BANGALORE UNIVERSITY

SYLLABUS : 2K11

(Seventh - Eighth Semester)

SCHEME OF STUDY AND EXAMINATIONS
FOR BE DEGREE COURSE IN

COMPUTER SCIENCE AND ENGINEERING

UNIVERSITY VISVESVARAYA COLLEGE OF ENGINEERING
K.R. CIRCLE, BANGALORE – 560 001

COMPUTER SCIENCE AND ENGINEERING

COMPUTER SCIENCE AND ENGINEERING

SEVENTH SEMESTER

Sl No	Code No.	Subject	No. of Hr. / week		Duration of Exams		Sessional Marks	Exam Marks	Total Marks
			Theory	Practical	Theory	Practical			
1.	2K11CS 71	Advanced Computer Architecture	04	--	03	--	25	100	125
2.	2K11CI 72	Soft Computing	04	--	03	--	25	100	125
3.	2K11CI 73	Cryptography and Network Security	04	--	03	--	25	100	125
4.	2K11CI 74	Elective – I	04	--	03	--	25	100	125
5.	2K11CIL 75	Networking Lab	--	03	--	03	25	100	125
6.	2K11CIL 76	Internet Programming Lab	--	03	--	03	25	100	125
7.	2K11CIL 77	Project Work (Preliminary)	--	03	--	--	50	--	50
Total			16	09	12	06	200	600	800

EIGHTH SEMESTER

Sl. No	Code No.	Subject	No. of Hr. / week		Duration of Exams		Sessional Marks	Exam Marks	Total Marks
			Theory	Practical	Theory	Practical			
1	2K11CI81	Compiler Design	04	--	03	--	25	100	125
2	2K11CI82	Distributed Operating Systems	04	--	03	--	25	100	125
3	2K11CS83	Mobile Computing	04	---	03	--	25	100	125
4	2K11CI84	Elective II	04		03	--	25	100	125
5	2K11CIL85	C# .NET Lab	--	03	--	03	50	100	150
6	2K11CIL86	Project Work	--	03	--	03	50	100	150
		Total	16	06	12	06	200	600	800

SEVENTH SEMESTER (ELECTIVE-I)

Sl. No	Code	Subject	No. of Hr. / week		Duration of Exams		Sessional Marks	Exam Marks	Total Marks
			Theory	Practical	Theory	Practical			
1.	2K11CS 74.1	Simulation & Modeling	04	--	03	--	25	100	125
2.	2K11CS 74.2	Virtual Reality and Multimedia Computing	04	--	03	--	25	100	125
3.	2K11CS 74.3	Optical Communication Networks	04	--	03	--	25	100	125

EIGHTH SEMESTER (ELECTIVE-II)

Sl. No	Code No.	Subject	No. of Hr. / week		Duration of Exams		Sessional Marks	Exam Marks	Total Marks
			Theory	Practical	Theory	Practical			
1	2K11CI84.1	Wireless Sensor Networks	04	---	03	--	25	100	125
2	2K11CI84.2	Storage Networks	04	---	03	--	25	100	125
3	2K11CS84.3	Embedded Systems	04	---	03	--	25	100	125
4	2K11CI84.4	Robotics	04	---	03	--	25	100	125

BE VII SEMESTER COMPUTER SCIENCE & ENGINEERING

2K11CS 71 : ADVANCED COMPUTER ARCHITECTURE

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1 : Parallel Computer Architecture **6 Hours**

The State of Computing, Computer Development Milestones, Elements of Modern Computers, Evolution of Computer Architecture.

Chapter 2 : Parallel Architecture Types **6 Hours**

System Attributes to Performance, Multiprocessors, Multivector and Architecture types SISD, SIMD, MISD and MIMD Computers.

Chapter 3 : Program and Network Properties **6 Hours**

Conditions of Parallelism, Program PART itioning and Scheduling, Program Flow Mechanisms, System Interconnect Architecture.

Chapter 4 : Processor and Memory Technologies **6 Hours**

Advanced Processor Technology, Superscalar and Vector Processor, Backplane Bus System, Shared Memory Organizations.

PART B

Chapter 5 : Pipelining and Superscalar Technologies **6 Hours**

Linear Pipeline Processors, Non Linear Pipeline Processors, Instruction Pipeline Design, Arithmetic Pipeline Design.

Chapter 6 : Multiprocessors and Multi Computers **6 Hours**

Multiprocessor System Interconnects, Cache Coherence and Synchronization Mechanisms, Message Passing Schemes.

Chapter 7 : Parallel Programs **6 Hours**

Parallel Application Case Studies, The Parallelization Process, Parallelization of an Example Program.

Chapter 8 : Scalable Multiprocessors **6 Hours**

Scalability, Realizing Programming Model.

References :

1. *Kai Hwang, Advanced Computer Architecture – Parallelism, Scalability, Programmability, McGraw Hill. 2005*
2. *David E Culler, J P Singh, Anoop Gupta, Parallel Computer Architecture, Harcoust Asia and Morgan Kaufmann, 1998.*
3. *John P Hayes, Computer Architecture and Organization, 3rd Edition, McGrawHill,1998*
4. *V Rajaraman, C Siva Ram Murthy, Parallel Computers – Architecture and Programming, PHI.*

2K11CI 72 : SOFT COMPUTING

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1: Introduction **6 Hours**

Neural Networks, Fuzzy Logic, Genetic Algorithms, Hybrid Systems.

