inter process communication problem(Reader Writers).
8. Write a program to implement classical inter process communication problem(Dining_Philosophers).
9. Write a program to implement & Compare various page replacement algorithm.
10. Write a program to implement & Compare various Disk & Drum scheduling Algorithms
11. Write a program to implement Banker's algorithms.
12. Write a program to implement Remote Proccedure Call(RPC).
13. Write a Devices Drivers for any Device or pheriperal.

Suggested Reading:

1.   Silberschatz ,"Operating system", Willey Pub.
2.   Dhamdhere, "Operating System",TMH.
3.   Tannanbaum, "Modern operating system",PHI Learning
4.   Achyut S Godbole,"Operating System", TMH.
5.   William stalling, "operating system" Pearson Edu.
6.   Deitel & Deitel, "Operating Systems", Pearson Edu.
7.   Haldar, "Operating System", Pearson Edu.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Computer Science and Engineering V-Semester

CS-5003 (Database Management System)

RATIONALE: The purpose of this subject is to cover the underlying concepts and techniques used increating a Data Base System. These techniques can be used in Software Developments.

PREREQUISITE: The students should have a general idea about data base concept, data models and SQL statements.

Unit I

DBMS Concepts and architecture Introduction, Database approach v/s Traditional file accessing approach, Advantages, of database systems, Data models, Schemas and instances, Data independence, Data Base Language and interfaces, Overall Database Structure, Functions of DBA and designer, ER data model:Entitles and attributes, Entity types, Defining the E-R diagram,Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables. Various other data models object oriented data Model, Network data model, and Relational data model, Comparison between the three types of models.

Unit II

Relational Data models: Domains, Tuples, Attributes, Relations, Characteristics of relations, Keys, Key attributes of relation, Relational database, Schemas, Integrity constraints. Referential integrity, Intension and Extension, Relational Query languages:SQL-DDL, DML, integrity constraints, Complex queries, various joins, indexing, triggers, ssertions,Relational algebra and relational calculus, Relational algebra operations like select, Project,Join, Division, outer union. Types of relational calculus i.e. Tuple oriented and domain oriented relational calculus and its operations.

Unit III

Data Base Design: Introduction to normalization, Normal forms, Functional dependency, Decomposition, Dependency preservation and losless join, problems with null valued and dangling tuples, multivalued dependencies.Query Optimization: Introduction, steps of optimization, various algorithms to implement select, project and join operations of relational algebra, optimization methods: heuristic based, cost estimation based.

Unit IV

Transaction Processing Concepts: - Transaction System, Testing of Serilizability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures. Log based recovery. Checkpoints deadlock handling. Concurrency Control Techniques: - Concurrency Control, locking Techniques for concurrency control, time stamping protocols for concurrency control, validation based protocol, multiple granularity. Multi version schemes, Recovery with concurrent transaction. Introduction to Distributed databases, data mining, data warehousing, Object Technology and DBMS, Comparative study of OODBMS Vs DBMS . Temporal, Deductive, Multimedia, Web & Mobile database.

Unit V

Study of Relational Database Management Systems through Oracle/Postgres SQL/MySQL: Architecture, physical files, memory structures, background process. Concept of table spaces, segments, extents and block. Dedicated server, multi threaded server. Distributed database, database links, and snapshot. Data dictionary, dynamic performance view.Security, role management, privilege management, profiles, invoker defined security model. SQL queries, Data extraction from single, multiple tables equi-join, non equi-join, self-join, outer join. Usage of like, any, all, exists, in Special operators. Hierarchical queries, inline queries, flashback queries. Introduction of ANSI SQL, anonymous block, nested anonymous block, branching and looping constructs in ANSI SQL. Cursor management: nested and parameterized cursors, Oracle exception handling mechanism. Stored procedures, in, out, in out type parameters, usage of parameters in procedures. User defined functions their limitations. Triggers, mutating errors, instead of triggers.

Suggested list of experiments: -
Lab Assignments:
1. Delete duplicate row from the table.
2. Display the alternate row from table.
3. Delete alternate row from table.
4. Update multiple rows in using single update statement.
5. Find the third highest paid and third lowest paid salary.
6. Display the 3rd, 4th, 9th rows from table.
7. Display the ename, which is start with j, k, l or m.
8. Show all employees who were hired the first half of the month.
9. Display the three record in the first row and two records in the second row and one record in the third row in a single sql statements.
10. Write a sql statements for rollback commit and save points.
11. Write a pl/sql for select, insert, update and delete statements.
12. Write a pl/sql block to delete a record. If delete operation is successful return 1 else return 0.
13. Display name, hire date of all employees using cursors.
14. Display details of first 5 highly paid employees using cursors.
15. Write a database trigger which fires if you try to insert, update, or delete after 7'o' clock.

