DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Computer Organisation & Architecture	**IT 501**	**3**	**1**	**0**	**4**

UNIT I

INTRODUCTION TO COMPUTER ARCHITECTURE AND ORGANIZATION: Defining computer architecture and computer organization, classes of computers, basic structure of computers, Operational concepts, performance and Amdhal's law.

UNIT II

ARITHMATIC AND LOGIC UNIT:

Microperations and their RTL specifications, Adder/Subtractor, Shifter, Multiplication and division circuits, Arithmatic logic shift unit.

Arithmetic addition & Subtraction of Signed and unsigned numbers-algorithm and hardware, Multiplication and division of Signed and unsigned numbers-algorithm and hardware, IEEE754 representation of Floating Point Numbers & Operations.

UNIT III

CONTROL AND PROCESSOR UNIT:

Control Unit: Machine instructions, Execution of a complete Instruction, Multiple Bus organization, Hardwired control, Micro-programmed control.

Processor Unit: Components, organization types, addressing modes, Instruction types, Concept of sub-routine and sub-routine call. Use of stack.

UNIT IV

I/O AND MEMORY UNIT:

I/O Unit:Synchronous vs. Asynchronous I/O, I/O techniques - interrupts, polling, DMA, IOP

Memory unit: Memory organization, Types of memories and performance considerations, organization of memory modules, associative memory, cache memory and related mapping and replacement policies, virtual memory.

UNIT V

INTRODUCTION TO PIPELINING: Concepts, Basic pipelining, Hazards.

Books Recommended:

1. "*Computer Organization and Architecture*" by Smruti R. Sarangi.
2. "*Computer Organization and Embedded Systems*" by Carl Hamachar, Z. Vranesic, s. Zaky, and N. Manjikian.
3. "*Computer System Architecture*" by M. Mano

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Database Management Systems	**IT 502**	**3**	**1**	**0**	**4**

UNIT I
INTRODUCTION:
Introduction to database management, data abstraction and system structure, Purpose of database system , uses of database approach, database applications, Views of data, Database languages, Database system – Concepts and architecture, Database users and administrator, database types.

UNIT II
DATA MODELLING:
Data models definition and types, Entity- Relationship Model (E-R Model), E-R diagrams, entity set, relationship sets, mapping, cardinalities. Introduction to relational databases, The relational model - Keys, Relational algebra – Domain relational calculus – Tuple relational calculus – Fundamental operations – Additional operations – SQL fundamentals, Views, Introduction to distributed databases and client/server databases.

UNIT III
DATABASE DESIGN:
Relational database design, Functional dependencies, Non-loss decomposition, First, Second, Third Normal Forms – Dependency Preservation – Boyce/Codd Normal Form, Multi-Valued Dependencies and higher normal Forms.

UNIT IV
TRANSACTIONS:
Transaction Concepts, Transaction Recovery, ACID Properties, System Recovery, Media recovery, Two phase commit, Save points, SQL facilities for recovery, Concurrency, Need for concurrency, Locking protocols - Two phase locking, Intent locking, Deadlock, Serializability, Recovery isolation levels, SQL facilities for concurrency**.**

UNIT V
IMPLEMENTATION TECHNIQUES:
Overview of physical storage media – Magnetic disks, Tertiary storage, File organization – Organization of records in files, Indexing and hashing, ordered indices, B trees index files, Static hashing, dynamic hashing, RAID organization and levels. Data warehouse and data mining- basic concepts and overview.

Text Books:

1. R. and Navathe, S.B., “Fundamentals of Database Systems”, Pearson Education.

Reference Books:

1. Abraham, H. and Sudershan, S., “Database System Concepts”,McGraw-Hill.Elmasri.
2. Ramakrishnan, R. and Gekhre, J., “Database Management Systems”, McGraw-Hill.

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Database Management Systems Lab	**IT 503 P**	**0**	**0**	**2**	**1**

List Of Experiments:

1. Creation of a database and writing SQL queries to retrieve information from the database.
2. Performing Insertion, Deletion, Modifying, Altering, Updating and Viewing records based on conditions.
3. Creation of Views for different users.
4. Creating an Employee database to set various constraints.
5. Creating relationship between the databases.
6. Study of PL/SQL block.
7. Creation of Procedures.
8. Creation of database triggers, cursors and functions.
9. Mini project (Application Development using Oracle/ Mysql/DB2)
    a) Inventory Control System.
    b) Material Requirement Processing.
    c) Hospital Management System.
    d) Railway Reservation System.
    e) Personal Information System.
    f) Web Based User Identification System.
    g) Timetable Management System.
    h) Hotel Management System

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Operating System	**IT 505**	**3**	**0**	**0**	**3**

UNIT I
INTRODUCTION:
Computer System Overview-Basic Elements, Instruction Execution, Operating system functions and structure, Interrupts, Memory Hierarchy, Cache Memory, Direct Memory Access, Multiprocessor and Multicore Organization. Operating system overview-objectives and functions, Evolution of Operating System, Distributed OS.

