PEOPLE'S UNIVERSITY, BHOPAL

PROGRAMME: M Tech (Cyber Security)   SEM: I

Subject Title	Subject Code
Advanced Operating System & Linux	MTCY 101

Unit	Contents *(Theory)*
I	**Operating System:** Definition, Operating System as Resource Manager. Types of Operating Systems: Simple Batch Processing, Multi-programmed Batch Processing, Time Sharing, Personal Computer systems, Parallel, Distributed and Real Time Operating Systems. Operating System Components, Services, Calls, System Programs, Operating System Structure, Virtual Machines, System Design and Implementation. **Process Management:** Concepts, Scheduling, Operations, Co-operating processes, Inter-process Communication. Threads: Thread usage, threads in User Space, threads in Kernel, Hybrid Implementation, Scheduler Activation, Pop-up threads, Multithreading
II	**CPU Scheduling:** Basic Concepts, Scheduling Criteria, Algorithms, Multiple-processor Scheduling, Real Time Scheduling, Algorithm Evaluation. **Process Synchronization:** Critical Section Problem, Synchronization Hardware, Semaphores, Classical Problem of synchronization, Critical Regions, Monitors. Deadlock: Characteristics, Necessary Conditions, Prevention, Avoidance, Detection and Recovery.
III	**Memory Management:** Logical and Physical Address Space, Swapping. Contiguous Allocation: Single partitioned, Multi-partitioned. Non-contiguous Allocation: Paging, Segmentation, and Segmentation with Paging. Virtual Memory: Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation. **File and Directory System:** File Concepts, Access Methods, Directory Structure, Protection, File system Structure, Allocation Methods, Free Space Management, Directory Implementation, Recovery
IV	**Linux:** Linux, History, Difference Between Linux and Windows, Difference Between Linux and Unix , GNU, Usage, Career Options, Interesting Facts about Linux, Why Linux is Virus proof?, Various Linux Distributions, Pros & Cons, Root, Who/why/what is root, Basic commands : mkdir, touch, ls, pwd, cd, chmod, df, du,dd, adduser, sort, passwd, rm/rmdir, date, tar, gzip , Editors: types of editor
V	**Understanding Files and Directories in Linux:** File Structure and hierarchy, File Permissions, LVM overview LVM (Logical Volume Manager), Volume groups, Physical and logical volumes, Resizing LVs etc , Software Installation In Linux: RPM, make

References:
1. Silberschatz and Galvin, "Operating System Concepts", Addison-Wesley publishing, Co.,1999.
2. A. S. Tanenbaum, "Modern Operating Systems", Pearson Education.
3. H.M. Dietel, "An Introduction to Operating System", Pearson Education.
4. D. M. Dhamdhere, "Operating Systems – A Concept Based Approach", Tata McGraw-Hill
5. M. Singhal, N. G. Shivaratri, "Advanced Concepts in Operating Systems", Tata McGraw

CHAIRMAN
BOARD OF STUDIES (ENGINEERING)

Registrar

DEAN

PEOPLE'S UNIVERSITY, BHOPAL

PROGRAMME: M Tech (Cyber Security)   SEM: I

Subject Title	Subject Code
Advanced Data Structures And Algorithms	MTCS 102

Unit	Contents *(Theory)*
I	**INTRODUCTION to DATA STRUCTURES & ALGORITHMS** Introduction to Data Structures, Classification of Data Structures, Introduction to Arrays, Addressing in Arrays, Trees, Types, Traversal Schemes, Stack, Multistack, Queue, Classification, Linked Lists, Types, Graphs, Traversal Schemes and their Applications and Operation, Introduction to Algorithms and Problem Solving
II	**Introduction to Analysis & Design of Algorithms** Introduction to Analysis of Algorithms, Priori and Posteriori Analysis, Introduction to Algorithmic Complexity, Space and Time Complexity, Introduction to Asymptotic Notations, Introduction to Algorithmic Design Techniques, Divide & Conquer Technique, Linear Search, Binary Search, Introduction to Sorting, Bubble Sort, Merge Sort, Quick Sort, Introduction to Greedy Strategy, Spanning Trees, Kruskal's and Prim's Algorithm, Knapsack Problem, Huffman Coding and Shortest Path Algorithm
III	**Introduction to Design Techniques** Introduction to Dynamic Programming, 0/1 Knapsack Problem, Multistage Graphs, Reliability Design Problem, Introduction to Backtracking, 8 Queen's Problem, Hamiltonian Cycle Problem, Graph Coloring Problem, Introduction to Branch & Bound Technique, Traveling Salesman Problem, 15 Puzzle Problem and Introduction to Lower Bound Theory
IV	**Introduction to Complexity Classes** Introduction to Complexity Classes, P, NP, NP Hard, NP Complete, Polynomial Time Reducibility, Introduction to Randomized Algorithms, its Applications, Introduction to Geometric Algorithms, its Applications, Introduction to Graph Algorithms and its Applications, Introduction to Parallel Algorithms and Approximation Algorithms
V	**Introduction to Programming** Introduction to Programming, Programming Languages, Classification of Programming Languages, Object Oriented Programming, Study of OOP Languages like C++, C# and Java, Introduction to Dynamic Memory Allocation and Garbage Collection