Chapter 2: Artificial Neural Networks **6 Hours**

Fundamental Concepts, Basic Models of Artificial Neural Networks, Important Terminologies of ANN, McCulloch Pitts Neuron, Linear Separability, Hebb Network.

Chapter 3: Supervised Learning Network **6 Hours**

Perceptron Networks, Adaline, Multiple Adaptive Linear Neurons, Back Propagation Network, RBFs.

Chapter 4: Unsupervised Learning Networks **6 Hours**

Kohonen Self Organizing Feature Maps, Learning Vector Quantization, Counterpropagation Networks, ART.

PART B

Chapter 5: Fuzzy Sets and Fuzzy Relations **6 Hours**

Crisp Sets vs Fuzzy Sets, Operations and Properties, Classical Relation vs Fuzzy Relations, Tolerance and Equivalence Relations.

Chapter 6: Membership Functions, Fuzzy Arithmetic and Fuzzy Rules **6 Hours**

Features of the Membership Functions, Fuzzification, Methods of Membership Value Assignments, Defuzzyfication, Fuzzy Arithmetic, Fuzzy Measures, Truth Values and Tables in Fuzzy Logic.

Chapter 7: Genetic Algorithms **6 Hours**

Introduction, Basic Operators and Terminologies in GAs, Simple GA, The Schema Theorem, Classification of GAs.

Chapter 8: Applications of Softcomputing **6 Hours**

Applications, Image Processing, Optimization, Search Engines, Real Time Applications.

References :

1. *S N Sivanandam, S N Deepa, Principles of Soft Computing, Wiley India Edition.*
2. *Vojislav Kecmann, Learning and Soft Computing, Pearson Education*
3. *David E Goldberg, Genetic Algorithms in search,optimization and machine learning,1989*
4. *Andrea Tettamanzi,Marco Tomassini and J JanBen, Soft Computing, Springer, 2001*

2K11CI 73 :CRYPTOGRAPHY AND NETWORK SECURITY

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1: Introduction **6 Hours**

Overview : Services, Mechanisms and Attacks, The OSI Security Architecture, A Model of Network Security. Classical Encryption Techniques : Symmetric Cipher Model, Substitution Techniques, Transposition Techniques

Chapter 2: Symmetric Ciphers **6 Hours**

Block Cipher and the Data Encryption Standard : Block Cipher Principles, The DES, The Strength of DES, Differential and Linear Cryptanalysis. Confidentiality using Conventional Encryption : Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random Number Generation.

Chapter 3: Number theory **6 Hours**

Number Theory: Prime Numbers Format's and Euler's Theorems, Testing for Primality, Chinese Remainder theorem

Chapter 4: Public Key Encryption **6 Hours**

Public Key Cryptography and RSA : Principles of Public Key Cryptosystems, The RSA Algorithms, Key Management, Diffie Hellman Key Exchange, Elliptic curve cryptography.

PART B

Chapter 5: Authentication Protocols **8 Hours**

Message Authentication : Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash functions, Security of Hash functions and MACs, Secure Hash algorithms, Digital Signatures.

Chapter 6: Network Security **8 Hours**

Authentication Applications : Kerberos, X.509 Authentication Service, Pretty Good Privacy, S/MIME. IP Security : Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload. Web Security : Web Security considerations, Secure Sockets Layer and Transport Layer Security.

Chapter 7: System Security **8 Hours**

Intruders, Intrusion detection, Viruses and Related Threats, Counter Measures, Firewalls and its Design Principles.

References **:**

1. *William Stallings, Cryptography and Network Security, Fourth Edition, Pearson Education/PHI, 2009*
2. *Behrouz A. Forouzan: Cryptography and Network Security, Special Indian Edition, Tata McGraw-Hill,2007.*
3. *Atul Kahate, Cryptography and Network Security, TMH.*

2K11CIL 75 : NETWORKING LABORATORY

(Programming and Mini Project Laboratory)

Hours per Week : 3 Examination Marks : 100 Sessional Marks : 25

PART A

1. Write a Program to implement RSA algorithm.
2. Write a Program to find the shortest path in a network of 6 to 10 nodes.
3. Write a program for error detecting code using CRC-CCITT (16- bits).
4. Write a program for distance vector algorithm to find suitable path for transmission.
5. Using TCP/IP sockets, write a client – server program to make the client send the file name and to make the server send back the contents of the requested file if present.
6. Write a program for error detecting using Hamming Code.
7. Write a Program to implement sliding window protocol.
8. Write a program to implement FIFO-Client and FIFO-Server to transfer files.
9. Using UDP Sockets write client server program to transfer files.
10. Write a program to implement Diffie-Hellman key Exchange.
11. Write a program to implement Congestion Control using leaky bucket.
12. Write a Socket program to implement PING/ECHO.

PART B

(Simulation Exercises)

The following experiments shall be conducted using NS2 or any other suitable simulator.

1. Simulate a three nodes point – to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.

2. Simulate a FOUR node point-to-point network with the links connected as follows: n0 – n2, n1 – n2 and n2 – n3. Apply TCP agent between n0-n3 and UDP between n1-n3. Apply relevant applications over TCP and UDP agents changing the parameter and determine the number of packets sent by TCP / UDP.

3. Simulate the transmission of ping messages over a network topology consisting of 6 nodes and find the number of packets dropped due to congestion.

4. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source / destination.

5. Simulate an Ethernet LAN using n nodes (6-10), change error rate and data rate and compare throughput

Note:
The evaluation is based on execution of one program from PART A and one program from PART B.

