Annexure-I to Notification No. F (Pres/Rep-PG Syllabi) Acad/KU/11 dated 6-05-2011. -1-

Post Graduate Department of Computer Sciences, The University of Kashmir, Srinagar - 190006

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Main subjects of MCA ist semester – 2011

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	100*	Computer Fundamentals and Applications	75	30	25	10	-	-
2	101	Microprocessor , ALP and its Applications	75	30	25	10	-	-
3	102	Technical Communication	75	30	25	10	-	-
4	103	Advanced Programming Concepts in C / C++	75	30	25	10	-	-
5	104	Advanced Database Management Systems	75	30	25	10	-	-
6	105	Discrete Mathematics	75	30	25	10	-	-
7	106	Lab for 103	-	-	25	10	50	20
8	107	Lab for 101/104	-	-	25	10	50	20
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total					***650***	

**For non BCA students only*

Main subjects of MCA 2nd semester – 2011

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	201	Advance Computer Systems	75	30	25	10	-	-
2	202	Data and File Structures	75	30	25	10	-	-
3	203	Numerical and Statistical Computing	75	30	25	10	-	-
4	204	Design and Analysis of Algorithms	75	30	25	10	-	-
5	205	Advanced Data Communication	75	30	25	10	-	-
6	206	Lab for 202	-	-	25	10	50	20
7	207	Lab for 203	-	-	25	10	50	20
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total					***650***	

Main subjects of MCA 3rd semester – 2012

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	301	Advanced Operating Systems	75	30	25	10	-	-
2	302	Optimization Techniques	75	30	25	10	-	-
3	303	Computer Graphics	75	30	25	10	-	-
4	304	Computer Networks , Protocols and Programming	75	30	25	10	-	-
5	305	Software Engineering & Managemen:	75	30	25	10	-	-
6	306	Lab for 301	-	-	25	10	50	20
7	307	Lab for 304	-	-	25	10	50	20
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total					***650***	

Main subjects of MCA 4th semester – 2012

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	401	Organization Behavior and Personal Management	75	30	25	10	-	-
2	402	Object Oriented Modeling Analysis and Design	75	30	25	10	-	-
3	403	Data Warehousing and Data Mining	75	30	25	10	-	-
4	404	System Software Design	75	30	25	10	-	-
5	405	Elective I	75	30	25	10	-	- -
6	406	Lab for 403/Elective	-	-	25	10	50	25
7	407	Lab for 404	-	-	25	10	50	25
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total					***650***	

Elective – I (Optional paper of 4th semester)

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	408	Windows Programming using C#	75	30	25	10	-	-
2	409	Pervasive Computing	75	30	25	10	-	-
3	410	Programming Language Paradigm	75	30	25	10	-	-
4	411	Managemen: Information Systems	75	30	25	10	-	-
5	412	Theory of Computation & Formal Languages	75	30	25	10	-	-
6	413	Advanced Unix/Linux Programming	75	30	25	10	-	-

Main subjects of MCA 5th semester – 2013

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	501	Java Programming	75	30	25	10	-	-
2	502	Modeling & Simulation	75	30	25	10	-	-
3	503	Artificial Intelligence & Neural Networks	75	30	25	10	-	-
4	504	Web Programming	75	30	25	10	-	-
5	505	Elective II	75	30	25	10	-	-
6	506	Lab for 501/502	-	-	25	10	50	20
7	507	Lab for 504	-	-	25	10	50	20
		TOTAL	**375**	-	**175**	-	**100**	-
		Grand total					*650*	

Elective II (Optional paper of 5th semester

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	508	Wireless and Mobile Communication	75	30	25	10	-	-
2	509	Bio-Informatics	75	30	25	10	-	-
3	510	Digital Image Processing	75	30	25	10	-	-
4	511	Quality Assurance and Testing	75	30	25	10	-	-
5	512	Design & Development of Embedded Systems	75	30	25	10	-	-
6	513	Network Security & Cryptography	75	30	25	10	-	-

Project of 6th semester – 2013

S.No	Subject code	Subject Name	Theory Max	Theory min	Internal max	Internal min	External max	External min
1	600	Project	-	-	150	75	200	100

Structure of Curriculum

1st Semester (2011)

i. 100* Computer Fundamentals and Applications
ii. 101 Microprocessor , ALP and its Applications
iii. 102 Technical Communication
iv. 103 Advanced Programming Concepts in C / C++
v. 104 Advanced Database Management Systems
vi. 105 Discrete Mathematics
vii. 106 Lab for 103
viii. 107 Lab for 101/104