References:

1. Fundamentals of Computer Algorithms by Sartaj Sahni, Galgotia Publications
2. Design & Analysis of Computer Algorithms by Aho, Hopcroft & Ullman, Addison Wesley Publishing Company
3. Introduction to Algorithms by Coreman, Liecerson, Rivest & Stein, PHI
4. Data Structures & Algorithms by Seymour Lipshutz, Tata McGraw Publications
5. Object Oriented Programming with C++ by E Balagurusamy, Tata McGraw Hill Publications
6. Computer Algorithms by Horowitz Sahni, Rajasekaran, Galgotia Publication
7. Data Structures using C & C++ by Tanenbaum A.S, Langram Y, Augestien M.J, Prentice Hall of India
8. Data Structures and Algorithm Analysis in C++ by Mark Allen Weiss, Pearson Education.
9. Data Structures and Algorithms by Aho Hopcroft Ullman, Pearson Education
10. Data structures and Algorithms in C++ by Michael T.Goodrich, R.Tamassia and Mount, Wiley and Sons.

CHAIRMAN   Registrar   DEAN
BOARD OF STUDIES (ENGINEERING)   People's University   FACULTY OF ENGINEERING

PEOPLE'S UNIVERSITY, BHOPAL

PROGRAMME: **M Tech (Cyber Security)**   SEM: I

Subject Title	Subject Code
Advanced Computer Network	MTCY 103

Unit	Contents *(Theory)*
I	**Introduction:** Introduction to Network models-ISO-OSI, and TCP/IP models. Review of Physical layer and Data link layers, Review of LAN (IEEE 802.3, 802.5, 802.11b/a/g, FDDI) and WAN (Frame Relay, ATM, ISDN) standards.
II	**Network layer** Internet architecture and addressing, internetworking, IPv4, ICMP, Routing Protocols- RIP, OSPF, BGP, IP over ATM. IPv6, Next Generation IP protocol, Wireless Networks, GSM, CDMA, Mobility in networks, Mobile IP, Mobile IP multicasting, BSD Sockets.
III	**Transport layer** Design issues, Connection management, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Finite state machine model. TCP extensions for high speed network, TCP/IP programming
IV	**Application layer** Application Layer, File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application, Example Networks - Internet and Public Networks.
V	**Network Security** IP Security, Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management, Web Security: Secure socket layer and transport layer security, secure electronic transaction (SET), System Security: Intruders, Viruses and related threads, firewall design principals, trusted systems, Study of various network simulators, Network performance analysis using NS2

References:

1. Networks for Computer Scientists and Engineers by Youlu Zheng / Shakil Akhtar, , Oxford University Press
2. TCP/IP Protocol Suite by Forouzan, Tata McGraw Hill.
3. High Performance Communication Networks by Walrand & Varaiya,Elsevier
4. Network Analysis, Architecture & Design by James D. McCabe, Elsevier India
5. Computer Networks by Andrew S. Tanenbaum, PHI
6. Network Security: PRIVATE Communication in a PUBLIC World by Charlie Kaufman, Radia Perlman, Mike Speciner, Prentice Hall India.
7. Network Security Essentials:- Applications and Standards byWilliam Stallings, Pearson Education.
8. Top-Down Network Design by Priscilla Oppenheimer, Pearson Education India
9. Effective TCP/IP Programming by Snader J.,Addison-Wesley Publication

CHAIRMAN
BOARD OF STUDIES (ENGINEERING)
PEOPLE'S UNIVERSITY, BHOPAL

Registrar
People's University
Bhopal (M.P.)

