M.Sc. COMPUTER SCIENCE CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus Regular (2015 – 2016)



DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University) (Established Under Section 3 of UGC Act, 1956) Eachanari(Post), Coimbatore – 641 021. Tamilnadu, India Phone No. 0422-2980011 - 15 Fax No: 0422-2980022-23 E mail ID: info@karpagam.com Web: www.kahedu.edu.in **PROGRAM OUTCOMES:** Post Graduate student of Computer Science programme will be able to

- a. Apply basic concepts of Computer Science to effectively involve in the research.
- b. Design software to meet required needs with realistic constraints such as economical, environmental, social, ethical and sustainable in the field of Computer Science.
- c. Design and conduct experiments as well as to analyze, interpret data on experiments relevant to Computer Science practice.
- d. implement software designs to provide working solutions, including use of appropriate programming languages, web-based systems and tools, design methodologies, and database systems
- e. To attain in depth knowledge and understanding the principles of programming for applying in broad range of languages and open source platforms.
- f. use IT skills and display mature computer literacy
- g. Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to computer science practice.
- h. Communicate effectively on complex research issues with research community and society, such as, being able to comprehend, write effective reports, design documentation and make effective presentations with clear instructions.
- i. Demonstrate knowledge and understanding of the computer science and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- j. Recognize the need for ability to engage in independent and life-long learning.

PROGRAM SPECIFIC OUTCOMES (PSOs)

- k. Exhibit an outstanding association and active contribution in their professional including entrepreneurship using the information in Computer Science.
- 1. Contribute effectively as a team member/leader using common tools and adopt latest technologies in education and solve real world problems.
- m. Pursue life-long learning and research in specific fields of Computer Science and develop novel and research oriented methodologies in an effective manner.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO I: Understand analyze and develop computer programs in the areas related to Database systems and Big data Analytics, cloud computing, soft computing, IoT, Image processing, Green computing, web designing, mobile computing and networking for efficient design of computer based system of varying complexity.

PEO II: Apply standard software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality for business success.

PEO III: Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

MAPPING of PEOs and POs

POs	a	b	c	d	e	f	g	h	i	j	k	1	m
PEO1	Х		Х	Х	Х	Х			Х	Х		Х	Х
PEO2	Х	Х	Х	Х	Х	Х	Х	Х			X	X	
PEO3	Х		Х	Х	Х	Х			Х	Х	X		X

DEPARTMENT OF COMPUTER SCIENCE FACULTY OF ARTS, SCIENCE AND HUMANITIES PG PROGRAM (CBCS) – M.Sc. Computer Science (2015–2016 Batch and onwards)

Course code	Name of the course	Objecti ves and		Inst h	ruc our	ction s /		Maximum Marks		
		0	out		week		dit(s			
		0		L	Т	Р	Cre	40	(0)	100
		PEC	POs				Ŭ	40	60	100
	SEME	STEF	R - I							
15CSP101	Web Technology	Ι	c,d	3	1	0	4	40	60	100
15CSP102	Cryptography and Network Security	Ι	a,g	4	0	0	4	40	60	100
15CSP103	Data Mining and Warehousing	Ι	b,c	4	0	0	4	40	60	100
15CSP104	Cloud Computing	III	b,g	4	0	0	4	40	60	100
		Ι	b					40	60	100
15CSP105	Wireless and Mobile Computing	III II	g c	4	0	0	4			
15CSP111	Web Technology Lab	Ι	c,d	0	0	4	2	40	60	100
15CSP112	Data Mining Lab using MATLAB	Ι	b,c	0	0	4	2	40	60	100
Seminar Prese	entation	III	h	0	2	0	-	-	-	-
	Semester Total			19	3	8	24	280	420	700
	SEMES	STER	– II		1.1				0	
15CSP201	Internetworking with TCP/IP	I	c	4	1	0	5	40	60	100
15CSP202	Cyber Security	1	b,g	5	0	0	5	40	60	100
15CSP203	Software Project Management	I	b,c	5	0	0	5	40	60	100
15CSP204A	Software Testing	Ι	b,g							
15CSP204B	Soft Computing	Π	с							
15CSP204C	Object Oriented Analysis and Design with UML	Ι	d	5	0	0	5	40	60	100
15CSP204D	Grid Computing	Π	с							
15CSP204E	Geographical Information System	Ι	a,b							
150EP201	Open Elective - I	Ι	с	0	0	0	3	-	100	100
15CSP211	Router Configuration Lab	II	d	0	0	4	2	40	60	100
15CSP212	Software Documentation Lab	Ι	с	0	0	4	3	40	60	100
Seminar Presentation		III	h	0	2	0	-	-	-	-
	Semester Total			19	3	8	27	240	460	700
	Program Total			44	-	16	48	560	840	1400
	SEMESTER – III									

Master of Science, Computer Science, 2015, Karpagam Academy of Higher Education, Coimbatore

15CSP301	J2EE		Ι	c,d	3	1	0	4	40	60	100
15CSP302	Open Source Technologies		I, II	dg	4	0	0	4	40	60	100
15CSP303	Digital Ima	age Processing	Ι	с	4	0	0	4	40	60	100
15CSP304	Network A Manageme	rchitecture and ent	I, III	d	4	0	0	4	40	60	100
15CSP305A	Distributed	Operating Systems	Ι	b							
15CSP305B	Distributed	l Database Management	Π	b,d							
	System		III		4	0	0	4	40	60	100
15CSP305C	Web Servi	ces	Π	f	4	0	0	4	40	00	100
15CSP305D	Wireless A	pplication Protocol	III	d							
15CSP305E	WAN Tech	nologies	I,II	b							
15CSP311	J2EE Lab		Ι	c,d	0	0	4	2	40	60	100
15CSP312	Linux Lab		Ι	dg	0	0	4	2	40	60	100
Seminar Presentation			III	h	0	2	0	-	-	-	-
	Semester	Total			19	3	8	24	280	420	700
		SEMES	TER	– IV							
15CSP491	Project and	Viva Voce	III	i,g	0	0	0	15	80	120	200
	Semester	Total			0	0	0	15	80	120	200
Program Total						90		90	880	1420	2300
Additional Courses											
15CSP306		Agent Technology	I, II	dg	0	0	0	4	•	100	100
15CSP401 Introduction to Software Architecture		Ι	c	0	0	0	4	-	100	100	

Elective courses*

15CSP204A	Software Testing
15CSP204B	Soft Computing
15CSP204C	Object Oriented Analysis & Design with UML
15CSP204D	Grid Computing
15CSP204E	Geographical Information System
Core Elect	live – II
15CSP305A	Distributed Operating System
15CSP305B	Distributed Database Management System
15CSP305C	Web Services
15CSP305D	Wireless Application Protocol
15CSP305E	WAN Technologies
Open Elective - I	
150EP201	Multimedia and its Applications

- To understand the fundamentals of JavaScript and use different objects
- To know the basics of ASP.NET, its objects and web forms
- To relate SQL Server and ASP.NET through database components
- To develop web application that deals with database and website development.
- To understand XML, Namespace and W3C XML Schema
- To get Familiar with Document Object Model for XML

Course Outcomes(COs)

- 1. Create a client side scripting web application using forms and Java Script
- 2. Understand the server side scripting of ASP.NET, its objects and web forms
- 3. Relate SQL Server and ASP.NET through database components
- 4. Develop web application that deals with database and website development.
- 5. Understand XML, Namespace and W3C XML Schema
- 6. Understand the Document Object Model for XML and JavaScript.

UNIT-I

JavaScript: Introduction to JavaScript – Programming fundamentals – Functions and objects – Navigator object model. Form and form elements – Scripting frames and multiple windows – Event object.

UNIT-II

ASP.NET: **ASP & ASP.NET**: An Overview – Programming ASP.NET with VB.NET: ASP Data types – operators- Request Object- Response Object – Server object - Web forms and ASP.NET: Web forms

UNIT-III

ASP.NET: ASP.NET Configuration, Scope and State: Configuration – state- application – session object- ASP.NET Objects & Components: Scripting object models- ASP components and controls- ASP.NET and SQL server-Using SQL server, using database in ASP.NET applications, ActiveX data objects

UNIT-IV

Creating Mark up with XML: Introduction – Parsers and well formed XML Documents – Parsing an XML Document - Characters – Mark up – CDATA Sections – XML Namespaces. Document Type Definition – Parsers, Well formed and valid XML documents – Element type declarations – Attribute declarations- Attributes Types. Schemas – Schemas VS DTD's – W3C XML Schema

UNIT-V

Document Object Model: DOM implementations – DOM with JavaScript – Components- Creating nodes – Traversing the DOM. Simple API for XML: DOM vs SAX – SAX based Parsers. XLink, XPointer, XInclude and XBase