* **Course No. 100 is Compulsory for those students who have not studied computer fundamentals in their Bachelor's Degree, however the marks scored will not be accounted for totaling purposes.**

2nd Semester (2011)

i. 201 Advance Computer Systems
ii. 202 Data and File Structures
iii. 203 Numerical and Statistical Computing
iv. 204 Design and Analysis of Algorithms
v. 205 Advanced Data Communication
vi. 206 Lab for 202
vii. 207 Lab for 203

3rd Semester (2012)

i. 301 Advanced Operating Systems
ii. 302 Optimization Techniques
iii. 303 Computer Graphics
iv. 304 Computer Networks , Protocols and Programming
v. 305 Software Engineering & Management
vi. 306 Lab for 303
vii. 307 Lab for 304

4th Semester (2012)

i. 401 Organization Behaviour and Personal Management
ii. 402 Object Oriented Modeling Analysis and Design
iii. 403 Data Warehousing and Data Mining
iv. 404 System Software Design
v. Elective I
vi. 406 Lab for 403/Elective I
vii. 407 Lab for 404

Elective's for 4th Semester

viii. 408 Windows Programming using C#
ix. 409 Pervasive Computing
x. 410 Programming Language Paradigm
xi. 411 Management Information Systems
xii. 412 Theory of Computation & Formal Languages
xiii. 413 Advanced Unix/Linux Programming

5th Semester (2013)

i. 501 Java Programming
ii. 502 Modeling & Simulation
viii. 503 Artificial Intelligence & Neural Networks
iii. 504 Web Programming
iv. Elective II
v. 506 Lab for 501/502
vi. 507 Lab for 504

Elective's for 5th Semester

vii. 508 Wireless and Mobile Communication
viii. 509 Bio-Informatics
ix. 510 Digital Image Processing
x. 511Quality Assurance and Testing
xi. 512 Design & Development of Embedded Systems
xii. 513 Network Security & Cryptography

6th Semester (2013)

i. Project seminar
ii. Project Work with Dissertation

Note : This revised syllabus shall be implemented from the academic session 2011 as follows :-

- **1st and 2nd Semester - Academic Session 2011**
- **3rd and 4th Semester - Academic Session 2012**
- **5th and 6th Semester – Academic Session 2013**

21/4/2011

Semester-IV-2013.

Course No: 501

Course Title : Java Programming

Unit I

Java Program Development , Java Source File Structure , Comparison with other languages (C & C++), Java and Internet, Features of Java, Java Virtual machine, ByteCode , Lexical Tokens, Identifiers, Keywords, Literals, Comments , Primitive Datatypes, Variables: Assignment, Initialization and Conversions,Operators: Arithmetic, Assignment, Modulus, Relational, Boolean, Bitwise., Precedence Summary ,Unicode Character Set , Arrays: Single and Multidimensional. Control Statements and Looping Structures

Unit II

Class Fundamentals , Object reference , Garbage Collection, Constructors, Access Control, Modifiers, methods , Nested , Inner Class & Anonymous Classes , Abstract Class, Argument Passing Mechanism , Method Overloading, Recursion , Dealing with Static Members. Finalize() Method, Native Method. Use of "this " reference , Cloning Objects, Generic Class Types, Inheritance in Java , Overriding Super Class Methods, Use of "super", Polymorphism in inheritance , Type Compatibility and Conversion ,Packages & Interfaces: Defining and importing packages , Understanding Class path , Implementing interfaces.

Unit III

Exceptions & Errors ,Types of Exception ,Control Flow In Exceptions , Use of try, catch, finally, throw, throws in Exception Handling ,In-built and User Defined Exceptions, Checked and UnChecked Exceptions, Operation on String ,Mutable & Immutable String , Using Collection Bases Loop for String , Tokenizing a String ,Creating Strings using StringBuffer , Multi-Threaded Programming ,Thread Life-Cycle , Thread Priorities , Synchronizing Threads , Inter -communication of Threads, DeadLock. Applet & Application , Applet Architecture, Parameters to Applet , Embedding Applets in Web page. Utility Methods for Arrays , Observable and Observer Objects , Date & Times Using Scanner.