DEAN
FACULTY OF ENGINEERING
PEOPLE'S UNIVERSITY, BHOPAL

PEOPLE'S UNIVERSITY, BHOPAL

PROGRAMME: M Tech (Cyber Security)   SEM: I

Subject Title	Subject Code
Secure Software Engineering	MTCY 104

Unit	Contents (Theory)
I	**Introduction to Software Engineering:** Software Engineering Processes, Project Management concept, Project Effort estimation, LOC and function point based estimates, Requirement Analysis and Specifications, Formal Requirements, Specifications, Socio-technical Systems, Dependability, Critical Systems Specification, Formal Specification. Analysis Modeling, Elements of Analysis Model.
II	**Design Concepts and Principles:** Fundamental issues in Software Design, Effective Modular Design, cohesion and coupling. Architectural Design, Distributed Systems Architecture, Application Architectures, Real-time Systems, User Interface Design, Component Level Design, Modeling Language(UML)
III	**Software Development Methodologies:** Iterative Software Development, Software Reuse, CBSE, Critical Systems Development Software Evolution. Verification and Validation, Software Testing, Software Testing Principles, Alternative Paradigms: Extreme Programming, Agile Software Engineering, Principles behind Agile method, Agile method and Project Management.
IV	**Object Oriented Software Engineering:** Software Process Improvement, Software Economics, Software Quality, Software Metrics, Software Maintenance, Risk management, Requirement Engineering, Object oriented concepts and principles, OO Analysis, OO Design, OO Testing
V	**Advanced Software Engineering Process:** Formal Methods, Basic concepts, Mathematical Preliminaries, Clean room Software Engineering, Component Based Software Engineering, Client/Server Software Engineering, Web Engineering, Reengineering

References:

1. Software Engineering, Ian Sommerville, 8th Edition, Addison-Wesley,2006.
2. Software Engineering: A Practitioner's Approach, 6/e, Roger S Pressman,McGraw Hill, 2005.
3. K.K Aggarwal & Yogesh Singh," Software Engineering", 3rd Edition, New Age International, 2007

Registrar
People's University
Bhopal (M.P.)

CHAIRMAN
BOARD OF STUDIES (ENGINEERING)

DEAN
FACULTY OF ENGINEERING
PEOPLE'S UNIVERSITY, BHOPAL

PEOPLE'S UNIVERSITY, BHOPAL

PROGRAMME: M Tech (Cyber Security)   SEM: I

Subject Title	Subject Code
Advance Digital Computer Organization	MTCY 105

Unit	Contents *(Theory)*
I	**Introduction to Computer Systems Organization :** Components of a Computer System (Processor, Memory, Input /Output), The Von Neuman Model, The system bus Model, Levels of abstraction, Introduction to number systems, Number systems conversion, Representation of binary numbers, Binary arithmetic.
II	*Analysis and Design of Combinational Logic*: Truth tables Canonical forms and switching equations, Simplification approaches .Examples: decoders, encoder, multiplexers, adders, etc. Memory devices (Flip-flops, registers etc.), State Machine Notation, State transition table, Synchronous Sequential Circuits ,Design of Random Access Memory, ROM, PROM and EPROM
III	**Instruction Set Architecture:** Overview of the ISA abstraction, Data types, Instruction formats, Addressing Modes, Instruction types. **Introduction to Assembly Language:** Programming with Assembly language ,The assembly process ,Linking and loading, Register-level debugging, Case study: Intel 80386
IV	**Memory Subsystem:** Semiconductor memories, Memory cells - SRAM and DRAM cells, Internal Organization of a memory chip, Organization of a memory unit, Error correction memories, Interleaved memories, Cache memory unit - Concept of cache memory, Mapping methods, Organization of a cache memory unit, Fetch and write mechanisms, Memory management unit - Concept of virtual memory, Address
V	**Input/output Subsystem:** Access of I/O devices, I/O ports, I/O control mechanisms - Program controlled I/O Interrupt controlled I/O and DMA controlled I/O I/O interfaces Program controlled I/O, Interrupt controlled I/O, and DMA controlled I/O, I/O interfaces- Serial port, Parallel port, PCI bus, SCSI bus, USB bus, Firewall and Infiniband, I/O peripherals - Input devices, Output devices, Secondary storage devices

References:
1. C. Hamacher, Z. Vranesic and S. Zaky, "Computer Organization", McGrawHill, 2002.
2. W. Stallings, "Computer Organization and Architecture - Designing for Performance", Prentice Hall of India, 2002.
3. D. A. Patterson and J. L. Hennessy, "Computer Organization and Design- The Hardware/Software Interface", Morgan Kaufmann,1998.
4. J .P. Hayes, "Computer Architecture and Organization", McGraw-Hill, 1998.

CHAIRMAN
BOARD OF STUDIES (ENGINEERING)

Registrar
People's University
Bhopal (M.P.)

