# ANNA UNIVERSITY, CHENNAI

### **AFFILIATED INSTITUTIONS**

# R - 2009

### CURRICULUM I SEMESTER (FULL TIME)

### M.TECH. INFORMATION TECHNOLOGY

#### SEMESTER I

SL. NO	COURSE CODE	COURSE TITLE	L	т	Р	С
THEORY						
1	MA9219	Operations Research	3	1	0	4
2	CS9212	Data Structures and algorithms	3	0	0	3
3	CS9211	Computer Architecture	3	0	0	3
4	CS9213	Computer Networks and Management	3	0	0	3
5	IT9211	Software Engineering	3	0	0	3
PRACTICAL						
6	CS9215	Data Structures Laboratory	0	0	3	2
7	CS9216	Networking Laboratory	0	0	3	2
		TOTAL	15	1	6	20

#### MA9219

#### **OPERATIONS RESEARCH**

#### LTPC 3104

UNIT I QUEUEING MODELS 12 Poisson Process – Markovian Queues – Single and Multi-server Models – Little's formula – Machine Interference Model – Steady State analysis – Self Service Queue.

#### UNIT II ADVANCED QUEUEING MODELS

Non- Markovian Queues – Pollaczek Khintchine Formula – Queues in Series – Open Queueing Networks –Closed Queueing networks.

#### UNIT III SIMULATION

Discrete Even Simulation - Monte - Carlo Simulation - Stochastic Simulation -Applications to Queueing systems.

#### UNIT IV LINEAR PROGRAMMING

Formulation – Graphical solution – Simplex method – Two phase method -Transportation and Assignment Problems.

#### UNIT V NON-LINEAR PROGRAMMING

Lagrange multipliers – Equality constraints – Inequality constraints – Kuhn – Tucker conditions – Quadratic Programming.

#### L + T: 45+15 =60 PERIODS

#### TEXT BOOKS:

- 1. Winston.W.L. "Operations Research", Fourth Edition, Thomson Brooks/Cole, 2003.
- 2. Taha, H.A. "Operations Research: An Introduction", Ninth Edition, Pearson Education Edition, Asia, New Delhi, 2002.

#### **REFERENCES:**

- 1. Robertazzi. T.G. "Computer Networks and Systems Queuing Theory and Performance Evaluation", Third Edition, Springer, 2002 Reprint.
- 2. Ross. S.M., "Probability Models for Computer Science", Academic Press, 2002.

#### CS9212 DATA STRUCTURES AND ALGORITHMS LTPC

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#### UNIT I **COMPLEXITY ANALYSIS & ELEMENTARY DATA STRUCTURES** Asymptotic notations – Properties of big on notation – asymptotic notation with several parameters – conditional asymptotic notation – amortized analysis – NP-completeness – NP-hard - recurrence equations - solving recurrence equations - arrays - linked lists trees.

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#### UNIT II HEAP STRUCTURES

Min-max heaps – Deaps – Leftist heaps –Binomial heaps – Fibonacci heaps – Skew heaps - Lazy-binomial heaps.

#### UNIT III SEARCH STRUCTURES

Binary search trees – AVL trees – 2-3 trees – 2-3-4 trees – Red-black trees – B-trees – splay trees – Tries.

#### UNIT IV GREEDY & DIVIDE AND CONQUER

Quicksort – Strassen's matrix multiplication – Convex hull - Tree-vertex splitting – Job sequencing with deadlines – Optimal storage on tapes

#### UNIT V DYNAMIC PROGRAMMING AND BACKTRACKING

Multistage graphs – 0/1 knapsack using dynamic programming – Flow shop scheduling – 8-queens problem – graph coloring – knapsack using backtracking

#### **TOTAL: 45 PERIODS**

#### **REFERENCES**:

- 1. E. Horowitz, S.Sahni and Dinesh Mehta, Fundamentals of Data structures in C++, Galgotia, 1999.
- 2. E. Horowitz, S.Sahni and S. Rajasekaran, Computer Algorithms / C++, Galgotia, 1999.
- 3. Adam Drozdex, Data Structures and algorithms in C++, Second Edition, Thomson learning vikas publishing house, 2001.
- 4. G. Brassard and P. Bratley, Algorithmics: Theory and Practice, Printice Hall, 1988.
- 5. Thomas H.Corman, Charles E.Leiserson, Ronald L. Rivest, "Introduction to Algorithms", Second Edition, PHI 2003.

### CS9211 COMPUTER ARCHITECTURE LTPC

3003

#### **UNIT I FUNDAMENTALS OF COMPUTER DESIGN AND PIPELINING** 9 Fundamentals of Computer Design – Measuring and reporting performance –

Quantitative principles of computer design. Instruction set principles – Classifying ISA – Design issues. Pipelining – Basic concepts – Hazards – Implementation – Multicycle operations.

#### UNIT II INSTRUCTION LEVEL PARALLELISM WITH DYNAMIC APPROACHES 9

Concepts – Dynamic Scheduling – Dynamic hardware prediction – Multiple issue – Hardware based speculation – Limitations of ILP – Case studies.