2K11CIL 76 : INTERNET PROGRAMMING LABORATORY

(Programming and Mini Project Laboratory)

Hours per Week : 3 Examination Marks : 100 Sessional Marks : 25

PART A

Develop and execute the following programs using HTML and PHP. Create Database using MYSQL wherever necessary.

1. a) Program to display various Server Information like – Server Name, Server Software, Server protocol, CGI Revision etc.
   b) Program to accept UNIX command from a HTML form and to display the output of the command executed.
2. a) Program to accept the User Name and display a greeting message.
   b) Program to keep track of the number of visitors, visited the web page and display the counter with proper headings.
3. Program to display a greeting based on the access time of the Web server. Also to verify whether the webmaster is currently logged in.
4. Program to display a digital clock which displays the current time of the server.
5. Program to display the current contents of the table in a database.
6. Program to insert new name and age information entered by the user into the database.

7. Program to query the database and to display the result on a web page.
8. Program to accept book information viz. Accession number, title, authors, edition and publication from a web page and to store those in a database.
9. Program to search a book for a title given by the user on a web page and display the search results with proper headings.

Develop and execute the following programs using HTML and JAVA Servlets.

10. a) Program to accept user name and display a greeting message.
    b) Program to change the background color of the page based on the color selected by the user.
11. Program to display a greeting based on the access time of the server.
12. Program to create and display a cookie.
13. Program to create a session and display session information viz. session ID, creation time and last accessed.
14. Program to request server information viz. Request Method, URI, Protocol and Remote address.
15. Program to accept User name and address and display them in a web page by passing parameters.

PART B

The Student should Develop an integrated Mini project to demonstrate their skills in JAVA, CGI, PERL, HTML, XML, etc. based on Internet Applications.

Note :

The evaluation is based on Execution of any one program from PART A and demonstration of Mini Project. The student has to submit a report to the examiner.

2K11CIL 77 : PROJECT WORK (PRELIMINARY)
(Project Laboratory)

Hours per Week : 3 Sessional Marks : 50

The Student has to submit a Preliminary Project Report to the respective Guide in Connection with the Project Work that has to be carried out in Eighth Semester.

ELECTIVE – VII SEMESTER

2K11CS 74.1 : SIMULATION AND MODELING

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks : 25

PART A

Chapter 1: Introduction **4 Hours**

When Simulation is the Appropriate Tool; When Simulation is Not Appropriate; Advantages and Disadvantages of Simulation, Areas of Application, Systems and System Environment, Components of a System, Discrete and Continuous Systems, Model of a System, Types of Models, Discrete Event System Simulation, Steps in a Simulation Study.

Chapter 2: Simulation Examples **4 Hours**

Characteristics of Queuing Systems, Queuing Notation, Simulation of Queuing Systems, Simulation of Inventory Systems .

Chapter 3: General Principles **4 Hours**

Concepts in Discrete Event Simulation, The Event Scheduling/Time Advance Algorithm, World Views, Manual Simulation Using Event Scheduling.

Chapter 4: Probability Theory and Random Number Generation **8 Hours**

Introduction to Probability Theory, Random Variables and their Properties, Estimation of mean, variance and correlations, confidence intervals, Hypothesis tests for Mean, Properties of Random Numbers, Generation of Pseudo Random Numbers, Techniques for Generating Random Numbers, Tests for Random Numbers.

Chapter 5: Random Variate Generation **4 Hours**

Inverse Transform Technique, Exponential Distribution, Uniform Distribution, Discrete Distributions, Acceptance Rejection Technique, Poisson Distribution, Gamma Distribution.

PART B

Chapter 6: Input Modeling **6 Hours**

Data Collection, Identifying the Distribution with Data, Parameter Estimation, Goodness of Fit Tests, Selecting Input Models without Data, Multivariate and Time Series Input Models.

Chapter 7: Verification and Validation of Models **6 Hours**

Model Building, Verification and Validation, Verification of Simulation Models, Calibration and Validation of Models.

Chapter 8: Output Analysis for a Single Model **6 Hours**

Types of Simulations with respect to Output analysis. Stochastic nature of output data, Measures of Performance and their estimation, Output analysis of terminating simulations, Output analysis for Steady State Simulations.

Chapter 9: GPSS and SIMSCRIPT **6 Hours**

General Descriptions, Facilities, Storages, Queues, Transfer Blocks, Control Statements, Variables, Logic Switches, Boolean Variables, Functions Concept of User Chains, Facility Pre emption, Matching, Introduction to SIMSCRIPT and Some Simple Program using Simscript.

References :

1. *Jerry Banks, John S Carson, Barry L Nelson, David M Nicol, Discrete Event System Simulation, Third Edition, Pearson Education/PHI, India.*
2. *Averill M Law, W David Kelton, "Simulation Modeling and Analysis", Third Edition, McGraw Hill.*
3. *Geoffery Gordon, System Simulation, Second Edition, PHI.*

2K11CS 74.2 : VIRTUAL REALITY AND MULTIMEDIA COMPUTING

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1: Computer Graphics, Color Displays, Simulation of Virtual Reality **6 Hours**

Multimedia : Audio, Video, Data Compression, Different Techniques like JPEG and MPEG Standard, Video on Demand, Video Servers, Distributed Network OS for Multimedia.

Chapter 2: Enabling Technologies **6 Hours**

Delivery of Multimedia, Historical Context, Multimedia, Production Technology, Interactivity, Social and Ethical Considerations, New Medium, Digital Representations, Hardware Requirements, Software Networks, Standards.