TEXT BOOKS

- 1. Javascript: The Definitive Guide, David Flanagan, 6th Edition, 2011, O'Reilly Media.
- Danny Goodman, 2000, "Javascript Bible", 3rd Edition, IDG Books India Pvt Ltd. (Page Nos.: 9-16, 24-33, 68-89, 116-130, 151-157, 174-198, 248-252, 323-329, 348-356)
- 3. Dave Mercer. ASP.NET Beginner's Guide. 2nd Edition, New Delhi: MCGraw Hill, 2010.
- 4. Rohit Khurana's , 2002, "Javascript Professional edition", 2nd Edition, A.P.H. Publishing company, NewDelhi. (Page Nos.: 1-93, 98-170)
- Deitel & Deitel. 2001. XML How to Program, 1st Edition, Pearson Education, New Delhi. (Page Nos: 110-127, 134-159, 165-186, 192-227, 232-258, 372-391, 297-314, 319-347, 603-608)

REFERENCES

- 1. David Flanagan. 2006. JavaScript: The Definitive Guide, O'Reilly.
- 2. Nicholas C. Zakas, Inc Ebrary and Ebrary. 2005. Professional JavaScript for Web Developers, John Wiley & Sons Inc, New Delhi.
- 3. Russell Jones A.. 2000. Mastering ActiveServerPages 3, 1st Edition, BPB Publishing, New Delhi.
- 4. Thau. 2007. The Book of JavaScript: A Practical Guide to Interactive WebPages,
- 5. Ann Novarro, Chuck White and Linda Burman. 2000. Mastering XML, 1st Edition, BPB Publications, New Delhi.
- 6. Charles Ashbacher. 2000. XML in 24 hours, 1st Edition, Techmedia Publication, New Delhi.
- 7. Manish Jain. 2001. XML Complete, 1st Edition, BPB Publications, New Delhi.
- 8. Steve Holzner. 2000. Inside XML , 1st Edition, TechMedia, New Delhi.
- 9. Matthew MacDonald. 2013. ASP.NET The Complete Reference, McGraw Hill Education, New Delhi.

- 1. www.w3schools.com/
- 2. www.2createawebsite.com
- 3. www.javascriptkit.com
- 4. www.learn-javascript-tutorial.com
- 5. www.webteacher.com/javascript
- 6. www.asptutorial.info
- 7. www.aspfree.com
- 8. www.aspnettutorials.com

Semester-I L T P C 15CSP102 CRYPTOGRAPHY AND NETWORK SECURITY 4 0 0 4

Course Objectives

This course will provide students with a theoretical knowledge to understand the fundamental principles of access control models and techniques and,

- To understand theory of fundamental cryptography, encryption and decryption algorithms
- To know about various encryption techniques.
- To understand various Block Ciphers, DES and AES algorithms
- To understand the concept of Public key cryptography.
- To study about message authentication and hash functions
- To impart knowledge on web security, electronic mail security, firewalls

Course Outcomes (COs)

On successful completion of the course the student should be able to:

- 1. Classify the symmetric encryption techniques
- 2. Illustrate various Public key cryptographic techniques
- 3. Evaluate the authentication and hash algorithms.
- 4. Summarize the intrusion detection and its solutions to overcome the attacks.
- 5. Understand basic concepts of system level security
- 6. Build secure authentication systems by use of message authentication techniques.

UNIT -I

Introduction – Security Trends - The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security. Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques – Transposition Techniques – Rotor Machines - Steganography.

UNIT -II

Block Ciphers and Data Encryption Standard –Block Cipher Principles – The Data Encryption Standard - The Strength of DES –Advanced Encryption Standard (AES) – Evaluation Criteria for AES – The AES Cipher – Multiple Encryption and Triple DES – Block Cipher Modes of Operation – Stream Ciphers and RC4- modular Arithmetic and Euclidean Algorithm.

UNIT-III

Confidentiality using Symmetric Encryption – Placement of Encryption Function – Traffic Confidentiality – Key Distribution – Public key Cryptography and RSA – Principles of Public Key Cryptosystems – The RSA Algorithm- Basic prime numbers and Discrete Logarithms -Key Management – Diffie Hellman Key Exchange.

UNIT-IV

Message Authentication and hash functions – Authentication Functions – Message Authentication Codes (MAC's) Functions – Security of Hash Functions and MAC's Digital Signatures and Authentication Protocols – Digital Signatures – Digital Signature Standard

UNIT-V

Network Security Applications - Authentication Applications - KERBEROS - X.509 Authentication Service - Public Key Infrastructure - Electronic Mail Security - Pretty Good Privacy - S/MIME - IP Security.

TEXT BOOKS

- William Stallings. 2006. Cryptography and Network Security Principles and Practices, 4th Edition, Pearson Education, New Delhi. (Page Nos. : 6-35, 62-75, 80-135, 199-220, 289-298, 317-340, 377-390, 400-436, 436-457, 483-506)
- 2. Atul Kahate, 2003. Cryptography and Network Security, 2nd Edition, Tata McGraw Hill, New Delhi.

REFERENCES

- 1. Ankit Fadia. 1998. Network Security, 1st Edition, McMillan Publications, New Delhi.
- 2. Bruce Schneir. 1998. Applied Cryptography, 1st Edition, CRC Press, New Delhi.
- 3. Charlie Kaufman, Radia Perlman and Mike Speciner. 2003. Network Security Private Communication in a Public World, 2nd Edition, Prentice-Hall of India, New Delhi.
- 4. Menezes .A, Van Oorschot and S. Vanstone. 1997. Hand Book of Applied Cryptography, 1st Edition, CRC Press, New Delhi. (Free Downloadable)

- 1. williamstallings.com/Crypto3e.html
- 2. u.cs.biu.ac.il/~herzbea/book.html
- *3.* www.flipkart.com/search-books/cryptography+and+network+security +William+ stallings+ebook

- To identify the scope and essentiality of Data Warehousing and Mining.
- To analyze data, choose relevant models and algorithms for respective applications.
- To study spatial and web data mining.
- To develop research interest towards advances in data mining.
- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.

Course Outcomes (COs)

- 1. Understand Data Warehouse fundamentals, Data Mining Principles
- 2. Design data warehouse with dimensional modelling and apply OLAP operations.
- 3. Identify appropriate data mining algorithms to solve real world problems
- 4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
- 5. Describe complex data types with respect to spatial and web mining.
- 6. Benefit the user experiences towards research and innovation integration.

UNIT-I

Introduction: Fundamentals of data mining - Data Mining Functionalities - Classification of Data Mining systems - Major issues in Data Mining.

Data Warehouse and OLAP Technology: An Overview - Data Warehouse - Multidimensional Data Model - Data Warehouse Architecture - Data Warehouse Implementation - From Data Warehousing to Data Mining.

UNIT-II

Data Preprocessing: Needs Preprocessing the Data - Data Cleaning - Data Integration and Transformation - Data Reduction - Discretization and Concept Hierarchy Generation - Online Data Storage.

UNIT-III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts - Efficient and Scalable Frequent item set Mining Methods - Mining various kinds of Association rules – From Association Mining to Correlation Analysis - Constraint-Based Association Mining.

UNIT-IV

Classification and Prediction: Issues Regarding Classification and Prediction - Classification by Decision Tree Induction - Rule-based Classification – Prediction -

Accuracy and Error Measures - Evaluating the Accuracy of a classifier or Predictor - Ensemble Methods - incrvveases the Accuracy - Model Selection.

UNIT-V

Cluster Analysis Introduction :Types of Data in Cluster Analysis - A Categorization of Major Clustering Methods - Partitioning Methods - Hierarchical Methods – Density-Based Methods, Grid-Based Methods - Model-Based Clustering Methods - Clustering High-Dimensional Data – Constraint-Based Cluster Analysis - Outlier Analysis.

Applications and Trends in Data mining: Text Mining - Web Mining - Multimedia Mining-Spatial Mining - Visual data mining.

TEXT BOOK

1. Jiawei Han and Micheline Kamber. 2006. Data Mining – Concepts and Techniques, 1st Edition, Morgan Kaufmann Publishers, Mumbai.

(Page Nos: 1-36, 47 -94, 105-148, 227 -267, 289 -306, 318- 322, 354-372, 386-458, 600-640) **REFERENCES**

- 1. Michael J.A. Berry, Gordon S. and Linoff. 2006. Data mining Techniques, 2nd Edition, Wiley Publishing Inc,
- 2. Arun K Pujari. 2001. Data Mining Techniques, 1st Edition, University Press, New Delhi.
- 3. Gupta G.K. 2000. Introduction to Data mining with case studies, 1st Edition, Prentice Hall of India, New Delhi.
- Hillol Kargupta, Anupam Joshi, Krishnamoorthy Sivakumar and Yelena Yesha. 2005. Data Mining Next Generation Challenges and Future Directions, 1st Edition, Prentice Hall of India, New Delhi.
- 5. Inmon W. H. Building the DataWarehouse, Wiley Dreamtech India, 1st Edition, New Delhi.
- Michael J.A. Berry, Gordon S. and Linoff. 2000. Mastering Data Mining, 1st Edition, John Wiley & Sons Inc, New Delhi.
- 7. Margaret H. Dunham. 2000. Data Mining Introductory and advanced topics, 1st Edition, Pearson Education, New Delhi.
- 8. Paulraj Ponnaiah. 2002. Data Warehousing Fundamentals, 1st Edition, Wiley Student Edition, New Delhi.
- 9. Ralph Kimball. The Data Warehouse Life cycle Tool kit, 1st Edition, Wiley Student Edition, New Delhi.
- 10. Sam Anahory and Dennis Murray. Data Warehousing in the Real World, 1st Edition, Pearson Education, Asia.
- 11. Soman K.P, Shyam Diwakar and V.Ajay. 2006. Insight into Data Mining Theory and Practice, 1st Edition, Prentice Hall of India, New Delhi.