DEAN
FACULTY OF ENGINEERING

PEOPLE'S UNIVERSITY, BHOPAL

Subject Title	Subject Code
LAB-1	MTCY 106

Set -1

1. Study of Compiler and its Phases
2. Implementation of Machine Op-Code Table, Symbol Table and Pseudo Op- Code table using First Pass Assembler.
3. Implementation of Machine Op- code table using Two pass Assembler.
4. Implementation of Macro Name Table, Macro definition Table and Argument List Array during Pass One of Two Pass Macro.
5. Study of Lexical Analyzer.
6. Implementation of FCFS, SJF & Round Robin CPU Scheduling Algorithms
7. Implementation of Banker's Algorithm
8. Implementation of FIFO, LRU and Optimal Page Replacement Algorithms
9. Introduction to Linux operating system and its commands
10. Write a script using case to perform basic mathematical operations

Set -2

1. Write a program to Implement Multidimensional Array.
2. Write a program to Implement Multistack.
3. Write a program to Implement Priority Queue.
4. Write a program to Implement Huffman code Algorithm.
5. Write a program to Implement Merge Sort Algorithm.
6. Write a program to Implement Quick Sort Algorithm.
7. Write a program to implement minimum spanning trees using Kruskal's algorithm.
8. Write a program to implement minimum spanning trees using Prim's algorithm.
9. Write a program for traveling salesman problem.
10. Write a program to Implement Dynamic Memory Allocation

References:

1. Systems Programming and Operating systems by Dhamdhere ,TMH
2. Distributed operating system by Sinha , PHI
3. Modern Operating System by Tanenbaum, PHI Learning.
4. Fundamentals of Computer Algorithms by Sartaj Sahni, Galgotia Publications
5. Design & Analysis of Computer Algorithms by Aho, Hopcroft & Ullman, Addison Wesley Publishing Company
6. Introduction to Algorithms by Coreman, Liecerson, Rivest & Stein, PHI
7. Data Structures & Algorithms by Seymour Lipshutz, Tata McGraw Publications

Registrar
People's University
Bhopal (M.P.)

CHAIRMAN
BOARD OF STUDIES (ENGINEERING)
PEOPLE'S UNIVERSITY, BHOPAL

DEAN
FACULTY OF ENGINEERING
PEOPLE'S UNIVERSITY, BHOPAL.

PEOPLE'S UNIVERSITY, BHOPAL

Subject Title	Subject Code
LAB -II	MTCS 107

Set -1

1. Study of different types of Network cables
2. Study of Network Devices in Details
3. Study of Network IP
4. Study of basic network command and network configuration commands
5. Study of TCP/UDP Performance
6. Study the working of BGP and formation of BGP Routing table.
7. Study how the number of channels increases and the Call blocking probability decreases as the bandwidth of a GSM network is increased.
8. Study the effect of different Routing protocols (RIP and OSPF) on network's performance through simulation
9. Study the effect of Peak Cell Rate (per Sec) and Cell Delay Variation Tolerance on the performance of an ATM Networks.
10. Understand and write a program to find the Shortest Path using Distance Vector Routing.

Set -2

1. Studying various phases of Water-Fall Model.
2. Using COCOMO model estimate effort for Banking or On line book store domain Problem.
3. To perform the function oriented diagram: DFD and Structured chart
4. To perform the user's view analysis: Use case diagram
5. To draw the structural view diagram: Class diagram, object diagram
6. To draw the behavioral view diagram: Sequence diagram, Collaboration diagram
7. To draw the behavioral view diagram: State-chart diagram, Activity diagram
8. To draw the implementation view diagram: Component diagram.
9. To draw the implementation view diagram: deployment diagram
10. To perform various techniques for testing using manual Testing

References:

1. Networks for Computer Scientists and Engineers by Youlu Zheng / Shakil Akhtar, , Oxford University Press
2. TCP/IP Protocol Suite by Forouzan, Tata McGraw Hill.
3. High Performance Communication Networks by Walrand & Varaiya,Elsevier
4. Network Analysis, Architecture & Design by James D. McCabe, Elsevier India
5. Computer Networks by Andrew S. Tanenbaum, PHI
6. Software Engineering, Ian Sommerville, 8th Edition, Addison-Wesley,2006.
7. 2. Software Engineering: A Practitioner's Approach, 6/e, Roger S Pressman,McGraw Hill, 2005.
8. 3. K.K Aggarwal & Yogesh Singh," Software Engineering", 3rd Edition, New Age
9. International, 2007

CHAIRMAN

Registrar
People's University
Bhopal (M.P.)

DEAN