Chapter 3: Vector Graphics, Bit Mapped Images and Colors **6 Hours**

Vector Graphics and Bitmapped Graphics, Combining Vectors and Bitmaps, File Formats, Fundamentals, Shapes, Transformations and Filters, 3D Graphics, Resolution, Image Compression, Image Manipulations, Geometrical Transformations, Color and Sciences, RGB Color, Other Color Models, Channels and Color Correction, Consistent Color.

Chapter 4: Characters and Fonts, Layout, Hypertext **6 Hours**

Character Sets, Fonts, Text in Graphics, Markup, Text Layout using HTML and CSS, Portable Documents, A short history of Hypertext and Hypermedia, The nature of Hypertext, Links, Navigations, and Structures in Hypertext.

PART B

Chapter 5: Video **6 Hours**

Digitalizing Video, Video Standards, Introduction to Video Compression, Quick Time Digital video Editing and Post Production and Steam Video and Video Conferencing.

Chapter 6: Animation **6 Hours**

Captured Animation and Image Sequence, Digital Cell and Sprite Animation, Key Frame Animation, 3D Animation.

Chapter 7: Sound and Combining Media **6 Hours**

The Nature of Sound, Digitizing Sound, Processing Sound, Compression, Formats, MIDI, Combining Sound and Pictures, Hyper Media, Synchronization based Presentations and Accessibility.

Chapter 8: Events, Scripts and Interactivity **6 Hours**

Scripting Fundamentals, WWW, Client Side Scripting, Behaviors, Time Lini Scripting and Behaviors, Beyond Scripting, Protocols, Network and Transport Protocols, Multicasting, Application Protocols for Multimedia, Quality of Service, Service Computations.

References :

1. *John Vince, Virtual Reality Systems, ACM Press.*
2. *A S Tanenbaum, Computer Networks, Fourth Edition, 2008*
3. *John E Koegal, Buford, Multimedia Systems, IIBK.*
4. *S V Raghavan and Satish R Tripathi, Multimedia Networking, PHI.*
5. *Nigel Chapman and Jenny Chapman, Digital Multimedia, Weley.*

2K11CS 74.3 : OPTICAL COMMUNICATION NETWORKS

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.

Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per Week : 4 Examination Marks 100 Sessional Marks 25

PART A

Chapter 1: Introduction **6 Hours**

Telecommunication Network Architecture, Services, Circuit Switching, Packet Switching, Optical Networks, Optical Layer, Transparency and All Optical Networks, Optical Packet Switching, Transmission Basics and Network Evolution, Optical Amplifiers and WDM, Beyond Transmission Links to Networks.

Chapter 2: Propagation of Signals in Optical Fibers **6 Hours**

Light Propagation in Optical Fibers, Loss and Bandwidth, Chromatic Dispersion, Non Linear Effects, Solitons.

Chapter 3: Components **6 Hours**

Couplers, Isolators and Circulators, Multiplexers and Filters, Optical Amplifiers, Transmitters, Detectors, Switches, Wavelength Convertors.

Chapter 4: Modulation and Demodulation **6 Hours**

Modulation, Subcarrier Modulation and Multiplexing, Spectral Efficiency, Demodulation, Error and Detection and Correction.

PART B

Chapter 5: Transmission System Engineering **6 Hours**

System Model, Power Penalty, Transmitter, Receiver, Optical Amplifiers, Cross Talk, Dispersion, Fiber Non Linarites, Wavelength Stabilization, Design of Soliton System, Overall Design Considerations.

Chapter 6: Client Layers of the Optical Layer **6 Hours**

SONET/SDH, ATM, IP, Storage Area Networks, Gigabit and 10 Gigabit Ethernet.

Chapter 7: WDM Network Elements **6 Hours**

Optical Line Terminals and Amplifiers, Optical Add/Drop Multiplexers, Optical Cross connects.

Chapter 8: WDM Network Design **6 Hours**

Cost Trade Offs, LTD and RWA Problems, Dimensioning Wavelength Routing Networks, Statistical Dimensioning Models, Maximum Load Dimensioning Models.

References :

1. *R Ramaswamy and Kumar Sivarajan, Optical Networks : A Practical Perspective, Morgan Kaufmann, Second Edition.*
2. *Venugopal K R, Wavelength Convertors in All Optical Networks, IK Publishers.*

BE VIII SEMESTER COMPUTER SCIENCE AND ENGINEERING

2K11CI81 :COMPILER DESIGN

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter : 1 Introduction, lexical analysis: **6 Hours**

Language processors; structure of a Compilers; evolution of programming languages; Applications of Compiler technology; Programming language basics; Lexical analysis: Role of Lexical Analyzer; Input Buffering; Specifications of Tokens; Recognition of Tokens, Finite Automata, Regular Expression to in Lexical Analyzer

Chapter 2: Syntax Analysis – 1: **6 Hours**

Context-free Grammars; Writing a Grammar; Top-Down Parsing: Recursive-Descent Parsing, FIRST and FOLLOW, LL(1) Grammars, Nonrecursive Predictive Parsing, Error Recovery in Predictive parsing

Chapter 3: Syntax Analysis – 2: **6 Hours**

Bottom-Up Parsing; Shift –Reduce parsing, Conflicts During Shift-Reduce parsing ,LR Parsing: Simple LR, LR(0) Automation, Construction of SLR Parsing tables, Viable prefixes

Chapter 4: Syntax Analysis – 3: **6 Hours**

Canonical LR(1) Parser, LR(1) items, Construction of LR(1) Parsing Tables, Construction of LALR Parsing Tables, Compaction of LR Parsing Tables; using ambiguous grammars; Parser Generators:YACC

PART B

Chapter 5: Syntax-Directed Translation: **6 Hours**

Syntax-Directed definitions; Evaluation order for SDDs; Applications of Syntax-directed translation; Syntax-directed translation schemes.