- 1. Thedacs.Com
- 2. Dwreview.Com
- 3. Pcai.Com
- 4. Eruditionhome.Com

To learn about the basic things involved in cloud computing and its architecture.

- To know the basics of cloud computing and its types.
- To know about the services such as IaaS, PaaS, SaaS, IDaaS and CaaS.
- To understand the Virtualization Technologies.
- To understand the Information Security, Privacy and Compliance Risks.
- To learn commercial Google Web services Open Nebula.
- To portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.

Course Outcomes (COs)

On successful completion of the course the student should be able to:

- 1. Understand cloud architecture and model.
- 2. Identify various service models of Cloud computing.
- 3. Explore cloud infrastructure.
- 4. Learn Threat issues and Database Integrity Issues.
- 5. Learn Open Source and Commercial Clouds such as Microsoft Azure, Amazon EC2.
- 6. Provide a good understanding of the concepts, standards and protocols in Cloud computing

UNIT-I

Introduction to Cloud Computing -Characteristics of Cloud Computing -Paradigm shift -Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards-Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud -Community cloud

UNIT –II

Infrastructure as a Service (IaaS) -Platform as a Service (PaaS) -Software as a Service (SaaS) -Identity as a Service (IDaaS) -Compliance as a Service (CaaS)- Cloud storage.

UNIT -III

Virtualization Technologies -Load Balancing and Virtualization -Advanced load balancing -The Google cloud - Hypervisors -Virtual machine types -VMware vSphere -Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance

UNIT-IV

Cloud Information Security Objectives -Confidentiality, Integrity, and Availability -Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing Risk Issues -The CIA Triad

Privacy and Compliance Risks -Threats to Infrastructure, Data, and Access Control -Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider Risks Architectural Considerations

General Issues- Trusted Cloud Computing -Identity Management and Access Control

UNIT -V

Case Study on Open Source and Commercial Clouds: Microsoft Azure- Amazon EC2-Google Web services – Open Nebula.

TEXT BOOKS

- 1. Barrie Sosinsky .2010. Cloud Computing Bible, Wiley- India
- 2. Rajkumar Buyya, James Broberg, Andrzej M Goscinski. 2011. Tata Mc-Graw Hill, New Delhi.
- 3. Ronald L. Krutz, Russell Dean Vines. 2010. Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Wiley –India

REFERENCES

- 1. Dr Kumar Saurabh.2012. Cloud Computing, 2nd Edition, Wiley India.
- 2. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter. 2010. Cloud Computing Practical Approach, 1st Edition, Tata McGraw Hill, New Delhi.
- 3. Nikos Antonopoulos, Lee Gillam. 2012. Cloud Computing: Principles, Systems and Applications, Springer.
- 4. OpenNebula 3 Cloud Computing by Giovanni Toraldo, 2012.

- 1. en.wikipedia.org/wiki/Cloud_computing
- 2. www.ibm.com/cloud-computing/in/en/
- 3. www.oracle.com/CloudComputing
- 4. www.microsoft.com/en-us/cloud/default.aspx

- To learn about the concepts and principles of mobile computing;
- To explore both theoretical and practical issues of mobile computing;
- To develop skills of finding solutions and building software for mobile computing applications.
- To identify the use of mobile wireless technologies
- To know the types of mobile wireless technologies that are currently being used
- To understand the working of mobile wireless technologies access to network resources.

Course Outcomes (COs)

- 1. Grasp the concepts and features of mobile computing technologies and applications
- 2. Have a good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support
- 3. Identify the important issues of developing mobile computing systems and applications
- 4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities;
- 5. Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools;
- 6. Organize and manage software built for deployment and demonstration.

UNIT-I

Mobile computing applications and Platforms - Introduction – Strengths and Weakness of Wireless – Applications – Platforms to support Mobile Computing Applications –Wireless Networks – Wireless Architecture, Security and Management – Wireless Business

UNIT-II

Mobile Computing Applications - Key Characteristics of Mobile Applications – Messaging for users – Mobile Portals – Special Applications – Mobile agent applications

UNIT-III

Wireless Internet, Mobile IP and Wireless Web - Internet and Web – How it works – Mobile IP – WWW for wireless – Mobile Web Services - **Mobile Computing Platforms** - Introduction – Wireless Middleware – Wireless Gateways and Mobile Application Servers – WAP – I-MODE, Wireless JAVA, MMIT, and BREW – Voice communication

UNIT-IV

Wireless LANs - IEEE 802.11 – MANET – HiperLAN2 - Wireless Personal Area Networks - IEEE 802.15 – Home Networks – Blue tooth LANs – Sensor Networks -Cellular Networks - Principles – First Generation(1G) Cellular – Paging networks – Second Generation(2G) Cellular – Data over Cellular Networks – Third Generation Cellular (3G) Networks – Beyond 3G

UNIT-V

WML: Formatting Output – Variables – Input Operations – WML Script – WML Libraries.

TEXT BOOKS

- 1. Amjad Umar. 2004. Mobile Computing and Wireless Communication Applications, Networks, Platforms Architecture and Security, NGE Solutions INC., New York. (Page Nos: 1.1-1.52, 2.3 2.51, 3.2 3.37, 4.3-4.51, 6.16-6.36, 7.3-7.33, 8.4-8.39)
- 2. Kris Jamsa. 2001. WML & WML Script, Tata McGraw Hill Publishing, New Delhi (Page Nos: 61-198, 225-336)

REFERENCES

- 1. Ashok K.Talukder and Roopa R. Yavagal. 2008. Mobile Computing, Tata Mc-Graw Hill Publishing Company Pvt Ltd, New Delhi.
- 2. *Jack M. Holtzman and David J. Goodman. 1994. Wireless and Mobile Communications, Kluwer Academic Publishers.
- 3. *Mischa Schwartz. 2005. Mobile Wireless Communications, Cambridge University Press.

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- 2. http://www.homeandlearn.co.uk/bc/beginnerscomputing.html
- 3. http://compnetworking.about.com/
- 4. http://www.compinfo.co.uk/computer_books.htm#tele

15CSP111

Course Objectives

- To understand the fundamentals of JavaScript and use different objects
- To know the basics of ASP.NET, its objects and web forms
- To relate SQL Server and ASP.NET through database components
- To develop web application that deals with database and website development.
- To understand XML, Namespace and W3C XML Schema
- To get Familiar with Document Object Model for XML

Course Outcomes(COs)

- 1. Create a client side scripting web application using forms and Java Script
- 2. Understand the server side scripting of ASP.NET, its objects and web forms
- 3. Relate SQL Server and ASP.NET through database components
- 4. Develop web application that deals with database and website development.
- 5. Understand XML, Namespace and W3C XML Schema
- 6. Understand the Document Object Model for XML and JavaScript.
- 1. Using Javascript change the font color on reloading a webpage.
- 2. Generate web page that represents clock-every 60 see the page updated with server current time Using JavaScript.
- 3. Design a form and validate it using JavaScript.
- 4. Write Database Access program using ASP.NET
- 5. Program to retrieve Cookies information using ASP.NET
- 6. Program to count web page hits using ASP.NET
- 7. Create a menu in XML.
- 8. Create a demo for XSLT.
- 9. Display XML information in Tree structure format.

- To identify the scope and essentiality of Data Warehousing and Mining.
- To analyze data, choose relevant models and algorithms for respective applications.
- To study spatial and web data mining.
- To develop research interest towards advances in data mining.
- To introduce students to the basic concepts and techniques of Data Mining.
- To develop skills of using recent data mining software for solving practical problems.

Course Outcomes (COs)

- 1. Understand Data Warehouse fundamentals, Data Mining Principles
- 2. Design data warehouse with dimensional modelling and apply OLAP operations.
- 3. Identify appropriate data mining algorithms to solve real world problems
- 4. Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
- 5. Describe complex data types with respect to spatial and web mining.
- 6. Benefit the user experiences towards research and innovation integration.

List of Programs

1. Write a MATLAB program to do all basic matrix operations in MATLAB for a multidimensional array.

2. Write a MATLAB code to compares and contrasts some similarity and distance measures for the following .

(a) Compute the Hamming distance and the Jaccard similarity between the following two binary vectors.

x = 0101010001y = 0100011000

- 3. a. Plot the graph of $f(x) = \exp(-2x^2 3y^2)$. Choose appropriate intervals for x and y. b. Plot the graph of $f(x) = \cos(x) \sin(y)$. Choose appropriate intervals for x and y.
- 4. The number of children for different patients in a database is given with a vector $c = \{3,1,0,2,7,6,3,4,-2,0,0,10,15,6\}$

. Find the outliers in the set C using standard statistical parameters mean and variance. a. If the threshold value is changed from ± 3 standard deviations to ± 2 standard deviations, what additional outliers are found? 5. For a given data set X of three-dimensional samples,

 $X = [\{1,2,0\},\{3,1,4\},\{2,1,5\},\{0,1,6\},\{2,4,3\},\{4,4,2\},\{5,2,1\},\{7,7,7,\},\{0,0,0\},\{3,3,3\}]$ a) find the outliers using the distance-based technique if

i) the threshold distance is 4, and threshold fraction p for non-neighbor samples is 3. ii) the threshold distance is 6, and threshold fraction p for non-neighbor samples is 2.