Unit IV

Streams, Input and Output Classes,The Standard Streams,File Object , File I/O Basics , Reading and Writing to Files ,Buffer and Buffer Management, Read/Write Operations with File Channel , Serializing Objects , The Collection Framework , Collection Types , Sets , Sequence , Map , Hashing ,Use of ArrayList & Vector , Event-Driven Programming ,The Event Delegation Model , Event Classes, Event Sources , Event Listeners , Adapter Classes, Anonymous Inner classes , Keyboard and Mouse Event Handling , Avoiding Deadlocks in GUI Code ,Networking Basics , Client-Server Architecture , Socket Overview, Networking Classes and Interfaces , Network Protocols ,Developing Networking Applications in Java

Suggested Readings:

1. Herbert Schildt, "The Complete Reference Java-2 " ,Sixth Edition 2004,Tata McgrawHill.
2. Dietel & Dietel, "Java: How to Program Java 2, Sixth Edition, 2006, Pearson Education.
3. Horstmann & Cornell, "Java2 Vol-1 & Vol-2",Seven Indian Reprint 2006, Pearson Education.
4. E. BalaGurudamy " Programming with java A Primer" 3rd edition

Semester-V 2013 **Course No: 502**

Course Title: Modeling & Simulation

Unit I

Concepts of Systems, Models, and Simulation. Distributed Lag Model, Cobweb Models, The process of a simulation Study, Exponential Growth Models, Exponential Decay Models, Type of simulation, Discrete-Event Simulation: Time-Advance Mechanisms, Components and Organization of a Discrete-Event Simulation Model. Monte Carlo Method. Simulation of Single-Server Queuing System, Simulation of an Inventory System

Unit II

Continuous Simulation: Pure-pursuit Problem.

Random Number Generators: Linear Congruential Generators, Other kinds of Generators, Testing Random-Number Generators.

Generating Random Variates: General Approaches, Continuous and Discrete distributions.

Unit III

Introduction to GPSS, General Description, GPSS block-diagram, Simulation of a Manufacturing Shop. SNA, Function, Simulation of a Supermarket, GPSS Model of a Simple Telephone System

Unit IV

Output Data Analysis for a Single System: Transient and Steady-State Behavior of a Stochastic Process, Type of Simulations with regard to output Analysis and Statistical Analysis for Testing Simulation. Verification and Validation of Simulation. An introduction of different types of simulation languages.

Reference Books:

- G. Gordon. "System Simulation", (3rd Edition) Pearson Education, 2000.
- Law and Kelton, "Simulation Modeling and Analysis", McGraw Hill, 2001.
- N. Deo, "System Simulation with Digital Computer", Prentice Hall of India 1979
- Fred Maryanski, "Digital Computer Simulation", CBSPD 1987
- James A. Pyne, "Introduction to Simulation- Programming Techniques and Methods of Analysis", McGraw Hill 1988
- Zeigler and Kim, "Theory of Modeling and Simulation", Academic Press, 2002
- Banks et al, "Discrete event Simulation", Pearson Education, 2001

Course No: 503
Artificial Intelligence and Neural Networks

Unit I

Intelligent agents , Agents and environments -The nature of environments -Structure of agents , Problem solving agents , Example problems , Searching for solutions , Uniformed search strategies , Avoiding repeated states , Searching with partial information. Informed search and exploration , Informed search strategies , Heuristic function , Local search algorithms and optimistic problems , Local search in continuous spaces , Online search agents and unknown environments , Backtracking search -Adversarial search

Unit II

First order logic , Syntax and semantics for first order logic , Using first order logic , Knowledge engineering in first order logic , Inference in first order logic– Prepositional versus first order logic , Unification and lifting , Forward chaining , Backward chaining – Resolution , Knowledge representation , Ontological engineering, Learning from observations , Forms of learning , Inductive learning , Learning decision trees ,Ensemble learning

Unit III

Knowledge in learning , Logical formulation of learning , Explanation based learning , Learning using relevant information , Inductive logic programming , Statistical learning methods , Learning with complete data , Learning with hidden variable , EM algorithm – Instance based learning , Reinforcement learning , Passive reinforcement learning – Active reinforcement learning , Generalization in reinforcement learning.

Unit IV

Neural Computing : Nature and Goals Overview of network architectures and learning paradigms , Single-layer perceptrons and their limitations , The Multilayer Perceptron : The sigmoid output function , Hidden units and feature detectors , Training by error back propagation , The error surface and local minima , Generalization, how to avoid 'overtraining' , Binary Decision Neurons : The McCullough-Pitts model ,The Hopfield Model , Self-Organising Nets : The Kohonen self-organising feature map.