Chapter 6: Intermediate Code Generation: **6 Hours**

Variants of syntax trees; Three-address code; Types and declarations; Translation of expressions; Type checking; Control flow; Back patching; Switch statements; Intermediate code for procedures

.

Chapter 7: Run-Time Environments: **6 Hours**

Storage Organization; Stack allocation of space; Access to non-local data on the stack; Heap management; Introduction to garbage collection.

Chapter 8:Code Generation: **6 Hours**

Issues in the design of Code Generator; The Target language; Addresses in the target code; Basic blocks and Flow graphs; Optimization of basic blocks; A Simple Code Generator.

References

1. *Compilers- Principles, Techniques and Tools – Alfred V Aho, Monica S. Lam, Ravi Sethi, Jeffrey D Ullman – Second Edition, Addison-Wesley, 2007.*
2. *The Compiler Design Handbook: Optimization and Machine Code Generation - Y N Srikant, Priti Shankar CRC Press 2002*
3. *Compiler Construction Principles & Practice – Kenneth C Louden – Thomson Education, 1997.*
4. *Modern Compiler Implementation in C – Andrew W Apple Cambridge University Press, 1997.*
5. *Compiler Design in C- Allen I Holub, Prentice Hall Inc, 1990*
6. *Crafting a Compiler with C – Charles N. Fischer, Richard J. leBlanc, Jr., Pearson Education, 1991.*

2K11CI82 : DISTRIBUTED OPERATING SYSTEM

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1: Introduction To Network And Distributed Operating System **6 Hours**

Functions of an OS, Design Approaches, Issues in DOS, Process Synchronisation, Resource Management, Communication Primitives, Message Passing Model and RPC.

Chapter 2: Clocks And Distributed Mutual Exclusion **6 Hours**

Introduction, Inherent Limitations of Distributed System, Lamport's Logical Clocks, Vector Clocks, Casual Ordering of Messages, Global State, Termination Detection, A simple solution to Distributed Mutual Exclusion, Non token based Algorithms, Lamport's algorithm, The Ricart Agrawala Algorithm, Maekawa's Algorithm, Token based Algorithms, Suzuki Kasami's Broadcast Algorithm, Singhal's Heuristic Algorithm, Raymond's Tree based Algorithm.

Chapter 3: Distributed Deadlock Detection **6 Hours**

Preliminaries, Deadlock Handling strategies in Distributed systems, Issues in Deadlock Detection and Resolution, Control Organizations for Distributed Deadlock Detection, Centralized Deadlock Detection algorithms, Distributed Deadlock Detection Algorithms, Hierarchical Deadlock Detection Algorithms.

Chapter 4: Agreement Protocols **6 Hours**

Classification of Agreement Problems, Solutions to the Byzantine Agreement Problem, Applications of agreement algorithms.

PART B

Chapter 5: Distributed Scheduling **6 Hours**

Issues in Load Distribution, components of a load distributing algorithm, stability, load distributing algorithms, performance comparison, selecting a suitable load sharing algorithm, requirements for load sharing policies.

Chapter 6: Fault Tolerance **6 Hours**

Atomic actions and committing, commit protocols, non blocking commit protocols, voting protocols, dynamic voting protocols, The majority based reassignment protocols.

Chapter 7: Resource Security And Protection **6 Hours**

Access and flow control : The access matrix model, implementations of access matrix, safety in the access matrix model, requirement of a database operating system, database systems, a concurrency control model of a database systems, the problem of concurrency control, serializability theory.

Chapter 8: Concurrency Control Algorithms **6 Hours**

Introduction, Basic Synchronization Primitives, Lock Based algorithms, timestamp based algorithms, optimistic algorithms, concurrency control algorithms, data replication.

References

1. *Mukesh Singal and Niranjan Shivaratri, Advanced Concepts in Operating Systems, Tata Mcgraw Hill.*
2. *Bernstein P A Hazallacos and Goodmani M, Concurrency Control and Recovery in Database Systems, Addison Wesley Co.*

3. Ceri S and Pelagorthi S, Distributed Databases, McGraw Hill.

2K11CS83 MOBILE COMPUTING

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1: Mobile Devices And Systems, Architectures **6 Hours**

Mobile phones, Digital Music Players, Handheld Pocket Computers, Handheld Devices, Operating Systems, Smart Systems, Limitations of Mobile Devices, Automotive Systems. GSM – Services and System Architectures, Radio Interfaces, Protocols, Localization, Calling, Handover, General Packet Radio Service.

Chapter 2: Wireless Medium Access Control And CDMA – Based Communication **6 Hours**

Medium Access Control, Introduction to CDMA – based Systems, OFDM

Chapter 3: Mobile Ip Network Layer, Mobile Transport Layer **6 Hours**

IP and Mobile IP Network Layers Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, Dynamic Host Configuration Protocol. Indirect TCP, Snooping TCP, Mobile TCP, Other Methods of TCP – layer Transmission for Mobile Networks.