6. Given the data set X with three input features and one output feature representing the classification of samples

X:	$\overline{I_1}$	I_2	I ₃	0
	2.5	1.6	5.9	0
	7.2	4.3	2.1	1
	3.4	5.8	1.6	1
	5.6	3.6	6.8	0
	4.8	7.2	3.1	1
	8.1	4.9	8.3	0
	6.3	4.8	2.4	1

Rank the features using a comparison of means and variances

7. A data set for analysis includes only one attribute X:

X={7,12,5,18,5,9,13,12,19,7,12,12,13,3,4,5,13,8,7,6}

a) What is the mean of the data set X?

b) What is the median?

c) What is the mode, and what is the modality of the data set X?

d) Find the standard deviation for X.

e) Give a graphical summarization of the data set X using a boxplot representation.

f) Find outliers in the data set X.

8. Given a data set with two dimensions X and Y.

X	Y
1	5
4	2.75
3	3
5	2.5

a) Use a linear-regression method to calculate the parameters α and β where $y = \alpha + \beta x$.

b) Estimate the quality of the model obtained in a) Using the correlation coefficient r.

9.	The	follo	wing	is	the	data	set X:	
----	-----	-------	------	----	-----	------	--------	--

X:	Year	Α	В
	1996	7	100
	1997	5	150

1998	7	120
1999	9	150
2000	5	130
2001	7	150

Create 2D Presentations:

a) Show a bar chart for the variable A

- b) Show a histogram for the variable B.
- c) Show a line chart for the variable B
- d) Show a pie chart for the variable A

10. Create a MATLAB function to count the number of lines in a text file.

11. Create a structure array for student mark details and print a plot for the marks of the students.

12. The test scores for the three students are given in the following table:

	RDBMS	OracleDBA	WebDesigning	AI
Smith	66	91	95	83
Sam	91	88	80	73
John	80	88	80	78

Find the best student using multifactorial evaluation, if the weight factors for the subjects are given as the vector W = [0.3, 0.2, 0.1, 0.4]

15CSP201 INTERNETWORKING WITH TCP/IP

Course Objectives

- To get an architectural overview of the TCP/IP Protocol Suite
- To understand about subnets using IP classes
- To understand the key features and functions of ARP Protocol.
- To understand how basic routing protocol works.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN

Course Outcomes (COs)

At the completion of the course, students will:

- 1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
- 2. Understand the routing IP datagrams and checksum.
- 3. Exposed to unicast and multicast routing.
- 4. Learn about host name resolution and the Domain Name System (DNS).
- 5. Learn about services and operations of DHCP Servers and Domain Name Servers
- 6. Understand about SMTP and SNMP.

UNIT-I

Introduction: WAN, WAN technologies - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

UNIT-II

ARP & RARP – Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP – Types of Messages - Message Format – Error Reporting – Query – Checksum.

UNIT-III

Unicast Routing Protocol: Intra Domain and Inter Domain Routing – Distance Vector Routing – RIP – Link State Routing – OSPF – Path Vector Routing – BGP – Multicast Routing – Multicast Routing Protocols. Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

UNIT-IV

BOOTP - DHCP – Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records

UNIT-V

Remote Login - FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells – ATMARP – Logical IP Subnets. VPN

TEXT BOOK

 Behrouz A. Forouzan. 2009. TCP/IP Protocol Suite. 3rd Edition, Tata McGraw Hill Publication, New Delhi. (Page Nos: 2-5, 6-38, 69-74, 84-95, 102-121, 160-188, 191-1-201, 221-232, 238-241, 256-279, 299-304, 386-430, 441-444, 457-464, 471-488, 519-542, 561-566, 575-576, 621-632, 637-644, 680-682)

REFERENCES

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- 2. Buck Graham. 2007. TCP/IP Addressing, 2nd Edition, Harcount India Private Limited, New Delhi.
- 3. Douglas E. Comer. 2000. Computer Networks and Internets, 4th Edition. Pearson Education, New Delhi.
- 4. William Stallings. 2007. Data and Communication Network, 8th Edition, Tata McGraw Hill, New Delhi.

- 1. en.wikipedia.org/wiki/Internet_protocol_suite
- 2. http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
- 3. www.yale.edu/pclt/COMM/TCPIP.HTM
- 4. www.w3schools.com/**tcpip**/default.asp

- To state the basic concepts in information security, including security policies, security models, and security mechanisms.
- To provide an exposure to the spectrum of security activities methods methodologies and procedures with emphasis on practical aspects of Information Security.
- To understand principles of web security.
- To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
- To understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
- To provide the learner will be able to examine secure software development practices.

Course Outcomes (COs)

A student who successfully completes this course should at a minimum be able to:

- 1. State the basic concepts in information security, including security policies, security models, and security mechanisms.
- 2. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
- 3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
- 4. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
- 5. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
- 6. The learner will be able to examine secure software development practices.

UNIT-I

Introduction to cybercrime: Introduction-Cybercrime: Definition and Information Security-who are cybercriminals? - Classification of cybercrimes. Cybercrime: The legal perspectives- cybercrimes: An Indian Perspective - cybercrime and the Indian ITA2000: Hacking and the Indian law(s) - A Global Perspective on cybercrimes: cybercrime and the Extended Enterprise - cybercrime Era: Survival Mantra for the Netizens - Concluding Remarks and Way Forward to Further Chapters.

UNIT-II

Cyberoffenses: How Criminals Plan Them: Introduction: categories of Cybercrime -How criminals Plan the Attacks: Reconnaissance, Passive Attacks, Active Attacks, Scanning and Scrutinizing Gathered Information, Attack(Gaining and Maintaining the system

Access) -social Engineering: Classification of Social Engineering - Cyberstalking: Types of stalkers, Cases Reported on Cyberstalking, How stalking Works?, real-life incident of Cyberstalking -Cybercafe and Cybercrimes - Botnets: The Fuel for cybercrime: Botnet - Attack Vector-Cloud Computing: Why cloud computing? Types of Services, Cybercrime and Cloud Computing.

UNIT-III

Cybercrime: Mobile and wireless Devices-Introduction - Proliferation of Mobile and Wireless Devices - Trends in Mobility-Credit Card Frauds in Mobile and Wireless Computing Era: Types and Techniques of Credit Card Frauds - Security challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service security: cryptographic security, LDAP Security, RAS Security, Media Player Control Security, Networking API Security - Attacks on Mobile/Cell Phones: Mobile Phone Theft, Mobile Viruses, Mishing, Vishing, Smishing, Hacking Bluetooth.

UNIT-IV

Mobile Devices: Security Implication for Organizations – Managing Diversity and Proliferation of Hand-Held Devices, Unconventional/ Steath Storage Devices, Threats through Lost and Stolen Devices, Protecting Data on lost devices, Educating the Laptop Users - Organizational Measures for Handling Mobile devices - Related Security Issues: Encrypting Organization Databases, Including Mobile Devices in Security Strategy - Organizational Security Policies and Measures in mobile Computing Era: Importance of Security polices relating to mobile Computing Devices, Operating Guidelines for Implementing Mobile Devices Security Policies, Organizational Policies for the Use of Mobile Hand - Held Devices - Laptops: Physical Security Countermeasures.

UNIT-V

Tools and Methods Used in Cybercrime: Introduction - Proxy Servers and Anonymizers - Phishing: How Phishing Works? - Password Cracking: Online Attacks, Offline Attacks, Strong, Weak and Random Passwords, Random passwords - Keyloggers and Spywares: Software Keyloggers, Hardware Keyloggers, AntiKeylogger, Spywares - Virus and Worms: Types of Virus - Trojan Horses and Backdoors: backdoor, How to protect from Trojan Horses and Backdoors - Steganography: Steganalysis - DoS and DDoS Attacks: DoS Attacks, Classification of DoS Attacks, Types or Levels of DoS Attacks, Tools Used to Launch DoS Attacks, DDoS Attacks, How to Protect from DoS/DDoS Attacks - SQL Injection: Steps for SQL Injection Attacks, How to Prevent SQL Injection Attacks -Buffer Overflow: Types of Buffer Overflow, How to Minimize Buffer Overflow -Attacks on Wireless Networks: Traditional Techniques of Attacks on Wireless Networks, Thef of Internet Hours and Wi-fi-based Frauds and Misuses, How to Secure the Wireless Networks.

TEXT BOOK

Nina Godbole and Sunit Belapure. 2013. CYBER SECURITY. Wiley India Pvt. Ltd. **REFERENCES**

1. Charles P. Pfleeger and Shari L. Pfleeger. 2003.

2. Dieter Gollmann . 2006. Computer Security. 2nd Edition . John Wiley & Sons.

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4. T. Marther, S. Kumaraswamy and S. Latif (2009). Cloud Security and Privacy: An Enterprise Perceptive on Risk and Complaince, O'Reilly.

