ANNA UNIVERSITY, CHENNAI
AFFILIATED INSTITUTIONS
R-2008
B.TECH. INFORMATION TECHNOLOGY
II - VIII SEMESTERS CURRICULA AND SYLLABI

SEMESTER IV

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

Code No.	Course Title	L	T	P	C
THEORY					
MA 2262	Probability and **Queueing** Theory	3	1	0	4
CS 2255	Database Management Systems	3	0	0	3
CS2252	Microprocessors **and** Microcontrollers	3	0	0	3
CS 2253	Computer Organization and Architecture	**3**	**0**	**0**	**3**
CS 2254	Operating Systems	3	0	0	3
IT 2251	Software Engineering and Quality Assurance	3	0	0	3
PRACTICAL					
CS 2258	Database Management Systems Lab	0	0	3	2
CS 2257	Operating System Lab	0	0	3	2
CS 2259	Microprocessors Lab	0	0	3	2
	TOTAL	**18**	**1**	**9**	**25**

MA2262 **PROBABILITY AND QUEUEING THEORY** **L T P C**

(Common to CSE & IT) **3 1 0 4**

AIM

The probabilistic models are employed in countless applications in all areas of science and engineering. Queuing theory provides models for a number of situations that arise in real life. The course aims at providing necessary mathematical support and confidence to tackle real life problems.

OBJECTIVES

At the end of the course, the students would

- Have a well – founded knowledge of standard distributions which can describe real life phenomena.
- Acquire skills in handling situations involving more than one random variable and functions of random variables.
- Understand and characterize phenomena which evolve with respect to time in a probabilistic manner.
- Be exposed to basic characteristic features of a queuing system and acquire skills in analyzing queuing models.

UNIT I RANDOM VARIABLES 9+3

Discrete and continuous random variables - Moments - Moment generating functions and their properties. Binomial, Poisson ,Geometric ,Negative binomial, Uniform, Exponential, Gamma, and Weibull distributions .

UNIT II TWO DIMENSIONAL RANDOM VARIABLES 9+3

Joint distributions - Marginal and conditional distributions – Covariance - Correlation and regression - Transformation of random variables - Central limit theorem.

UNIT III MARKOV PROCESSES AND MARKOV CHAINS 9+3

Classification - Stationary process - Markov process - Markov chains - Transition probabilities - Limiting distributions-Poisson process

UNIT IV QUEUEING THEORY 9+3

Markovian models – Birth and Death Queuing models- Steady state results: Single and multiple server queuing models- queues with finite waiting rooms- Finite source models- Little's Formula

UNIT V NON-MARKOVIAN QUEUES AND QUEUE NETWORKS 9+3

M/G/1 queue- Pollaczek- Khintchine formula, series queues- open and closed networks

TUTORIAL 15 TOTAL : 60 PERIODS

TEXT BOOKS

1. O.C. Ibe, "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Indian Reprint, 2007 (For units 1, 2 and 3).
2. D. Gross and C.M. Harris, "Fundamentals of Queueing Theory", Wiley Student edition, 2004 (For units 4 and 5).

REFERENCES:
1. A.O. Allen, "Probability, Statistics and Queueing Theory with Computer Applications", Elsevier, 2nd edition, 2005.
2. H.A. Taha, "Operations Research", Pearson Education, Asia, 8th edition, 2007.
3. K.S. Trivedi, "Probability and Statistics with Reliability, Queueing and Computer Science Applications", John Wiley and Sons, 2nd edition, 2002.

CS 2255 DATABASE MANAGEMENT SYSTEMS L T P C
(Common to CSE & IT) **3 0 0 3**

UNIT I INTRODUCTION 9

Purpose of Database System -– Views of data – Data Models – Database Languages –– Database System Architecture – Database users and Administrator – Entity–Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases

UNIT II RELATIONAL MODEL 9

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals - Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

UNIT III DATABASE DESIGN 9

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form- Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT IV TRANSACTIONS 9

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 9

Overview of Physical Storage Media – Magnetic Disks – RAID – Tertiary storage – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing – Query Processing Overview – Catalog Information for Cost Estimation – Selection Operation – Sorting – Join Operation – Database Tuning.