16. Write a data base trigger, which acts just like primary key and does not allow duplicate values.

17. Create a data base trigger, which performs the action of the on delete cascade.

18. Write a data base trigger, which should not delete from emp table if the day is Sunday.

19. In this subject the students are supposed to prepare a small database application in complete semester like financial accounting system, Railway reservation system, institute timetable management system. Student record system, library management system, hospital management system etc. in RDBMS as follows:

Section A: Solving the case studies using ER datamodel (design of the database)

Section B: Implement a miniproject for the problem taken in section A.

Suggested Reading:-

1. Date C J, "An Introduction To Database System", Pearson Educations

2. Korth, Silbertz, Sudarshan, "Fundamental of Database System", McGraw Hill

3. Rob, " Data Base System:Design Implementation & Management", Cengage Learninig

4. Elmasri, Navathe, "Fundamentals Of Database Systems", Pearson Educations

5 . Atul Kahate , " Introduction to Database Management System", Pearson Educations

6. Oracle 9i Database Administration Fundamental-I, Volume I, Oracle Press, TMH.

7. Paneerselvam,"DataBase Management System", PHI Learning

8.Sanjeev Sharma, Jitendra Agarwal, Shikha Agarwal, "Advanced DBMS", Dreamtech Publication

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Credit Based Grading System

Computer Science and Engineering V-Semester

CS-5004 (Computer Graphics & Multimedia)

RATIONALE: The purpose of this subject is to introduce the concepts and techniques used in Computer Graphics ,Animations & Multimedia.

PREREQUISITE :- The students should have general idea about input/output devices and computing fundamentals. In addition, a familiarity with general mathematical transformations is required.

Unit-I

Introduction to Raster Scan displays, Pixels, Frame buffer, Vector & Character generation, Random Scan systems, Display devices, Scan Conversion techniques, Line Drawing: simple DDA, Bresenham's Algorithm, Circle Drawing Algorithms: Midpoint Circle drawing and Bresenham's Algorithm, Polygon fill algorithm: Boundary-fill and Flood-fill algorithms

Unit-II

2-D Transformation: Translation, Rotation, Scaling, Shearing, Reflection. Inverse Transformation, Homogenous coordinate system, Matrices Transformation, Composite Transformation. Windowing & Clipping: World Coordinate System, Screen Coordinate System, Viewing Transformation, Line Clipping & Polygon Clipping Algorithms.

Unit-III

3-D Transformations: Translation, Rotation and Scaling. Parallel & Perspective Projection: Types of Parallel & Perspective Projection, Hidden Surface elimination: Depth comparison, Back face detection algorithm, Painter's Algorithm, Z-Buffer Algorithm. Curve generation, Bezier and B-spline methods. Basic Illumination Model: Diffuse reflection, Specular reflection, Phong Shading, Gouraud shading, Ray Tracing, Color models like RGB, YIQ, CMY, HSV.

Unit-IV

Multimedia : Characteristics of a multimedia presentation , Uses of Multimedia, Text –Types, Unicode Standard ,text Compression, Text file formats, Audio Components of an audio system, Digital Audio, Digital Audio processing, Sound cards, Audio file formats ,Audio Processing software ,Video-Video color spaces,Digital Video, Digital Video processing, Video file formats.

Unit –V

Animation: Uses of Animation, Principles of Animation, Computer based animation, 3D Animation, Animation file formats, Animation softwares. Compression: Lossless/Lossy Compression techniques, Image, Audio & Video Compressions, MPEG Standards ,Multimedia Architecture, Multimedia databases

Recommended Text:

1. Rogers, "Procedural Elements of Computer Graphics", Tata McGraw Hill

2. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.

3. Parekh "Principles of Multimedia" Tata McGraw Hill

4. Maurya, "Computer Graphics with Virtual Reality System " , Wiley India

5. Pakhira,"Computer Graphics ,Multimedia & Animation",PHI learning

6. Andleigh, Thakral , "Multimedia System Design " PHI Learning

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

Credit Based Grading System

Computer Science and Engineering V-Semester

CS-5006 (Computer Programming V (Unix/Linux-Lab.))