- 1. http://www.csc.ncsu.edu/faculty/ning
- $2. \ csrc.nist.gov/publications/nistpubs/800-12/handbook.pdf$
- 3. www2.warwick.ac.uk/fac/sci/dcs/teaching/modules/cs134/

- To introduce the concepts and methods required for the construction of large software intensive systems.
- To develop a broad understanding of the discipline of software engineering and management of software systems.
- To provide an understanding of both theoretical and methodological issues involve in modern software engineering project management and focuses strongly on Practical techniques.
- To apply proper theoretical, technical, and practical knowledge of software requirements, analysis, design, implementation, verification and validation, and documentation
- To develop appropriate design solutions to a given problem using software engineering approaches that integrates ethical, social, legal, and economic concerns.
- To express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

- 1. Apply the process to be followed in the software development life-cycle models.
- 2. Implement communication, modeling, construction & deployment practices in software development.
- 3. Analyze & design the software models using unified modeling language (UML).
- 4. Explain the concepts of various software testing methods & be able to apply appropriate testing approaches for development of software.
- 5. Explain the quality management & different types of metrics used in software development.
- 6. Apply the concepts of project management & planning

UNIT-I

Introduction to Software Project Management – Stepwise: an overview of project planning – Project Evaluation.

UNIT-II

Selection of an appropriate project approach – Software effort estimation – Activity planning – Risk Management.

UNIT-III

Resource Allocation – Monitoring and Control – Managing Contracts.

UNIT-IV

Managing People and Organizing Teams – Software Quality – Small Projects. **UNIT-V**

Prince 2 An Overview – BS 6079:1996 An Overview – Programme Management – ISO12207: An Overview.

TEXT BOOK

1. Bob Hughes and Mike Cotterell. 2010. Software Project Management, 5th Edition, Tata McGraw Hill, New Delhi:

REFERENCES

1. Royce.2000. Software Project Management, 1st Edition, Addisions Wesley, New Delhi.

- 1. http://en.wikipedia.org/wiki/Software_project_management
- 2. http://www.onesmartclick.com/engineering/software-engineering.html
- 3. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/

15CSP204A

SOFTWARE TESTING

Course Objectives

- To understand basic software debugging methods.
- To describe the principles and need for various types of testing and understand the essential characteristics of tool used for test automation
- To understand White box and Black box testing methods and techniques.
- To design test plans.
- To differentiate between validation testing and defect testing
- To use various Quality Assurance models.

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

- 1. Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.
- 2. Implement various test processes for quality improvement
- 3. Design test planning.
- 4. Manage the test process
- 5. Apply the software testing techniques in commercial environment
- 6. Use practical knowledge of a variety of ways to test software and an understanding of some of the tradeoffs between testing techniques.

UNIT-I

Introduction about testing, Definition about software testing-Principles of testing-Phases of software project-Difference between QC and QA-Testing, Verification and Validation. Life cycle models for Waterfall, Spiral and V model.

UNIT-II

Types of testing-White box testing- Black box testing-Performance testing- Regression testing-Adhoc testing.

UNIT-III

Test planning-Test process-Test reporting-Best practices-Test planning check list-Test plan templates-Test case writing-Techniques for SRS document.

UNIT-IV

Software test automation-Skills needed for automation-What to automate-Scope of automation-Design and architecture for automation. Process model for automation-Selecting test tool.

UNIT-V

Test metrics – Types of metrics – Project metrics-progress metrics-productivity metrics. What is win runner-Methods of testing in win runner.

TEXT BOOK

 Srinivasan Desikan, GopalaSwamy and Ramesh. 2008. Software testing –Principles and Practices, 1st Edition, Pearson Education, New Delhi. (Page Nos: 3-22, 25-43, 47-68, 73-104, 169-190, 193-207, 228-248, 351-385, 388-416, 420-456)

REFERENCES

- 1. Boris Beizer. 2000. Software Testing Techniques, 2nd Edition, Wiley Dreamteach, India, New Delhi.
- 2. Elfride Dustin. 2007. Effective software testing, 1st Edition, Pearson Education, New Delhi.
- 3. Louise Tamres. 2002. Introduction to Software Testing, 1st Edition Pearson Education, New Delhi.
- 4. Ron Patton. 2004. Software Testing, 2nd Edition, Pearson Education, New Delhi.
- 5. William E. Perry. 2001. Effective methods for Software Testing, 2nd Edition, John Wiley & Sons, New Delhi.

- 1. en.wikipedia.org/wiki/Software_testing
- 2. www.onestoptesting.com/ -
- 3. www.ece.cmu.edu/~koopman/des_s99/sw_testing/
- 4. http://students.depaul.edu/~slouie/wr_tut.pdf (Unit V)

- To understand the scope and evolution of soft computing
- To learn the various soft computing frame works
- To be familiar with design of various neural networks
- To be exposed to fuzzy sets and fuzzy logic
- To understand fuzzy measures and reasoning
- To learn genetic programming.

Course Outcomes(COs)

- 1. Understand the scope and evolution of soft computing
- 2. Learn the various soft computing frame works
- 3. Be familiar with design of various neural networks
- 4. Be exposed to fuzzy sets and fuzzy logic
- 5. Understand fuzzy measures and reasoning
- 6. Learn genetic programming.

UNIT-I

Introduction : Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence – Neural Networks - Scope and Evolution– Models of Neural Networks – Feed forward Networks – Supervised Learning Neural Networks – Associative memory networks – Unsupervised learning networks – Special Networks.

UNIT-II

Fuzzy Sets and Fuzzy Logic : Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations - Fuzzy Rules Non – interactive fuzzy sets – Fuzzification– Intuition, inference, Rank ordering – Defuzzification – Max-membership principle, centroid method, center of sums, center of largest area.

UNIT-III

Fuzzy Measures and Reasoning: Fuzzy arithmetic and measures – Fuzzy reasoning – approximate reasoning – categorical, qualitative, syllogistic, dispositional – Fuzzy inference systems – fuzzy decision making – individual, multiperson, multi objective, Bayesian – fuzzy logic control system – architecture, model and application.

UNIT-IV

Machine Learning And Genetic Algorithm : Machine Learning Techniques – Machine Learning Using Neural Nets – Genetic Algorithms (GA) – Simple and General GA – Classification of Genetic Algorithm – Messy, Adaptive, Hybrid, Parallel – Holland Classifier System.

UNIT-V

Application and Implementation Soft Computing: Genetic algorithms -. Traveling Salesperson Problem, Internet Search Techniques – Fuzzy Controllers – Bayesian Belief networks for Rocket Engine Control – Neural Network, Genetic algorithm and Fuzzy logic implementation in C++ and Matlab.

TEXT BOOK

1.S.N. Sivanandam and S.N. Deepa, "Principles of Soft Computing", Wiley India Ltd., First Indian Edition, 2007

REFERENCES

1.Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, "Neuro-Fuzzy and Soft Computing", Prentice-Hall of India, 2003.

2. James A. Freeman and David M. Skapura, "Neural Networks Algorithms, Applications, and Programming Techniques", Pearson Edn., 2003.

3. George J. Klir and Bo Yuan, "Fuzzy Sets and Fuzzy Logic-Theory and Applications", Prentice Hall, 1995.

4. Amit Konar, "Artificial Intelligence and Soft Computing", First Edition, CRC Press, 2000.

5. Simon Haykin, "Neural Networks: A Comprehensive Foundation", Second Edition Prentice Hall, 1999.

6. Mitchell Melanie, "An Introduction to Genetic Algorithm", Prentice Hall, 1998.

7. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning", Addison Wesley, 1997.

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- 2. www.soft-computing.de/def.html
- 3. en.wikipedia.org/wiki/Soft_computing
- 4. endnote.com/downloads/style/applied-soft-computing
- 5. www.allbookez.com/soft-computing-lecture-notes/

Semester-II L T P C

15CSP204C OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML 5 0 0 5

Course Objectives

- to use an object-oriented method for analysis and design
- To analyse information systems in real-world settings and to conduct methods such as interviews and observations
- To have a general understanding of a variety of approaches and perspectives of systems development, and to evaluate other is development methods and techniques
- To know techniques aimed to achieve the objective and expected results of a systems development process
- To know different types of prototyping
- To know how to use UML for notation.

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

- 1. Understand the concepts and terms used in the object-oriented approach to systems analysis and design
- 2. Use Unified Modeling Language 2.2
- 3. Perform object-oriented analysis and design
- 4. Identify the characteristics of the UML and explain UML is relevant to the process development.
- 5. Draw class Diagrams, Object Diagram and Interaction Diagram.
- 6. Construct various UML models (including use case diagrams, class diagrams, interaction diagrams, statechart diagrams, activity diagrams, and implementation diagrams) using the appropriate notation.

UNIT-I

The Object Model: The evolution of the object model – Elements of the object model – Applying object model. **Classes and Objects:** The nature of an object – Relationships among objects.

UNIT-II

Classes and Objects: The nature of the class – Relationship among classes – The Interplay of Classes and Objects – On building quality classes and objects. **Classification**: The Importance of proper classification – Identifying proper classes and objects – Key abstraction mechanism.