TOTAL: 45 PERIODS

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006 (Unit I and Unit-V) .
2. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.(Unit II, III and IV)

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, FourthEdition , Pearson / Addision wesley, 2007.
2. Raghu Ramakrishnan, “Database Management Systems”, Third Edition, McGraw Hill, 200UNIT III
3. S.K.Singh, “Database Systems Concepts, Design and Applications”, First Edition, Pearson Education, 2006.

CS 2252 MICROPROCESSORS AND MICROCONTROLLERS L T P C
(Common to CSE & IT) **3 0 0 3**

UNIT I THE 8085 AND 8086 MICROPROCESSORS 9

8085 Microprocessor architecture-Addressing modes- Instruction set-Programming the 8085

UNIT II SOFTWARE ASPECTS 9

Intel 8086 microprocessor - Architecture - Signals- Instruction Set-Addressing Modes-Assembler Directives- Assembly Language Programming-Procedures-Macros-Interrupts And Interrupt Service Routines-BIOS function calls.

UNIT III MULTIPROCESSOR CONFIGURATIONS 9

Coprocessor Configuration – Closely Coupled Configuration – Loosely Coupled Configuration –8087 Numeric Data Processor – Data Types – Architecture –8089 I/O Processor –Architecture –Communication between CPU and IOP.

UNIT IV I/O INTERFACING 9

Memory interfacing and I/O interfacing with 8085 – parallel communication interface – serial communication interface – timer-keyboard/display controller – interrupt controller – DMA controller (8237) – applications – stepper motor – temperature control.

UNIT V MICROCONTROLLERS 9

Architecture of 8051 Microcontroller – signals – I/O ports – memory – counters and timers – serial data I/O – interrupts- Interfacing -keyboard, LCD,ADC & DAC

TOTAL: 45 PERIODS

TEXT BOOKS

1. Ramesh S. Gaonkar ,”Microprocessor – Architecture, Programming and Applications with the 8085” Penram International Publisher , 5th Ed.,2006
2. Yn-cheng Liu,Glenn A.Gibson, “Microcomputer systems: The 8086 / 8088 Family architecture, Programming and Design”, second edition, Prentice Hall of India , 2006
3. Kenneth J.Ayala, ’The 8051 microcontroller Architecture, Programming and applications‘ second edition ,Penram international.

REFERENCES

1. Douglas V.Hall, " Microprocessors and Interfacing : Programming and Hardware", second edition , Tata Mc Graw Hill ,2006.
2. A.K.Ray & K.M Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Tata Mc Graw Hill , 2006.
3. Peter Abel, " IBM PC Assembly language and programming" , fifth edition, Pearson education / Prentice Hall of India Pvt.Ltd,2007.
4. Mohamed Ali Mazidi,Janice Gillispie Mazidi," The 8051 microcontroller and embedded systems using Assembly and C",second edition, Pearson education /Prentice hall of India , 2007.

CS 2253 COMPUTER ORGANIZATION AND ARCHITECTURE L T P C
(Common to CSE & IT) **3 0 0 3**

UNIT I BASIC STRUCTURE OF COMPUTERS 9

Functional units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Hardware – Software Interface – Instruction set architecture – Addressing modes – RISC – CISC. ALU design – Fixed point and floating point operations.

UNIT II BASIC PROCESSING UNIT 9

Fundamental concepts – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

UNIT III PIPELINING 9

Basic concepts – Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

UNIT IV MEMORY SYSTEM 9

Basic concepts – Semiconductor RAM – ROM – Speed – Size and cost – Cache memories – Improving cache performance – Virtual memory – Memory management requirements – Associative memories – Secondary storage devices.

UNIT V I/O ORGANIZATION 9

Accessing I/O devices – Programmed Input/Output -Interrupts – Direct Memory Access – Buses – Interface circuits – Standard I/O Interfaces (PCI, SCSI, USB), I/O devices and processors.