UNIT II
PROCESS MANAGEMENT AND COORDINATION:
Process concept, Process States, Process Description and Process Control, Interprocess Communication, Processes and Threads, Types of Threads, Multicore and Multithreading,

UNIT IV
MEMORY MANAGEMENT:
Memory management requirements, Partitioning, Paging and Segmentation, Virtual memory - Hardware and control structures, operating system software, Linux memory management, Windows memory management. Virtual memory management.

UNIT III
CONCURRENCY AND SCHEDULING:
Principles of Concurrency - Mutual Exclusion, Semaphores, Monitors, Readers/Writers problem. Deadlocks – prevention- avoidance – detection, Scheduling- Types of Scheduling – Scheduling algorithms.

UNIT V
INPUT/OUTPUT AND FILE SYSTEMS:
I/O management and disk scheduling – I/O devices, organization of I/O functions; OS design issues, I/O buffering, disk scheduling, Disk cache. File management – Organization, Directories, File sharing, and Record blocking, secondary storage management.

Text Books:

1. Silberschatz, Peter Galvin, Greg gagne "Operating System Principles".
2. William Stallings, "Operating Systems – internals and design principles", Prentice Hall.

Reference Books:

1. Andrew S. Tannenbaum & Albert S. Woodhull, "Operating System Design and Implementation", Prentice Hall.
2. Andrew S. Tannenbaum, "Modern Operating Systems", Prentice Hall.
3. Gary J.Nutt, "Operating Systems", Pearson/Addison Wesley.
4. Pramod Chandra P.Bhatt, "An Introduction to Operating Systems Concepts and Practice".

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Operating System Lab	**IT 506 P**	**0**	**0**	**2**	**1**

List Of Experiments:

1. To familiarize the students with the Operating Systems.
2. Introduction and use of basic Linux commands.
3. To demonstrate the process, memory, file and directory management modules under the Linux/Windows operating systems
4. To introduce Linux basic commands
5. To demonstrate use of Window APIs.
6. Write programs using the following system calls of UNIX operating system:
   Fork, exec, getpid, exit, wait, close, stat, opendir, readdir
7. Write programs to implement Thread management using pthread library.
8. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for FCFS and SJF. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
9. Given the list of processes, their CPU burst times and arrival times, display/print the Gantt chart for Priority and Round robin. For each of the scheduling policies, compute and print the average waiting time and average turnaround time.
10. Write programs to simulate and analyze page replacement algorithms with respect to various parameters. Implement the Producer Consumer problem using semaphores.
11. Implement the deadlock free solution to Dining Philosophers problem to illustrate the problem of deadlock and/or starvation that can occur when many synchronized threads are competing for limited resources.
12. Linux Kernel configuration, compilation and rebooting from the newly compiled kernel. Get a Linux kernel source code from www.kernel.org ,Menu based configuration of Linux kernel using menuconfig/xconfig/gconfig, Creating a monolithic compressed image of a kernel , Compilation of kernel modules, Installation of kernel modules , Finalize installation

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Microprocessor	**IT 507**	**3**	**0**	**0**	**3**

UNIT I
MICROPROCESSOR-BASED SYSTEMS: HARDWARE AND INTERFACING:

Microprocessors, Microcomputers, and Assembly Language, Introduction to 8085 Assembly Language Programming, Microprocessor Architecture and Microcomputer Systems, 8085 Microprocessor Architecture and Memory Interfacing Interfacing I/O Devices

UNIT II
PROGRAMMING THE 8085:

Introduction to 8085 Instructions, Programming Techniques with Additional Instructions, Counters and Time Delays, Stack and Subroutines, Code Conversion, BCD Arithmetic, and 16-Bit Data Operations, Software Development, Assemblers, and IDE

UNIT III
INTERFACING PERIPHERALS (I/OS) AND APPLICATIONS:

Interrupts, Interfacing Data Converters, Programmable Interface Devices: 8155 I/O and Timers: 8279 Keyboard / Display Interface, General Purpose Programmable Peripheral Devices, Serial I/O and Data Communication, Microprocessor Applications, Trends in Microprocessor Technology

UNIT IV
MICROPROCESSOR 8086:
Pin diagram, Architecture, Addressing Modes, Timing diagram, Instruction Set, Programming Techniques, Interrupt, Assembler Directives, Memory & I/O mapping