UNIT-III

The notation: Elements of the notation – class diagrams –state transition diagrams – object diagrams.

UNIT-IV

The Process: First principles – The micro development process – The macro development process.

UNIT-V

UML Overview: UML History – Goals of UML – UML concept areas – Syntax of Expressions and Diagrams.

Nature and purpose of Models: A Model – Levels of Models – Meaning of Model. UML Walkthrough: UML views – Static views – use case view – interaction views – state machine view – activity view – physical view – model management view- extensibility constructs.

TEXT BOOK

1. Grady Booch. 2007. Object Oriented Analysis and Design, 3rd Edition, Addison Wesley, New Delhi.

REFERENCES

- 1. James Rumbaugh, Ivar Jcobson and Grady Booch. 2003. The Unified Modeling Language Reference Manual, 1st Edition, Addison Wesley, New Delhi.
- Martin Fowler, Kendall Scott. 2004. UML Distilled, 2nd Edition, Pearson Education, New Delhi.

- 1. uml-tutorials.trireme.com/
- 2. http://www.devshed.com/c/a/Practices/Introducing-UMLObjectOriented-Analysisand-Design/
- 3. http://community.sparxsystems.com/tutorials/object-oriented-analysis-and-design

		Semester-II
		LTPC
15CSP204D	GRID COMPUTING	5 0 0 5

- To portray the recent trends in the field of Grid computing and creation and management of Internet-based utility computing infrastructure.
- To introduce the principles underlying the function of distributed systems and their extension to grid computing.
- To introduce students to the fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.
- To provide a good understanding of the concepts, standards and protocols in Grid computing
- To enable students to be able to justify the applicability, or non-applicability, of Grid technologies for a specific application.
- To perform analysis, design and implementation of ARC grid computing model.

Course Outcomes (COs)

After successful completion of this course, student will be able to

- 1. Understand and explain the basic concepts of Grid Computing.
- 2. Explain the principles underlying the function of distributed systems and their extension to grid computing
- 3. Explain the advantages of using Grid Computing within a given environment.
- 4. Identify fundamental components of Grid environments, such as authentication, authorization, resource access, and resource discovery.
- 5. Understand Data management and transfer in Grid environments.
- 6. Perform analysis, design and implementation of ARC grid computing model.

UNIT- I

Introduction: Cluster to Grid Computing – Cluster Computing Models – Grid Models – Mobile Grid Models – Applications. Parset: System-independent Parallel Programming on Distributed Systems –introduction – Semantics of the Parset Construct – Expressing Parallelism through Parsets – Implementing Parsets on a Loosely Coupled Distributed System

UNIT-II

Anonymous Remote Computing Model: Issues in Parallel Computing on Interconnected Workstations – Existing Distributed Programming Approaches – The ARC Model of Computation – The Two-tired ARC Language Constructs – Implementation. Integrating Task Parallelism with Data Parallelism: A Model for Integrating Task Parallelism into Data Parallel Programming Platforms – Integration of the Model into ARC – Design and Implementation – Applications - Performance Analysis

UNIT-III

Anonymous Remote Computing and Communication Model: Location – Independent Inter-task Communication with DP – DP Model of Iterative Grid Computations – Design and Implementation of Distributed Pipes. Parallel Programming Model on CORBA: Notion of Concurrency – System Support –Implementation and Performance

UNIT-IV

Sneha-Samuham Grid Computing Model: A Parallel Computing Model over Grids – Design and Implementation – Performance studies. Introducing Mobility into Anonymous Remote Computing and Communication Model – Issues in Mobile clusters and Parallel Computing on Mobile Clusters – Moset Overview – Computation Model – Implementation and Performance

UNIT- V

Distributed Simulated Annealing Algorithms for Job Shop Scheduling - Implementation. Parallel Simulated Annealing Algorithms - Simulated Annealing (SA) Technique – Clustering Algorithm for Simulated Annealing (SA) – Combination of Genetic Algorithm and Simulated Annealing (SA) Algorithm - Implementation. Epilogue : DOS Grid: Vision of Mobile Grids - Mobile Grid Monitoring System – Healthcare Application Scenario.

TEXT BOOK

1. Janakiram .D. 2005. Grid Computing – A Research Monograph, TataMcGraw Hill Publishing Company Limited, New Delhi.

REFERENCES

- 4. Joshy Joseph and Craig Fellenstein. 2003. Grid Computing, Pearson Education, New Delhi.
- 5. Prabhu .C.S.R. 2008. Grid and Cluster Computing, Prentice Hall of India, New Delhi.

- 1. http://cseweb.ucsd.edu/classes/sp00/cse225/notes/fran/introweb.html
- 2. http://www.wisegeek.com/what-is-grid-computing.htm
- 3. http://www.cs.kent.edu/~farrell/grid06/lectures/index.html

- To have a basic, practical understanding of GIS concepts, techniques and real world applications.
- To analyse the basic components of GIS
- To classify the maps, coordinate systems and projections
- To process spatial and attribute data and prepare thematic maps
- To identify and rectify mapping inaccuracies
- To formulate and solve geospatial problems

Course Outcomes (COs)

After successful completion of this course, student will be able to

- 1. Understand the basic concepts of geography necessary to efficiently and accurately use GIS technology.
- 2. Understand basic GIS data concepts.
- 3. Have an ability to perform basic GIS analysis of concepts.
- 4. Have demonstrated a practical application of GIS.
- 5. Have practical experience using basic GIS tools.
- 6. Have an understanding of GIS and its relationship to mapping software development.

Unit I

What is a Geographical Information Systems (GIS) – Geographically referenced data – GIS operations – Geographic Coordinate systems – Map Projections – Commonly used Map Projections – Projected Coordinate Systems – Working with Coordinate systems in GIS.

Unit II

Georelational Vector Data Model – Georelational data model – Representation of simple features – Topology – Nontopological Vector data – Data models for composite features. Object based vector data model – Object based data model – The geodatabase data model – Interface – Topology rules – Advantages of Geodatabase model.

Unit III

Raster Data Model – Elements of Raster Data Model - Raster Data Structure – Data Compression – Data Conversion – Integration of Raster and Vector Data.

Data Input – Existing GIS data – Meta Data – Conversion of Existing Data – Creating New Data.

Unit IV

Geometric Transformation – Root Mean Square (RMS) Error – Interpretation of RMS errors Digitized Maps – Re sampling of Pixel Values.

Spatial Data Editing – Location Errors – Spatial Data Accuracy Standards – Topological Errors – Topological Editing – Nontopological Editing – Other Editing operations

Unit V

Data Display and Cryptography – Cartographic Symbolization – Types of Maps – Typography – Map Design – Map Production.

Data Exploration – Attribute and Data Query – Spatial Data Query – Raster Data Query – GIS Applications.

Text Book

1. Kang-tsung Chang. "*Introduction to Geographic Information Systems*", 3rd Edition, New Delhi: Tata McGraw-Hill, 2006.

Reference Book

 Ian Heywood, Sarah Cornelius, Steve Carver and Srinivasa Raju. "An introduction to Geographical Information Systems", 2nd Edition, New Delhi: Pearson Education, 2006.

150EP201 MULTIMEDIA AND ITS APPLICATIONS

Course Objectives

- To learn and understand technical aspect of Multimedia Systems.
- To understand the standards available for different audio, video and text applications.
- To Design and develop various Multimedia Systems applicable in real time.
- To learn various multimedia authoring systems.
- To design different application in M.M and use different tools like adobe Photoshop and macromedia flash.
- To develop multimedia application and analyze the performance of the same.

Course Outcomes (COs)

- 1. Developed understanding of technical aspect of Multimedia Systems.
- 2. Understand various file formats for audio, video and text media.
- 3. Develop various Multimedia Systems applicable in real time.
- 4. Design interactive multimedia software.
- 5. Design different application using different tools like Adobe Photoshop and flash.
- 6. To evaluate multimedia application for its optimum performance.

UNIT-I

Definition of multimedia – Introduction to making multimedia: the stages of a project – Basic software tools-Using Text in multimedia - font editing and design tools – hypermedia and hypertext.

UNIT-II

Introduction to Photoshop 6: Interfaces and Navigation-Tools-Text-Working in Photoshop-Creating new documents-Saving Files.

UNIT-III

Displaying the Images- Using Rulers, Guides and Grids – Making Selections- Layers and Types-Choosing Colors-Creating Brushes- painting & editing Tools- Making and Applying Gradients.

UNIT-IV

Introduction to Flash: Variables & data types- Data types in Action Script-Creating and placing variables – Buttons with text fields.

UNIT-V

Basic Actions: Play, stop, Back & forth- Between frames and scenes – Timelines – External scripts-Loops.

TEXT BOOKS

- 1. Bill Sanders. 2001. Flash5 Action Script, 1st Edition, DreamTech Press, New Delhi. (Page Nos : 1-19, 20-36, 51-69)
- 2. Steve Romaniello. 2001. Mastering Photoshop 6, 1st Edition, BPB Publications, New Delhi.