RATIONALE: The purpose of this subject is to cover the concepts, Installation Process, Hardware Requirements and features of Unix/Linux. Basic Commands & Shell Programming.

PREREQUISITE : The students should have general Idea about computing fundamentals & operating system and at least one year of experience in programming .

Overview of Unix/Linux: - Concepts, Unix/Linux Installation Process, Hardware Requirements for Unix/Linux ,Advantages of Unix/Linux, Reasons for Popularity and Success of Linux/Unix Operating System, Features of Linux/Unix Operating System, Kernel, Kernel Functions, The Shell Basic Commands, Shell Programming:-Shell Variables, Branching Control Structures, Loop-Control Structure, Continue and break Statements, Sleep Command, Debugging Script. Use of Linux as web-server, file server, directory server, application server, DNS server, SMTP server, Firewall, Proxy server.

File System: - Definition of File System, Defining Geometry, Disk Controller, Solaris File System, Disk Based File Systems, Network-Based File Systems, Virtual File systems, UFS File System, The Boot Block, The Super Block, The Inode, Tuning File System, Repairing File System.
Process Control: - Viewing a Process, Command to display Process, Process Attributes, Process States, Process Fields, PS Commands options, PGREP, PRSTAT, CDE Process Manager, Scheduling Process, Scheduling Priorities, Changing the Priority of a time-sharing process, Killing Process.

System Security: - Physical Security, Controlling System Access, Restricted Shells Controlling File Access, File Access Commands, Access Control List(ACLs), Setting ACL Entries, Modifying ACL entries on a file, Deleting ACL entries on a file, Restricting FTP, Securing Super User Access, Restricting Root Access, Monitoring super user Access, TCP Wrappers.
Dynamic Host Configuration Protocol: - Introduction, DHCP Leased Time, DHCP Scopes, DHCP IP Address, Allocation Types, Planning DHCP Deployment, DHCP Configuration files, Automatic Startup of DHCP Server, Configuration of DHCP Clients, Manually Configuring the DHCP.

Case Study: -Installation of Linux, Customization of Linux, Installation of SAMBA, APACHE, TOMCAT, Send MAIL, Postfix, Implementation of DNS, LDAP services, Firewall, Proxy server.

List of Experiments:-

1. To Study basic & User status Unix/Linux Commands.
2. Study & use of commands for performing arithmetic operations with Unix/Linux.
3. Create a file called wlcc.txt with some lines and display how many lines, words and characters are present in that file.
4. Append ten more simple lines to the wlcc.txt file created above and split the appended file into 3 parts. What will be the names of these split files? Display the contents of each of these files. How many lines will be there on the last file?
5. Given two files each of which contains names of students. Create a program to display only those names that are found on both the files.
6. Create a program to find out the inode number of any desired file.
7. Study & use of the Command for changing file permissions.
8. Write a pipeline of commands, which displays on the monitor as well as saves the information about the number of users using the system at present on a file called usere.ux.
9. Execute shell commands through vi editor.
10. Installation, Configuration & Customizations of Unix/Linux.
11. Write a shell script that accepts any number of arguments and prints them in the reverse order.
12. Write a shell script to find the smallest of three numbers that are read from the keyboard.
13. Write a shell script that reports the logging in of a specified user within one minute after he/she logs in. The script automatically terminates if the specified user does not login during a specified period of time.
14. Installation of SAMBA, APACHE, TOMCAT.
15. Implementation of DNS, LDAP services,
16. Study & installation of Firewall & Proxy server

Suggested Reading:

1. Sumitab Das,"Unix Concept & Application",TMH
2. Forouzan, "Unix &Shell Programming", Cengage Learning
3. Venkatesh Murthy, "Introduction to Unix &Shell", Pearson Edu
4. Gopalan, Shivaselvan,"Beginners Guide to Unix " PHI Learning
5. Venkateshwavle,"Linux Programming Tools Unveil`ed", BS Publication.
6. Richard Peterson,"Linux Complete Reference",TMH
7. Richard Peterson,"Unix Complete Reference",TMH

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Credit Based Grading System

Computer Science and Engineering V-Semester

Elective-I CS-5005(1) Object Oriented Analysis and Design

Unit I:
Overview of Object Oriented concepts: Objects and classes, abstraction, generalization and inheritance, encapsulation, multiple inheritance, aggregation abstraction classes, polymorphism, link and association, Need for object oriented approach.