TOTAL:45PERIODS

TEXT BOOK

1. Carl Hamacher, Zvonko Vranesic and Safwat Zaky, "Computer Organization", Fifth Edition, Tata McGraw Hill, 2002.

REFERENCES

1. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software interface”, Third Edition, Elsevier, 2005.
2. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Sixth Edition, Pearson Education, 200UNIT III
3. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998.
4. V.P. Heuring, H.F. Jordan, “Computer Systems Design and Architecture”, Second Edition, Pearson Education, 2004.

CS 2254 OPERATING SYSTEMS L T P C

(Common to CSE & IT) **3 0 0 3**

AIM

To learn the various aspects of operating systems such as process management, memory management, and I/O management

UNIT I PROCESSES AND THREADS 9

Introduction to operating systems – review of computer organization – operating system structures – system calls – system programs – system structure – virtual machines. Processes: Process concept – Process scheduling – Operations on processes – Cooperating processes – Interprocess communication – Communication in client-server systems. Case study: IPC in Linux. Threads: Multi-threading models – Threading issues. Case Study: Pthreads library

UNIT II PROCESS SCHEDULING AND SYNCHRONIZATION 10

CPU Scheduling: Scheduling criteria – Scheduling algorithms – Multiple-processor scheduling – Real time scheduling – Algorithm Evaluation. Case study: Process scheduling in Linux. Process Synchronization: The critical-section problem – Synchronization hardware – Semaphores – Classic problems of synchronization – critical regions – Monitors. Deadlock: System model – Deadlock characterization – Methods for handling deadlocks – Deadlock prevention – Deadlock avoidance – Deadlock detection – Recovery from deadlock.

UNIT III STORAGE MANAGEMENT 9

Memory Management: Background – Swapping – Contiguous memory allocation – Paging – Segmentation – Segmentation with paging. Virtual Memory: Background – Demand paging – Process creation – Page replacement – Allocation of frames – Thrashing. Case Study: Memory management in Linux

UNIT IV FILE SYSTEMS 9

File-System Interface: File concept – Access methods – Directory structure – File-system mounting – Protection. File-System Implementation : Directory implementation – Allocation methods – Free-space management – efficiency and performance – recovery – log-structured file systems. Case studies: File system in Linux – file system in Windows XP

UNIT V I/O SYSTEMS 8

I/O Systems – I/O Hardware – Application I/O interface – kernel I/O subsystem – streams – performance. Mass-Storage Structure: Disk scheduling – Disk management – Swap-space management – RAID – disk attachment – stable storage – tertiary storage. Case study: I/O in Linux

TOTAL: 45 PERIODS

TEXT BOOK

1. Silberschatz, Galvin, and Gagne, "Operating System Concepts", Sixth Edition, Wiley India Pvt Ltd, 200UNIT III

REFERENCES

1. Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Pearson Education / PHI 2001.
2. Gary Nutt, "Operating Systems", Third Edition, Pearson Education, 2004.
3. Harvey M. Deital, "Operating Systems", Third Edition, Pearson Education, 2004.

IT 2251 SOFTWARE ENGINEERING AND QUALITY ASSURANCE L T P C
3 0 0 3

UNIT I SOFTWARE PRODUCT AND PROCESS 9

Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering Overview – Product Engineering Overview.

UNIT II SOFTWARE REQUIREMENTS 9

Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioral Models – Structured Analysis and Data Dictionary.

UNIT III ANALYSIS, DESIGN CONCEPTS AND PRINCIPLES 9

Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.

UNIT IV TESTING 9

Taxonomy Of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques

UNIT V SOFTWARE QUALITY ASSURANCE 9

Process and Product Quality – Quality Assurance and Standards – Quality Planning and Control – Software metrics – Process Improvement – Software configuration Management.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Ian Sommerville, "Software engineering", Seventh Edition, Pearson Education Asia, 2007.
2. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Sixth Edition, McGraw-Hill International Edition, 2005.

REFERENCES:

1. Watts S.Humphrey,"A Discipline for Software Engineering", Pearson Education, 2007.
2. James F.Peters and Witold Pedrycz,"Software Engineering, An Engineering Approach", Wiley-India, 2007.
3. Stephen R.Schach, " Software Engineering", Tata McGraw-Hill Publishing Company Limited, 2007.
4. S.A.Kelkar,"Software Engineering", Prentice Hall of India Pvt, 2007.