Chapter 4: Databases **6 Hours**

Database Hoarding Techniques, Data Caching, Client – Server Computing and Adaptation, Transactional Models, Query Processing, Data Recovery Process, Issues relating to Quality of Service.

PART B

Chapter 5: Data Dissemination And Broadcasting Systems **6 Hours**

Communication Asymmetry, Classification of Data – Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Techniques, Digital Audio Broadcasting, Digital video Broadcasting.

Chapter 6: Data Synchronization In Mobile Computing Systems **6 Hours**

Synchronization, Synchronization Protocols, SyncML – Synchronization Language for Mobile Computing, Synchronized Multimedia Markup Language (SMIL).

Chapter 7: Mobile Devices, Server And Management, Wireless LAN, Mobile Internet Connectivity And Personal Area Network: 6 Hours

Mobile agent, Application Server, Gateways, Portals, Service Discovery, Device Management, Mobile File Systems. Wireless LAN (WiFi) Architecture and Protocol Layers, WAP 1.1 and WAP 2.0 Architectures, Bluetooth – enabled Devices Network, Zigbee.

Chapter 8: Mobile Application Languages – XML, Java, J2ME And JavaCard, Mobile Operating Systems 6 Hours

Introduction, XML, JAVA, Java 2 Micro Edition (J2ME), JavaCard. Operating System, PalmOS, Windows CE, Symbian OS, Linux for Mobile Devices.

References

1. *Mobile Computing – Raj Kamal, Oxford University Press, 2007.*
2. *Mobile Computing: Technology, Applications and Service Creation, Asoke K. Talkukder, Roopa R Yavaga, Tata McGraw Hill, 2005.*
3. *Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML, Reza B'Far, Fifth Edition, Cambridge University press, 2006.*
4. *Principles of Mobile Computing – Uwe Hansmann, Lothat Merk, Martin S Nicklous and Thomas Stober, Second Edition, Springer International Edition, 2003.*
5. *Mobile Communication – Schiller, Pearson Education, 2004.*

2K11CIL85 C# .NET LABORATORY

Hours per week : 3 Examination Marks : 100 Sessional Marks : 50

WRITE AND EXECUTE C# PROGRAMS ON .NET PLATFORM

1.Program to Check whether a number is Palindrome or not.
2. Program to demonstrate Command line arguments Processing.
3. Program to find the roots of Quadratic Equation.
4. Program to demonstrate boxing and unBoxing.
5. Program to implement Stack operations.
6. Write a program to demonstrate Operator overloading.
7. Program to find the second largest element in a single dimensional array.
8. Program to multiply to matrices using Rectangular arrays.
9. Find the sum of all the elements present in a jagged array of 3 inner arrays.
10. Write a program to reverse a given string .
11. Using Try, Catch and Finally blocks Program to demonstrate error handling.
12. Design a simple calculator using Switch Statement .
13. Demonstrate Use of Virtual and override key words with a simple program
14. Implement linked lists using the existing collections name space.
15. Write a program to demonstrate abstract class and abstract methods .
16. Program to build a class which implements an interface which already exists.
17. Write a program to illustrate the use of different properties .
18. Demonstrate arrays of interface types with a C# program

The student should develop an integrated mini project to demonstrate their skill on .NET platform

Note: The evaluation is based on execution of any one program from PART A and demonstration of mini project. The student has to submit a report to the examiner

2K11CIL86: PROJECT WORK

Hours per Week : 3 Sessional Marks : 50

The Student has to submit a Project Report to the respective Guide in Connection with the Project Work for Eighth Semester.

ELECTIVE – VIII SEMESTER

2K11CI84.1 WIRELESS SENSOR NETWORKS

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1: Introduction **6 Hours**

Unique Constraints and Challenges, Advantages of Sensor Networks, Energy advantage, Detection advantage, Sensor Network Applications, Habitat monitoring, Wildlife conservation through autonomous, non-intrusive sensing, Tracking chemical plumes, Ad hoc, just-in-time deployment mitigating disasters, Smart transportation: networked sensors making roads safer and less congested, Collaborative Processing.

Chapter 2 : Key Definitions And The Problem **6 Hours**

Key Definitions of Sensor Networks, Canonical Problem: Localization and Tracking, Tracking Scenario, Problem Formulation, Sensing model, Collaborative localization, Bayesian state estimation, Distributed Representation and Inference of States, Impact of choice of representation, Design desiderata in distributed tracking, Tracking Multiple Objects, State space decomposition, Data association, Sensor Models, Performance Comparison and Metrics.

Chapter 3: Networking And Protocols **6 Hours**

Networking Sensors, Key Assumptions, Medium Access Control, The SMAC Protocol, IEEE 802.15.4 Standard and ZigBee, General Issues, Geographic, Energy-Aware Routing, Unicast Geographic Routing, Routing on a Curve, Energy-Minimizing Broadcast, Energy-Aware Routing

to a Region, Attribute-Based Routing, Directed Diffusion, Rumor Routing, Geographic Hash Tables. Infrastructure Establishment, Topology Control, Clustering.

Chapter 4 : Time Synchronization **6 Hours**

Clocks and Communication Delays, Interval Methods, Broadcasts, Localization and Localization Services, Ranging Techniques, Range-Based Localization Algorithms, Other Localization Algorithms, Location Services. Sensor Tasking and Control, Task-Driven Sensing, Roles of Sensor Nodes and Utilities, Information- Based Sensor Tasking, Sensor selection, IDSQ: Information-driven sensor querying, Cluster leader based protocol, Sensor tasking in tracking relations, Joint Routing and Information Aggregation, Moving center of aggregation, Multi-step information-directed routing, Sensor group management, Case study: Sensing global phenomena.