(Page Nos : 1-16, 21-24, 39-50, 70-79, 107-122, 195-213, 256-289)

 Tay Vaughan. 2008. Multimedia making it Work, 7th Edition, Tata McGraw-Hill, New Delhi. (Page Nos : 1-11, 18-23, 50-56, 262-276)

REFERENCES

- 1. Dinesh Maidasani. 2006. Flash 8, 1st Edition, Firewall Media Publications, New Delhi.
- 2. Robert Shufflebotham. 2004. Photoshop CS in Easy Steps, 1st Edition, DreamTech Pess, New Delhi.
- 3. Ze-Nian Li and Mark S. Drew. 2004. Fundamentals of Multimedia, Pearson Eduction, New Delhi.

- 1. en.wikipedia.org/wiki/Multimedia
- 2. www.arena-multimedia.com/ -
- 3. www.nextwavemultimedia.com/

Semester-II

15CSP211

ROUTER CONFIGURATION LAB

L T P C 0 0 4 2

Course Objectives

- To get an architectural overview of the TCP/IP Protocol Suite
- To understand about subnets using IP classes
- To understand the key features and functions of ARP Protocol.
- To understand how basic routing protocol works.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN

Course Outcomes (COs)

At the completion of the course, students will:

- 1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
- 2. Understand the routing IP datagrams and checksum.
- 3. Exposed to unicast and multicast routing.
- 4. Learn about host name resolution and the Domain Name System (DNS).
- 5. Learn about services and operations of DHCP Servers and Domain Name Servers
- 6. Understand about SMTP and SNMP.

List of programs

- 1. Simple router configuration.
- 2. Access and utilize the router to set basic parameters.
- 3. Connect, configure, and verify operation status of a device interface.
- 4. Implement static and dynamic addressing services for hosts in a LAN environment.
- 5. Identify and correct common problems associated with IP addressing and host configurations.
- 6. Configure, verify, and troubleshoot RIPv2.
- 7. Perform and verify routing configuration tasks for a static or default route given.
- 8. Configure, verify and troubleshoot NAT operation on a router.
- 9. Configure and verify a PPP connection between routers.

Semester-II L T P C

15CSP212

SOFTWARE DOCUMENTATION LAB 0 0 4 2

Course Objectives

- To introduce the concepts and methods required for the construction of large software intensive systems.
- To develop a broad understanding of the discipline of software engineering and management of software systems.
- To provide an understanding of both theoretical and methodological issues involve in modern software engineering project management and focuses strongly on Practical techniques.
- To apply proper theoretical, technical, and practical knowledge of software requirements, analysis, design, implementation, verification and validation, and documentation
- To develop appropriate design solutions to a given problem using software engineering approaches that integrates ethical, social, legal, and economic concerns.
- To express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

- 1. Apply the process to be followed in the software development life-cycle models.
- 2. Implement communication, modeling, construction & deployment practices in software development.
- 3. Analyze & design the software models using unified modeling language (UML).
- 4. Explain the concepts of various software testing methods & be able to apply appropriate testing approaches for development of software.
- 5. Explain the quality management & different types of metrics used in software development.
- 6. Apply the concepts of project management & planning

Prepare a more detailed, organized and easy-to-read documentation, for any application software, which should describe the following:

- 1. User Requirement Documentation (USD)
- 2. Requirement Analysis Documentation. (RAD)
- 3. User Interfaces Specification. (UIS)
- 4. Object Oriented Design (OOD) or Low Level Design (LLD)
- 5. Code Documentation (CD)
- 6. Testing Documentation (TD)
- 7. User's Guide (UG)

		Semester-III
		LTPC
15CSP301	J2EE	3 1 0 4

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications
- To impart expertise in Web Application Development using J2EE.

Course Outcomes(COs)

- 1. Understand the In-depth concepts of JEE
- 2. Understand the in-depth Life cycle of servlets and JSP.
- 3. Learn how to communicate with databases using Java.
- 4. Handle Errors and Exceptions in Web Applications
- 5. Use NetBeans IDE for creating J2EE Applications
- 6. Understand J2EE as an architecture and platform for building and deploying webbased, n-tier, transactional, component-based enterprise applications

UNIT-I

J2EE Overview: Beginning of Java – Java Byte code – Advantages of Java –J2EE and J2SE. J2EE Multi Tier Architecture – Distributive Systems – The Tier – Multi Tier Architecture – Client Tier, Web Tier, Enterprise Java Beans Tier, Enterprise Information Systems Tier Implementation.

UNIT-II

J2EE Database Concepts: Data – Database – Database Schema. **JDBC Objects**: Driver Types – Packages – JDBC Process – Database Connection – Statement Objects – Result Set – Meta Data.

UNIT-III

Java Servlets: Benefits – Anatomy – Reading Data from Client –Reading HTTP Request Headers – Sending Data to client – Working with Cookies.

UNIT-IV

Enterprise Java Beans: Deployment Descriptors – Session Java Bean –Entity Java Bean Message Driven Bean.

UNIT-V

JSP: What is Java Server Pages? - Evolution of Dynamic Content Technologies – JSP & Java 2 Enterprise Edition; **JSP Fundamentals**: Writing your first JSP- Tag conversions-

Running JSP. **Programming JSP Scripts**: Scripting Languages – JSP tags- JSP directives – Scripting elements – Flow of Control – comments; **Java Remote Method Invocation.**

TEXT BOOKS

- Jim Keogh. 2010. The Complete Reference J2EE, 1st Edition, Tata McGraw Hill, New Delhi. (PAGE NOS.: 3 - 61,23 - 35,98 - 116,124 - 151, 157 - 159, 350 - 369, 406 - 443, 380 - 395, 486-490)
- Duane K. Fields & Mark A.Kolb. 2000 Web Development with Java Server Pages, 1st Edition, Manning Publications, Pune. (PAGE NOS.: 2-15, 46 - 64, 65-99)

REFERENCES

- 1. Joseph J. Bambara et al. 2001. J2EE Unleashed, 1st Edition, Tech Media, New Delhi.
- 2. Paul J. Perrone, Venkata S. R. Chaganti, Venkata S. R. Krishna and Tom Schwenk. 2003. J2EE Developer's Handbook, Sams Publications, New Delhi.
- 3. Rod Johnson. 2004. J2EE Development without EJB, 1st Edition, Wiley Dream Tech, New Delhi.
- 4. Rod Johnson and P.H. Rod Johnson. 2004. Expert One-On-One J2ee Design and Development, John Wiley & Sons, New Delhi.

- 1. java.sun.com/javaee/
- 2. java.sun.com/j2ee/1.4/docs/tutorial/doc/
- 3. www.j2eebrain.com/

- To understand the concepts and principles that underlies modern operating systems
- To practice component to relate theoretical principles with operating system implementation.
- To learn about processes and processor management
- To learn about concurrency and synchronization
- To understand memory management schemes, file system and secondary storage management security and protection etc.
- To use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.

Course Outcomes(COs)

At the end of the course the student will be in a position to –

- 1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.
- 2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.
- 3. Understand basics of various OS related concepts, from programmer's point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.
- 4. Develop applications where several processes need to communicate with each other to complete a task.
- 5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.
- 6. Write programs which employs advanced concepts like multithreading.

UNIT-I

History and Overview Of GNU/Linux And FOSS 3

Definition of FOSS & GNU, History of GNU/Linux and the Free Software Movement, Advantages of Free Software and GNU/Linux, FOSS usage , trends and potential—global and Indian.

UNIT-II

System Administration

GNU/Linux OS installation--detect hardware, configure disk partitions & file systems and install a GNU/Linux distribution ; Basic shell commands -logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions, process management ; User and group management, file ownerships and permissions, PAM authentication ; Introduction to common system configuration files & log files ; Configuring networking, basics of TCP/IP networking and routing, connecting to the Internet (through dialup, DSL, Ethernet, leased line) ; Configuring additional hardware - sound cards, displays & display cards, network cards, modems, USB drives, CD writers ; Understanding the OS boot up process ; Performing every day tasks using gnu/Linux -- accessing the Internet, playing music, editing documents and spreadsheets, sending and receiving email, copy files from disks and over the network, playing games, writing CDs ; X Window system configuration and utilities--configure X windows, detect display devices ; Installing software from source code as well as using binary packages.

UNIT-III

Server Setup And Configuration

Setting up email servers--using postfix (SMTP services), courier (IMAP & POP3 services), squirrel mail (web mail services); Setting up web servers --using apache (HTTP services), php (server-side scripting), perl (CGI support); Setting up file services --using samba (file and authentication services for windows networks), using NFS (file services for gnu/Linux / Unix networks); Setting up proxy services --using squid (http / ftp / https proxy services); Setting up rinter services -using CUPS (print spooler), foomatic (printer database); Setting up a firewall -Using netfilter and iptables.

UNIT-IV

Programming Tools

Using the GNU Compiler Collection --GNU compiler tools ; the C preprocessor (cpp), the C compiler (gcc) and the C++ compiler (g++), assembler (gas) ; Understanding build systems --constructing make files and using make, using autoconf and autogen to automatically generate make files tailored for different development environments ; Using source code versioning and management tools --using cvs to manage source code revisions, patch & diff ; Understanding the GNU Libc libraries and linker –linking against object archives (.a libraries) and dynamic shared object libraries (.so libraries), generating statically linked binaries and libraries, generating dynamically linked libraries.