TEXT BOOK

1. Russell, S. and Norvig, P., "Artificial Intelligence-A Modern Approach", 2nd Edition, Pearson Education / Prentice Hall of India, 2004.
2. Neural Computing: An Introduction; R Beale and T Jackson; Institute of Physics Publishing.

References :

1. Patterson ," Introduction to Artificial intelligence and expert systems" , Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill, 2003.
3. Luger, G.F., "Artificial Intelligence , Structures and Strategies for Complex Problem Solving",Pearson Education / Prentice Hall of India, 2002.

Course No.: 504
Course Title : Web Programming

UNIT I
HTML - Concepts of Hypertext, Versions of HTML, Elements of HTML syntax, Head & Body Sections, Building HTML documents, Inserting texts, Images, Hyperlinks, Backgrounds and Colour controls, Different HTML tags, Table layout and presentation, Use of front size & Attributes List types and its tags, Use of Frames and Forms in web pages.

UNIT II
VB Script Concepts: VB Script Language Elements: Constants, Variables and Data Types, Mathematical Operators, Logical Operators, Looping and Decision Structures.

VB Script Functions and Objects: Date Conversion Functions, Mathematical Functions, Data Formatting Functions, Text Manipulation Functions, Date and Time Functions.

UNIT III:
ASP Concepts: SSI Directives, Response Object, Request Object Cookies, Application, Session and Server Objects, Global.asa, ASPError Object, Object Context.

Reading and Writing Files on Web Server.

UNIT IV
Integrating with Databases: OLEDB, ODBC, Remote Data Service, Active Data Objects, Connection Object, RecordSet and Fields Objects, Using SQL statements to Query Data, Command and Parameter Objects, Using Error Collection. Developing ASP Application for a Case Study.

TEXTS & REFERENCE BOOKS :

ACTIVE SERVER PAGES 2.0 (UNLEASHED)
BY *STEPHEN WALTHER : TECHMEDIA*
ASP 3 PROGRAMMING BIBLE
BY ERIC A. SMITH : IDG
BOOKS(REPRIN02001)
TEACH YOURSELF ASP 3.0 IN 21 DAYS
BY SCOTT MITCHELL, JAMES
ATKINSON : TECHMEDIA (1ST EDITION 2000)
MASTERING ACTIVE SERVER PAGES 3.0
BY *RUSSELL JONES : BPB(1ST EDI 2000)*

ELECTIVE,s for 5th Semester

Course No: 508

Course Title: Wireless and Mobile Communications

Unit I

Classification and types of Wireless telephones. Introduction to Cordless, Fixed Wireless(WLL), Wireless with limited mobility(WLL-M) and (Fully)Mobile Wireless phones. Introduction to various generations of mobile phone technologies and future trends. Wireline vs. Wireless portion of mobile communication networks. Mobile-Originated vs. Mobile-Terminated calls. Mobile-Phone numbers vs. Fixed-Phone numbers; Billing Issues.

Unit II

Electromagnetic spectrum, its use and allocation to well-known bands. Concept of cells, sectorization, coverage area, frequency reuse, cellular networks & handoffs.

Unit III

Wireless Transmission concepts; types of antennas, signal propagation, multipath propagation. Comparison of FDM, TDM and CDM techniques. Basic concepts of Spread Spectrum(SS) technique; Direct Sequence SS versus Frequency Hopping SS.

Unit IV

Simplified implementation of IS-95 CDMA using chip sequences. Concept of CDMA(PCS& Cellular) channel; Forward and Reverse CDMA channel for a cell/sector. Concept of(Walsh)Code Channels within a CDMA Channel. Purpose of Pilot, Sync, Paging, Forward Traffic Channels. Purpose of Access & Reverse TCs. Comparison of Cellular and PCS CDMA networks; frequencies and cell-sizes. Advantages/Disadvantages of smaller cell size. Concept of Voice Coding . Components of Mobile Network Infrastructure: MS, BTS, BSC, MSC; their basic functions and characteristics. Types of handoffs in GSM. Use of HLR and VLR in mobile networks.