PART B

Chapter 5 : Databases **10 Hours**

Sensor Network Databases, Sensor Database Challenges, Querying The Physical Environment, Query Interfaces, Cougar sensor database and abstract data types, Probabilistic queries, High-level Database Organization, In- Network Aggregation, Query propagation and aggregation, Tiny DB query processing, Query processing scheduling and optimization, Data-Centric Storage, Data Indices and Range Queries, One-dimensional indices, Multidimensional indices for orthogonal range searching, Non-orthogonal range searching, Distributed Hierarchical Aggregation, Multi-resolution, Partitioning, Fractional cascading, Locality preserving hashing, Temporal Data, Data aging, Indexing motion data.

Chapter 6 : Platforms and Tools **6 Hours**

Sensor Network Platforms and Tools, Sensor Network Hardware, Berkeley motes, Sensor Network Programming Challenges, Node-Level Software Platforms,

Chapter 7 : Operating System **8 Hours**

Tiny OS, Imperative language: NesC, Dataflow style language: Tiny GALS, Node-Level Simulators, ns-2 and its sensor network extensions, TOSSIM, Programming Beyond Individual Nodes: State-centric programming, Collaboration groups, PIECES: A state-centric design framework, Multi-target tracking problem revisited. Applications and Future Directions.

References

1. *Feng Zhao, Leonidas Guibas: Wireless Sensor Networks – An Information Processing Approach, Elsevier, 2004.*
2. *Waltenegus Dargie, Christian Poellabauer, Fundamentals of Wireless Sensor Networks: Theory and Practice, a John Willey and sons publication , Third edition, 201*
3. *C.S. Raghavendra, Krishna M. Sivalingam, Taieb Znati, Wireless Sensor Networks, Springer, 2004*

2K11CI84.2 STORAGE NETWORKS

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1 : Introduction **6 Hours**

Server Centric IT Architecture and its Limitations; Storage – Centric IT Architecture and its advantages. Case study: Replacing a server with Storage Networks The Data Storage and Data Access problem; The Battle for size and access.

Chapter 2 : Intelligent Disk Subsystems **6 Hours**

Architecture of Intelligent Disk Subsystems; Hard disks and Internal I/O Channels; JBOD, Storage virtualization using RAID and different RAID levels; Caching: Acceleration of Hard Disk Access; Intelligent disk subsystems, Availability of disk subsystems.

Chapter 3 : I/O Techniques **6 Hours**

The Physical I/O path from the CPU to the Storage System; SCSI; Fibre Channel Protocol Stack; Fibre Channel SAN; IP Storage.

Chapter 4 : Network Attached Storage **6 Hours**

The NAS Architecture, The NAS hardware Architecture, The NAS Sotfware Architecture, Network connectivity, NAS as a storage system.

PART B

Chapter 5 : File System And NAS **6 Hours**

Local File Systems; Network file Systems and file servers; Shared Disk file systems; Comparison of fibre Channel and NAS.

Chapter 6 : Storage Virtualization **6 Hours**

Definition of Storage virtualization ; Implementation Considerations; Storage virtualization on Block or file level; Storage virtualization on various levels of the storage Network; Symmetric and Asymmetric storage virtualization in the Network.

Chapter 7 : SAN Architecture And Hardware Devices **6 Hours**

Overview, Creating a Network for storage; SAN Hardware devices; The fibre channel switch; Host Bus Adaptors; Putting the storage in SAN; Fabric operation from a Hardware perspective.

Chapter 8 : Software Components of SAN **6 Hours**

The switch's Operating system; Device Drivers; Supporting the switch's components; Configuration options for SANs.

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***Reference**s*

1. *Ulf Troppens, Rainer Erkens and Wolfgang Muller, Storage Networks Explained, Wiley India, 2007.*
2. *Marc Farley, Storage Networking Fundamentals – An Introduction to Storage Devices, subsystems, Applications, Management, and File Systems, Cisco Press, 2005.*
3. *Robert Spalding, Storage Networks The Complete Reference, Tata McGraw-Hill, 2003.*
4. *Richard Barker and Paul Massiglia,Storage Area Network Essentials A CompleteGuide to understanding and Implementing SANs", Wiley India, 2006.*

2K11CS84.3 EMBEDDED SYSTEMS

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1: Introduction **6 Hours**

Overview of embedded systems, embedded system design challenges, common design metrics and optimizing them. Survey of different embedded system design technologies, trade-offs. Custom Single-Purpose Processors, Design of custom single purpose processors

Chapter 2 :Single-Purpose Processors **6 Hours**

Hardware, Combinational Logic, Sequential Logic, RT level Combinational and Sequential Components, Optimizing single-purpose processors. Single-Purpose Processors: Software, Basic Architecture, Operation, Programmer's View, Development Environment, ASIPS.

Chapter 3: Peripherals **6 Hours**

Standard Single-Purpose Peripherals, Timers, Counters, UART, PWM, LCD Controllers, Keypad controllers, Stepper Motor Controller, A to D Converters, Examples.

Chapter 4: Memory: 6 **Hours**

Introduction, Common memory Types, Compulsory memory, Memory Hierarchy and Cache, Advanced RAM. Interfacing, Communication Basics, Microprocessor Interfacing, Arbitration, Advanced Communication Principles, Protocols - Serial, Parallel and Wireless.