Unit II:
System design life cycle, object oriented S/W development process model, Object Oriented Analysis, Object Modeling Technique (OMT): object model, function model, relationship among models, object diagrams, state diagrams, data flow diagrams, analysis.

Unit III:
Object oriented Design: Overview of object design, Combination the models, Designing algorithms, design optimization, Implementation of control, Adjustment, Design of association, object representation, physical packaging, documenting design decision, comparison of use-case driven approach.

Unit IV:
Translation Object Oriented design into implementation, Programming style, documentation, characterization of object oriented languages, Comparison of object oriented language like C++, JAVA, object programming.

Unit V:
Unified Modeling Language (UML): Class diagram sequence diagram Use case diagram, Collaboration, diagram, state, chart diagram, Activity diagram, component diagram, deployment diagram, Object oriented Database: Relational Vs .object oriented database, the architecture of object oriented database, query language for Object Oriented database.

References:-
1. Satzinger, Jackson and Burd, "Object oriented Analysis and design with the Unified Process",CENGAGE Learning.
2. Michael Blaha and J. Rumbugh, "Object oriented Modeling and design with UML", Pearson Education
3. O'Docherty, "Object Oriented Analysis and Design Understanding, System Development with UML2.0", Wiley India.

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Credit Based Grading System

Computer Science and Engineering V-Semester

Elective-I CS-5005(2) Cyber Security

UNIT 1

Introduction of Cyber Crime, Challenges of cyber crime, Classifications of Cybercrimes: E-Mail Spoofing, Spamming, Internet Time Theft, Salami attack/Salami Technique,

UNIT 2

Web jacking, Online Frauds, Software Piracy, Computer Network Intrusions, Password Sniffing, Identity Theft, cyber terrorism, Virtual Crime, Perception of cyber criminals: hackers, insurgents and extremist group etc. Web servers were hacking, session hijacking.

UNIT 3

Cyber Crime and Criminal justice: Concept of Cyber Crime and the IT Act, 2000, Hacking, Teenage Web Vandals, Cyber Fraud and Cheating, Defamation, Harassment and E-mail Abuse, Other IT Act Offences, Monetary Penalties, jurisdiction and Cyber Crimes, Nature of Criminality, Strategies to tackle Cyber Crime and Trends.

UNIT 4

The Indian Evidence Act of 1872 v. Information Technology Act, 2000: Status of Electronic Records as Evidence, Proof and Management of Electronic Records; Relevancy, Admissibility and Probative Value of E-Evidence, Proving Digital Signatures, Proof of Electronic Agreements, Proving Electronic Messages.

UNIT 5

Tools and Methods in Cybercrime: Proxy Servers and Anonymizers, Password Cracking, Key loggers and Spyware, virus and worms, Trojan Horses, Backdoors, DoS and DDoS Attacks , Buffer and Overflow, Attack on Wireless Networks, Phishing : Method of Phishing, Phishing Techniques.

Suggested Books:
 1. Principles of Cyber crime, Jonathan Clough Cambridge University Press
2. John R. Vacca, Computer Forensics:Computer Crime Scene Investigation, 2nd Edition, Charles River Media, 2005
3. Cyber Law Simplified, VivekSood, Pub: TMH.
4. Cyber Security by Nina Godbole, SunitBelapure Pub: Wiley-India
5. Information Warfare: Corporate attack and defense in digital world, William Hutchinson, Mathew Warren, Elsevier.
6. Cyber Laws and IT Protection, Harish Chander, Pub:PHI.

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Credit Based Grading System

Computer Science and Engineering V-Semester

ELECTIVE-I CS-5005(3) ARTIFICIAL INTELLIGENCE

Unit I

Meaning and definition of artificial intelligence, various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.

Unit II

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.

Unit III

Probabistic reasoning, Baye's theorem, semantic networks scripts schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

Unit IV

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.

Unit V

Introduction to learning, Various techniques used in learning, introduction to neural networks, applications of neural networks, common sense, reasoning, some example of expert systems.

References:

- Rich E and Knight K, Artificial Intelligence, TMH, New Delhi.
- Nelsson N.J., Principles of Artificial Intelligence, Springer Verlag, Berlin.
- Waterman D.A., A guide to Expert System, Addison Wesley, Reading (Mars).
- Giarratand & Riley, Expert Systems: Principles and Programming, Thomson.