References Books:

1. Andy Dornan, "The Essential Guide to Wireless Communications Applications",Pearson.
2. Jochen Schiller, "Mobile Communications", Pearson.
3. K.Pahlavan, P.Krishnamurthy, "Principles of Wireless Networks", Pearson Education.
4. Andrew Tanenbaum, " Computer Networks(4th Edition)", Pearson Education.
5. T. Rappaport, "Wireless Communications, Principles and Practice(2nd dEition). Pearson Education

Course No: 509
Course Title: Bioinformatics

Unit I
Introduction to bioinformatics, Definitions and concepts, Biological complexity, The role of bioinformatics. Types of biological data, types of Biological Databases – flat file databases, relational databases, object-oriented databases, XML representation of biological databases, Sequence databases (EMBL, GenBank, DDBJ, SWISS-PROT, PIR, TrEMBL), Protein family/domain databases (PROSITE, PRINTS, Pfam, SMART, etc), Protein structure and fold classification databases (PDB, CATH, SCOP), pathway databases, PubMed database.

Unit II
Search engines - SRS, Entrez; BLAST, FASTA, Data Submission Tools: Nucleotide Sequence Submission Tools, Protein submission tools, Command line Tool for GenBank; Data Analysis Tools: Tools for Nucleotide Sequence Analysis, Tools for Protein sequence Analysis; Prediction tools: Phylogenetic trees and phylogenetic Analysis, Gene Prediction, Protein structure and Function prediction; Modeling tools: Tools for 2D Protein Modeling, Tools for 3D protein Modeling

Unit III
Ontologies in Bioinformatics: The need for ontologies (Gene naming, functional classifications, references schemes), Classification of ontologies – one dimensional, 2 dimensional, three dimensional, Gene ontology, EcoCyc etc.
Introduction to Markup Languages for biological data: BioML, ProML, CML, GAME, AGAVE

Unit IV
Querying and Integration of Biological Databases: Warehouse Integration, mediator-wrapper based integration, navigational integration. Existing systems and their drawbacks. XPath query language for querying biological data.

Reference Books:
1. Developing Bioinformatics Computer Skills, Cynthia Gibas & Per Jambeck, O'Reily
2. Bioinformatics – Databases, Tools and Algorithms, Orpita Basu, Simminder Kaur Thukral, Oxford Higher Education.
3. Introduction to bioinformatics, T. K. Attwood & D J Parry-Smith, Pearson Education
4. Bioinformatics – A beginner's Guide, Jean-Michel Claveriw, Cerdric Notredame, WILEY DreamTech India Pvt.
5. Krane ,"Bioinformatic", Pearson Education.

Course No : 510
Course Title: Digital Image Processing

UNIT I
Introduction to discrete time signals and systems: Discrete time signals, Discrete time systems, Analysis of discrete time, Linear time-invariant systems [Both 1D and 2D]. Introduction to digital image processing: Digital Image representation, Fundamental steps in image processing. Elements of digital image processing systems, Applications of digital image processing

UNIT II
Image sensing and aquisition. Image sampling and quantization, imaging geometry. Image transforms : Concepts of Spatial domain and Frequency domain Images, Fourier, Inverse Fourier, Fast Fourier [Both 1D and 2D].

UNIT III
Image Enhancement: Enhance in the spatial domain, some basic grey level transformations, Histogram processing, Enhancement using arithmetic/logic operations, Basics of spatial filtering, Smoothing of spatial filters, Sharpening spatial filters. Enhancement in frequency domain: Smoothing frequency domain filters, Sharpening frequency domain filters, Homomorphic filtering.

UNIT IV
Image Restoration: Model of the image Degradation / Restoration process, Noise models, Restoration in the presence of noise only-spatial filtering, Linear, Position-invariant degradation, Estimating the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering, Constrained least squares filtering, Restoration by SVD.
Image segmentation: Detection of discontinuities, Edge linking and boundary detection, Thresholding based segmentation, Region based segmentation.
Image Compression models: Error criteria, Lossy compression, Loss-less compression.

Reference Books :
1) Digital image processing 2nd edition by Rafael C.Gonzalez,Richard E.Woods(Pearson edition) .
2)Fundamentals of digital image processing by A.K.Jain(Pearson edition) .
3)Fundamentals of digital image processing by Catlemrene(Pearson edition).
4)Image processing analysis and machine vision by Milan Sonka,Vaclahlavac,Roger Boyle.
5)Digital signal processing by John G.Proakis, G.Manolakin ", 4/e Pearson Education

Course NO: 511
Course Title: Quality Assurance & Testing

Unit – I

Introduction to Testing: Verification and Validation; Software Testing for Conventional & Object Oriented Architectures; Testing Completion criteria; Strategic Issues; Test Strategies for Conventional & Object Oriented Software; Validation Testing; System Testing.