PART B

Chapter 5 : Interrupts **6 Hours**

Basics - Shared Data Problem - Interrupt latency. Survey of Software Architecture, Round Robin, Round Robin with Interrupts - Function Queues - scheduling – RTOS architecture.

Chapter 6 : Introduction To RTOS **6 Hours**

Tasks - states - Data - Semaphores and shared data. More operating systems services - Message Queues - Mail Boxes -Timers – Events - Memory Management.

Chapter 7 : Basic Design Using RTOS, Principles: **6 Hours**

An example, Encapsulating semaphores and Queues. Hard real-time scheduling considerations – Saving Memory space and power.

Chapter 8 : Hardware Software Co-Design **6 Hours**

Hardware software co-design aspects in embedded systems.

References

1. *Embedded System Design: A Unified Hardware/Software Introduction Frank Vahid, Tony Givargis, John Wiley & Sons, Inc.2002*
2. *Embedded Systems: Architecture and Programming, Raj Kamal, TMH. 2008*
3. *An Embedded software Primer - David E. Simon: Pearson Education, 1999*
4. *Embedded Systems Architecture – A Comprehensive Guide for Engineers and Programmers , Tammy Noergaard, Elsevier Publication, 2005*
5. *Embedded C programming, Barnett, Cox & O'cull, Thomson (2005)*

2K11CI84.4 ROBOTICS

Note :

FOUR questions from PART A and FOUR questions from PART B to be set.
Students should answer FIVE questions selecting atleast TWO from each PART .
For every SIX hours of syllabus ONE question may be set.

Hours per week : 4 Examination Marks : 100 Sessional Marks : 25

PART A

Chapter 1 : Introduction **6 Hours**

Introduction – brief history, types, classification and usage, Science and Technology of robots.

Chapter 2 : Elements of Robots **6 Hours**

links, joints, actuators, and sensor Position and orientation of a rigid body, Homogeneous transformations, Representation of joints, link representation using D-H parameters, Examples of D-H parameters and link transforms, different kinds of actuators – stepper, DC servo and brushless motors, model of a DC servo motor, Types of transmissions, Purpose of sensors, internal and external sensors, common sensors – encoders, tachometers, strain gauge based force-torque sensors, proximity and distance measuring sensors, and vision.

Chapter 3 : Kinematics of Serial Robots **6 Hours**

Introduction, Direct and inverse kinematics problems, Examples of kinematics ofcommon serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Tractrix based approach for fixed and free robots and multi-body systems, simulations

and experiments, Solution procedures using theory of elimination, Inverse kinematics solution for the general 6R serial manipulator.

Chapter 4 : Kinematics of Parallel Robots **6 Hours**

Degrees-of-freedom of parallel mechanisms and manipulators, Active and passive joints, Constraint and loop-closure equations, Direct kinematics problem, Mobility of parallel manipulators, Closed-from and numerical solution, Inverse kinematics of parallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.

PART B

Chapter 5 : Velocity and Static Analysis of Robot Manipulators **6 Hours**

Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians for serial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysis for serial and parallel manipulators, Loss and gain of degree of freedom, Statics of serial and parallel manipulators, Statics and force Transformation matrix of a Gough Stewart platform, Singularity analysis and statics.

Chapter 6 : Dynamics of Serial and Parallel Manipulators **6 Hours**

Mass and inertia of links, Lagrangian formulation for equations of motion for serial and parallel manipulators, Generation of symbolic equations of motion using a computer, Simulation (direct and inverse) of dynamic equations of motion, Examples of a planar 2R and FOUR-bar mechanism, Recursive dynamics, Commercially available multi body simulation software (ADAMS) and Computer algebra software Maple

Chapter 7 : Motion Planning and Control **6 Hours**

Joint and Cartesian space trajectory planning and generation, Classical control concepts using the example of control of a single link, Independent joint PID control, Control of a multi-link manipulator, Nonlinear model based control schemes, Simulation and experimental case studies on serial and parallel manipulators, Control of Constrained manipulators, Cartesian control, Force control and Hybrid position/force control, Advanced topics in non-linear control of manipulators

Chapter 8 : Modeling and Control of Flexible Robots **6 Hours**

Models of flexible links and joints, Kinematic modeling of multilink flexible robots, Dynamics and control of flexible link manipulators, Numerical simulations results, Experiments with a planar two-link flexible manipulator.

References

1. *Ghosal,A., Robotics: Fundamental Concepts and Analysis, Oxford University Press, Second reprint, 2008*
2. *Fu,K., Gonzalez, R. and Lee, C.S. G., Robotics: Control, Sensing, Vision and Intelligence¸ McGraw- Hill, 1987.*
3. *Murray, R.M., Li, Z., and Sastry,S.S.,A Mathematical Introduction to Robotic Manipulator, CRC Press, 1994.*
4. *Merlet, J.-P.,Parallel Robots,Kluwer Academic,Dordrecht, 2001.*

5. *Featherstone, R.S., Robot Dynamics Algorithms, Kluwer Academic Publishers 1987*
6. *Haug,E.J., Computer-Aided Kinematics and Dynamics of Mechanical Systems: Basic Methods, Vol. 1,Allyn and Bacon, 1989.*
7. *Siciliano,B., and Khatib, O.(Editors), Handbook of Robotics,Springer, 2008.*
8. *Craig, J. J., Introduction to Robotics: Mechanics and Control, Second Edition, Addison-Wesley, 1989.*