CS 2258 DATA BASE MANAGEMENT SYSTEM LAB L T P C
(Common to CSE & IT) **0 0 3 2**

1. Data Definition, Table Creation, Constraints,
2. Insert, Select Commands, Update & Delete Commands.
3. Nested Queries & Join Queries
4. Views
5. High level programming language extensions (Control structures, Procedures and Functions).
6. Front end tools
7. Forms
8. Triggers
9. Menu Design
10. Reports.
11. Database Design and implementation (Mini Project).

LAB EQUIPMENTS

(Common to Information Technology & Computer Science Engineering)

Hardware and Software required for a batch of 30 students:

Hardware:
30 Personal Computers

Software:
Front end : VB/VC ++/JAVA

Back end: Oracle 11g, my SQL, DB2

Platform: Windows 2000 Professional/XP

Oracle server could be loaded and can be connected from individual PCs.

CS 2257	OPERATING SYSTEMS LAB (Common to CSE & IT)	L T P C 0 0 3 2

(Implement the following on LINUX or other Unix like platform. Use C for high level language implementation)

1. Write programs using the following system calls of UNIX operating system: fork, exec, getpid, exit, wait, close, stat, opendir, readdir

2. Write programs using the I/O system calls of UNIX operating system (open, read, write, etc)

3. Write C programs to simulate UNIX commands like ls, grep, etc.

4. 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. (2 sessions)

5. 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. (2 sessions)

6. Developing Application using Inter Process communication (using shared memory, pipes or message queues)

7. Implement the Producer – Consumer problem using semaphores (using UNIX system calls).

8. Implement some memory management schemes – I

9. Implement some memory management schemes – II

10. Implement any file allocation technique (Linked, Indexed or Contiguous)

Example for exercises 8 & 9 :
Free space is maintained as a linked list of nodes with each node having the starting byte address and the ending byte address of a free block. Each memory request consists of the process-id and the amount of storage space required in bytes. Allocated memory space is again maintained as a linked list of nodes with each node having the process-id, starting byte address and the ending byte address of the allocated space. When a process finishes (taken as input) the appropriate node from the allocated list should be deleted and
this free disk space should be added to the free space list. [Care should be taken to merge contiguous free blocks into one single block. This results in deleting more than one node from the free space list and changing the start and end address in the appropriate node]. For allocation use first fit, worst fit and best fit.

TOTAL: 45PERIODS

Hardware and Software required for a batch of 30 students.

HARDWARE:

30 Personal Computers

SOFTWARE:

Linux:

- Ubuntu / OpenSUSE / Fedora / Red Hat / Debian / Mint OS

Linux could be loaded in individual PCs.

(OR)

A single server could be loaded with Linux and connected from the individual PCs.

CS2259	MICROPROCESSORS LABORATORY	L T P C
	(Common to CSE & IT)	0 0 3 2

AIM

- To learn the assembly language programming of 8085,8086 and 8051 and also to give a practical training of interfacing the peripheral devices with the processor.

OBJECTIVES

- To implement the assembly language programming of 8085,8086 and 8051.
- To study the system function calls like BIOS/DOS.
- To experiment the interface concepts of various peripheral device with the processor.

EXPERIMENTS IN THE FOLLOWING

1. Programming with 8085
2. Programming with 8086-experiments including BIOS/DOS calls:
   Keyboard control, Display, File Manipulation.
3. Interfacing with 8085/8086-8255,8253
4. Interfacing with 8085/8086-8279,8251
5. 8051 Microcontroller based experiments for Control Applications
6. Mini- Project

TOTAL: 45 PERIODS

List of equipments/components for 30 students (two per batch)

1. 8085 Trainer Kit with onboard 8255, 8253, 8279 and 8251 – 15 nos.
2. TASM/MASM simulator in PC (8086 programs) – 30 nos.
3. 8051 trainer kit – 15 nos.
4. Interfacing with 8086 – PC add-on cards with 8255, 8253, 8279 and 8251 – 15 nos.
5. Stepper motor interfacing module – 5 nos.
6. Traffic light controller interfacing module – 5 nos.
7. ADC, DAC interfacing module – 5 nos.
8. CRO's – 5 nos.