Unit – II

Testing Tactics: Basis Path Testing; Control Structure testing; Black Box Testing; White Box Testing; Object Oriented Testing Methods(Test Case design Implications of OO concepts, Fault based Testing, Test Cases, Scenario Based Testing); Testing specialized Environments, Architectures, and applications(Testing GUIs, Testing Client Server Architectures, Testing Documentation); Testing Patterns.

Unit – III

Introduction to Software Quality: Establishment of a software quality programme, Software Quality Assurance Planning-An overview, Software Quality Assurance Plan-Purpose and Scope, Standard,Practices,Conventions and Metrics, Tools, Techniques and Methadologies,Risk management: Concept, Reactive vs. Proactive Risk strategies, Software risks, Risk identification (Assessing Overall Project Risk, Risk Components and drivers.

Unit – IV

Quality Management: Quality Concepts (Quality, Quality Control, Quality assurance, Cost of quality),Software Quality assurance, Software reviews, Formal Technical Reviews, Formal approaches to Software quality assurance, Software Reliability, (Measures of Reliability and Availability, Software Safety), ISO 9000 Quality standards.

Suggested Readings:

1. **ROGER S. PRESSMAN -** Software Engineering - A Practitioner's Approach, Sixth edition, TMH.
2. **Pankaj Jalote -** An Integrated approach to Software Engineering, 3Rd edition, Narosa Publication.
3. **SommerVille** Software Engineering- ",Pearson Education
4. **SCHAUM'S Outlines**, TMH.
5. LOUISE TAMERS – Introducing Software Testing – Pearson
6. Gopalaswamy,"Software Testing", Pearson Education

Course No: 512
Course Title : Design & Development of Embedded Systems

Unit I
Introduction to Embedded Systems(ES), their examples and applications. Concept, Definition and Classification. Advanced hardware fundamentals. Criteria for Processor and Memory Selection for ES.

Unit II
Interrupts- Basics, Shared-Data Issues, Latency. ES software architectures. Round-Robin with interrupts; Function-Queue scheduling. Issues of context, latency and deadline.

Unit III
Introduction to Real-Time Operating Systems(RTOS). Tasks, Task States, Semaphores and Shared Data. Use of OS services e.g. Timer functions, Message Queues, Events, Pipes and ISRs.

Unit IV
Discussion of basic design using RTOS and examples. Hard Real-Time scheduling considerations. Memory and power conservation. Embedded Software Development tools: Host/Target machines, Linker/Re-Locator, Debugging Techniques.
Case study of Programming (at least one) industry-standard RTOS e.g. Micro-C/OS , VxWorks, (Embedded) Linux. Detailed study of its services and use of its API.

References Books:
David Simon, "An Embedded Software Primer", Pearson (Asia).
Raj Kamal, "Embedded Systems – Architecture, Programming & Design", TMH.
Qing Li, "Real-Time Concepts for Embedded Systems", CMP.
Arnold Berger, "Embedded Systems Design – An Introduction to Processes, Tools & Techniques", CMP.

Course No: 513
Course Title :Network Security & Cryptography

Unit I

Basics: Introduction, Protocol Structure Specification and Modeling: Validation Models, Correctness requirements, Protocol Design, Finite State machines

Unit II

Conformance Testing, Synthesis and validation: Conformance Testing, Protocol Synthesis, Protocol Validation,

Unit III

Mechanics of Routing Protocols, Internet working with Dissimilar Protocols, Future of Routing,
Protocol designing: Simplicity VS flexibility VS Optimality, Overhead and scaling, Operation above Capacity, forward compatibility, Migration: Routing Algorithms and addressing parameters, making multi protocol operation possible, Robustness, determinism VS Scalability, performance for correctness

Unit IV

Design Tools: A protocol Simulator, A Protocol Validator, using the validator,
Network Security: Features Security in Wireless, Adhoc and Sensor Networks,

References:

1. William Stalling ," cryptography and Network Security", Pearson Education
2. Interconnections: Bridges, Routers switches and Internet-working protocols Radia Perlman (Pearson education)
2. IP Routing Fundamentals Mark Sportack (Pearson Education)
3. Design and Validation Computer Protocols : Gerard J. Holzmann (Prentice Hall)