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# UNIT III INSTRUCTION LEVEL PARALLELISM WITH SOFTWARE APPROACHES

Compiler techniques for exposing ILP – Static branch prediction – VLIW – Advanced compiler support – Hardware support for exposing more parallelism – Hardware versus software speculation mechanisms – Case studies.

#### UNIT IV MULTIPROCESSORS AND MULTICORE ARCHITECTURES

Symmetric and distributed shared memory architectures – Performance issues – Synchronisation issues – Models of memory consistency – Software and hardware multithreading – SMT and CMP architectures – Design issues – Case studies.

#### UNIT V MEMORY AND I/O

Cache performance – Reducing cache miss penalty and miss rate – Reducing hit time – Main memory and performance – Memory technology. Types of storage devices – Buses – RAID – Reliability, availability and dependability – I/O performance measures – Designing an I/O system.

#### TOTAL:45 PERIODS

#### **REFERENCES:**

- 1. John L. Hennessey and David A. Patterson, "Computer Architecture A quantitative approach", Morgan Kaufmann / Elsevier, 4<sup>th</sup>. edition, 2007.
- 2. David E. Culler, Jaswinder Pal Singh, "Parallel Computing Architecture : A hardware/ software approach", Morgan Kaufmann / Elsevier, 1997.
- 3. William Stallings, " Computer Organization and Architecture Designing for Performance", Pearson Education, Seventh Edition, 2006.
- 4. Behrooz Parhami, "Computer Architecture", Oxford University Press, 2006.

#### CS9213 COMPUTER NETWORKS AND MANAGEMENT L T P C

#### UNIT I HIGH SPEED NETWORKS

Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet, Gigabit Ethernet, Fibre Channel – Wireless LAN's.

#### UNIT II CONGESTION AND TRAFFIC MANAGEMENT

Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control – Traffic Management – Congestion Control in Packet Switching Networks – Frame Relay Congestion Control.

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#### UNIT III TCP AND ATM CONGESTION CONTROL

TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM. Traffic and Congestion control in ATM – Requirements – Attributes – Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

#### UNIT IV INTEGRATED AND DIFFERENTIATED SERVICES

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services.

#### UNIT V PROTOCOLS FOR QoS SUPPORT

RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

#### TOTAL: 45 PERIODS

#### **TEXT BOOKS:**

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

#### **REFERENCES:**

- 1. Warland & Pravin Varaiya, "HIGH PERFORMANCE COMMUNICATION NETWORKS", Jean Harcourt Asia Pvt. Ltd., II Edition, 2001.
- 2 Irvan Pepelnjk, Jim Guichard and Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.

#### IT9211

#### SOFTWARE ENGINEERING

#### LTPC 3003

#### UNIT I

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Definition – systems approach – modeling the process and lifecycle – meaning of process – software process models – tools and techniques – practical process modeling – information systems – planning and managing the project – tracking project – project personnel – effort estimation – risk management – project plan – process models and project management

#### UNIT II

Capturing the requirements – requirements process – requirements elicitation – types – characteristics – modeling notations – specification languages – prototyping – documentation – validation and verification – measures – specification techniques – designing the system – decomposition and modularity – architectural styles and strategies – issues – characteristics – improvement techniques – design evaluation, validation – documentation

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#### UNIT III

Considering objects – object orientation – OO development – use cases – representing OO – OO system design – program design – OO measurement – writing programs – standards – procedures – guidelines – documentation – programming process

#### UNIT IV

Testing the program – faults – failures – issues – unit testing – Integration testing – testing OO systems – test planning – automated testing tools - testing the system – principles – function testing – performance testing – reliability, availability and maintainability – acceptance testing – installation testing – automated system testing – test documentation – testing safety critical systems – delivering the system – training – documentation

#### UNIT V

System maintenance – the changing system – nature of maintenance – problems – measuring maintenance characteristics – techniques and tools – software rejuvenation – evaluation approaches – selection – assessment vs. prediction - evaluating products, processes and resources – improving predictions, products, processes and resources – guidelines – decision making in software engineering – licensing – certification and ethics

#### **TOTAL:45 PERIODS**

#### TEXT BOOKS:

1. Shari Lawrence Pfleeger, Joanne M. Atlee, Software Engineering: Theory and Practice, Prentice Hall, 2006

#### **REFERENCES:**

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, Prentice Hall, 2002

#### TOTAL:45 PERIODS

# CS9215

### DATA STRUCTURES LABORATORY L T P C

0 0 3 2

- 1. Min Heap
- 2. Deaps
- 3. Leftist Heap
- 4. AVL Tree
- 5. B-Tree
- 6. Tries
- 7. Quick Sort
- 8. Convex hull
- 9. 0/1 Knapsack using Dynamic Programming
- 10. Graph coloring using backtracking

#### **TOTAL:45 PERIODS**

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CS9216

- 1. Socket Programming
  - a. TCP Socketsb. UDP Sockets

  - c. Applications using Sockets
- Simulation of Sliding Window Protocol
  Simulation of Routing Protocols
- 4. Development of applications such as DNS/ HTTP/ E mail/ Multi user Chat
- 5. Simulation of Network Management Protocols
- 6. Study of Network Simulator Packages such as opnet, ns2, etc.

#### **TOTAL:45 PERIODS**