Text Books:

1. Ramesh S.Goankar, Microprocessor Architecture, Programming and Applications with the 8085.

Reference Books:

1. Douglas .V Hall, Microprocessor & Interfacing, Tata McGraw Hill
2. Rafiquzzuman .M, Microprocessor theory & Applications, Prentice Hall of India
3. Yuchenhiu, Glenn A Gibson, Microprocessor Systems - 8086/8088 Family, Prentice Hall of India

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Microprocessor Lab	**CSE 508 P**	**0**	**0**	**2**	**1**

List of Experiments:

i) To develop a program to add two double byte numbers.
ii) To develop a subroutine to add two floating point quantities.
iii) To develop program to multiply two single byte unsigned numbers, giving a 16 bit product.
iv) To develop subroutine which will multiply two positive floating points numbers?
v) To write program to evaluate P* Q*+R* & S are 8 bit binary numbers.
vi) To write a program to divide a 4 byte number by another 4 byte number.
vii) To write a program to divide an 8 bit number by another 8 bit number upto a fractional quotient of 16 bit.
viii) Write a program for adding first N natural numbers and store the results in memory location X.
ix) Write a program which decrements a hex number stored in register C. The Program should half when the program register reads zero.
x) Write a program to introduce a time delay of 100 ms using this program as subroutine display numbers from 01H to OAH with the above calculated time delay between every two numbers.
xi) N hex numbers are stored at consecutive memory locations starting from X. Find the largest number and store it at location Y.
xii) Interface a display circuit with the microprocessor either directly with the bus or by using I/O ports. Write a programme by which the data stored in a RAM table is displayed.
xiii) To design and interface a circuit to read data from an A/D converter, using the 8255 A in the memory mapped I/O.
xiv) To design and interface a circuit to convert digital data into analog signal using the 8255 A in the memory mapped I/O.
xv) To interface a keyboard with the microprocessor using 8279 chip and transfer the output to the printer.
xvi) To design a circuit to interface a memory chip with microprocessor with given memory map.

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Data Communication	**IT 509**	**3**	**0**	**0**	**3**

UNIT I - DATA COMMUNICATION NETWORK:
Data communication concept, Basic concept of network, Types of networks (LAN, MAN and WAN), Different network topologies like star, ring, hybrid, tree. Network models (OSI and TCP/IP).

UNIT II - TRANSMISSION MEDIA:
Guided and unguided media, twisted wire pair, co-axial cable, optical fibre, microwave links, satellite microwave link, their characteristic features and applications for data transmission.

UNIT III - DATA AND SIGNALS:
Data, Signals, Types of Signals, Bandwidth, spectrum, transmission impairments, Shanon capacity.

UNIT IV - DIGITAL TRANSMISSION TECHNIQUES:
Digital-to digital conversions: NRZ, RZ, Biphase, Manchester coding, AMI. Analog-to-digital conversions: Nyquist sampling theorem, quantization, Pulse code modulation, Delta modulation.

UNIT V - ANALOG TRANSMISSION TECHNIQUES:
Digital-to-analog conversion: ASK, FSK, PSK, QAM. Signal constellation. Analog-to-analog conversion: amplitude modulation, frequency modulation, phase modulation.

UNIT VI - BANDWIDTH UTILIZATION TECHNIQUES:
Frequency Division Multiplexing, Time Division Multiplexing, Wavelength division Multiplexing, Spread Spectrum.

UNIT VII - ERROR DETECTION AND CORRECTION:
Errors in data communication: Types of errors, error detection and correction techniques, simple parity check, computation of CRC, Checksum, Hamming code.

Recommended Books:

1. William Stallings: Data & Computer Communications, PHI.
2. Andrew Tanenbaum, “Computer Networks” PHI
3. Sklar, “Digital Communications fundamentals & Applications”.
4. Keizer, “ Local Area Networks” McGraw Hill

DEPARTMENT OF INFORMATION TECHNOLOGY
NATIONAL INSTIUTE OF TECHNOLOGY SRINAGAR

Course	Code	L	T	P	Credits
Data Communication Lab	**IT 510 P**	**0**	**0**	**2**	**1**

List Of Experiments:

1. Study of Sampling theorem for Bandlimited signals.
2. Study of PCM and Delta modulation signal coding techniques.
3. Study and generation of various digital modulation techniques like FSK, PSK, Differential PSK, Quadrature PSK.
4. Study and generation of different line coding signal formats like NRZ, RZ, Bipolar RZ, AMI, Manchester coding and HDB3.
5. Study and implementation of error detection and correction techniques like Polynomial code for error detection and Hamming code for error correction.
6. Study and implementation of FDM, TDM and CDMA techniques.