Using the GNU debugging tools --gdb to debug programs, graphical debuggers like ddd, memory debugging / profiling libraries mpatrol and valgrind ; Review of common programming practicies and guidelines for GNU/Linux and FOSS ; Introduction to Bash, sed & awk scripting.

UNIT-V

Application Programming

Basics of the X Windows server architecture ; Qt Programming ; Gtk+ Programming ; Python Programming ; Programming GUI applications with localisation support.

TEXT BOOK

1. N. B. Venkateshwarlu (Ed); Introduction to Linux: Installation and Programming, B S Publishers; 2005.

REFERENCES

1. Matt Welsh, Matthias Kalle Dalheimer, Terry Dawson, and Lar Kaufman, Running Linux, Fourth Edition, O'Reilly Publishers, 2002.

2. Carla Schroder, Linux Cookbook, First Edition, O'Reilly Cookbooks Series, 2004.

Web Sites:

- 1. http://www.oreilly.com/catalog/ open sources/book/toc.html
- 2. http://dsl.org/cookbook/cookbook_toc.html
- 3. http://www.tldp.org/guides.html
- 4. http://www.gnu.org/doc/using.html
- 5. http://www.networktheory.co.uk/docs/gccintro/
- 6. http://sources.redhat.com/autobook/
- 7. http://cvsbook.red-bean.com/
- 8. http://www.tldp.org/guides.html
- 9. http://developer.gnome.org/doc/GGAD
- 10.http://www.python.org/doc/current/tut/tut.html

DIGITAL IMAGE PROCESSING

Course Objectives

- To make the students learn the fundamental theories and techniques of digital image processing.
- To study the mathematical transforms necessary for image processing, image manipulation and a preliminary understanding of Computer Vision.
- To make students to understand the image degradation and enhancement.
- To understand the basic relationships between pixels in an image
- To know various segmentation techniques, and object descriptors.
- To implement pattern recognition to enhance an image.

Course Outcomes(COs)

- 1. Perform image manipulations and analysis in many different fields.
- 2. Apply knowledge of computing mathematics science and engineering to solve problems in multidisciplinary research.
- 3. Implement the understanding in sharpening the image.
- 4. Perform the image segmentation using the compression method.
- 5. Understand the image to represent in an region.
- 6. Analyze the basic algorithms used for image processing &image compression with morphological image processing.

UNIT-I

Introduction: Digital image processing – Origins of digital image processing- Examples of fields that use digital image processing-Fundamental steps in digital image processing-Components of an image processing system-Representing digital image.

UNIT-II

Some Basic relationships between Pixels-Basic gray level transformations- Histogram processing - Basic spatial filtering- Smoothing special filtering- Image Degradation/ Restoration process- Noise Models.

UNIT-III

Image Segmentation: Thresholding - Edge Based Segmentation – Region Based Segmentation – Matching. Image Compression: Error Criterion - Lossy Compression - Lossless Compression.

UNIT-IV

Shape Representation and Description: Region Identification - Contour Based Representation And Description – Region Based Shape Representation And Description

UNIT-V

Image Recognition: Introduction – Statistical Pattern Recognition - Neural Net-Syntactic Pattern Recognition - Graph Matching - Clustering

TEXT BOOK

1. Rafael C. Gonzalez, Richard E. Woods. 2008. Digital Image Processing, 3rd Edition, Pearson Education, New Delhi.

REFERENCES

- 1. Chanda. B and Dutta Majumder .D. 2000. Digital Image Processing and Analysis, 1st Edition, Prentice Hall of India, New Delhi.
- 2. Milan Sonka and Vaclav Hlavac and Roger Boyle. 2004. Image Processing, Analysis and Machine Vision, 2nd Edition, Vikas Publishing House, New Delhi.
- Nick Efford. 2000. Digital Image Processing A Practical introduction using JAVA, 1st Edition, Pearson Education Limited, New Delhi.

WEB SITES

http://www.cs.dartmouth.edu/farid/tutorials/fip.pdf http://www.imageprocessingbasics.com/ http://www.astropix.com/HTML/J_DIGIT/TOC_DIG.HTM

Semester-III L T P C 15CSP304 NETWORK ARCHITECTURE AND MANAGEMENT 4 0 0 4

Course Objectives

- To understand the various architecture models and routing strategies of networks.
- To understand the privacy and security needs of a network and formulate a plan.
- To analyze the various case studies of network architecture and management.
- To implement the SNMP protocol in various architectures.
- To use various network management tools and understand their modules.
- To design an architecture with all the network requirements of a client with felp of network management tools.

Course Outcomes(COs)

- 1. Understand the various architecture models and routing strategies of networks.
- 2. Understand the privacy and security needs of a network and formulate a plan.
- 3. Analyze the various case studies of network architecture and management.
- 4. Implement the SNMP protocol in various architectures.
- 5. Use various network management tools and understand their modules.
- 6. Design an architecture with all the network requirements of a client with felp of network management tools.

UNIT-I

Introduction: Objectives - Component architectures – Reference architecture – Architectural models; Addressing and Routing Architecture: Addressing mechanisms – Routing mechanisms – Addressing strategies – Routing strategies – Architectural considerations; Network Management Architecture: Defining Network Management – Network Management Mechanism - Architectural considerations; Performance Architecture; Developing goals – Performance mechanisms – Architectural considerations

UNIT- II

Security And Private Architecture: Developing a security and privacy plan – Security and privacy Administration & Mechanism - Architectural considerations; Selecting Technologies for the Network Design: Goals – Criteria for Technology Evaluation – Guidelines and constraints on Technology Evaluation – Choices for Network Design; Interconnecting Technologies Within The Network Design: Shared medium – Switching – Routing – Hybrid mechanism – Applying Interconnection Mechanism to the Design

UNIT-III

Case history of Networking and Management: Challenges of Information Technology Managers – Goals, organization and functions – Network and System Management – Network Management System Platform; SNMP, Broadband and TMN Management: Network Management Standards & Model – Organization, Information and Communication Model – ASN.1 – Encoding structure – Macros – Functional model; Organization and Information Model: Managed Networks – The History of Network Management – Internet Organization and standards – SNMP Model – The Organization and Information Model; Communication and Functional Model: The SNMP Communication Model – Functional Model.

UNIT- IV

SNMPv2 Management: Major changes – System architecture – Structure of Management Information – Management Information Base – SNMPv2 protocol – Compatibility; RMON: Remote monitoring – RMON1 – RMON2 – ATM remote monitoring; Broadband Network Management: ATM Networks - Network and Services – ATM Technology – ATM Network Management; Telecommunication Management Network: Operations systems – Conceptual model – Standards – Architecture – TMN Management service architecture – Integrated view of TMN – Implementation issues.

UNIT- V

Network Management Tools and Systems: Network management tools – Network statistics measurement system – Network Management Systems – System Management; Network Management Applications: Configuration Management - Fault Management - Performance Management – Security Management – Accounting Management – Report Management - Policy Based Management – Service Level Management.

TEXT BOOK

- 1. James D. Mc Cabe. 2007 . Network Analysis, Architecture and Design, 3rd Edition, Morgan Kaufmann Publishers.
- 2. Mani Subramanian. 2000. Network Management Principles and Practice, Pearson Education Asia Pvt. Ltd.

REFERENCES

1. William Stallings. 1999. SNMP, SNMPv2, SNMPv3 and RMON 1 and 2, 3rd Edition, Pearson Education Asia Pvt. Ltd.

- 1. http://staff.um.edu.mt/csta1//courses/lectures/csm202/os17.html
- 2. http://www.inf.uni-konstanz.de/dbis/teaching/ss06/os/ch14-wrongNumber.pdf
- 3. https://www.cs.columbia.edu/~smb/classes/s06-4118/l26.pdf

- To understand the hardware and software concepts of distributed operating systems, various design issues like transparency, flexilibity etc., and communication and synchronization in distributed operating systems.
- To understand scheduling in distributed operating systems, fault tolerance, realtime distributed systems, and designing of distributed file systems.
- To understand the concept of design and implementation in the context of distributed operating systems.
- To Design and Implement Distributed applications using Technologies like RPC, threads.
- To understand How Distributed Shared Memory is managed.
- To analyze security issues in network and distributed environments

Course Outcomes(COs)

- 1. Understand the different Distributed Systems and the challenges involved in Design of the Distributed Systems.
- 2. Understand how computing power is created and synchronized in Distributed systems
- 3. Design and Implement Distributed applications using Technologies like RPC, threads.
- 4. Learn how to store data in Distributed File System.
- 5. Understand How Distributed Shared Memory is managed.
- 6. Analyze security issues in network and distributed environments

UNIT-I

Fundamentals – message passing – Remote procedure calls : Introduction – the RPC model – transparency of RPC – Implementing RPC mechanism –stub generation – RPC messages – marshaling arguments and results – server management – parameter passing semantics – call semantics.

UNIT-II

Distributed shared memory : Introduction – general architecture of DSM systems – design and implementation of DSM – granularity – structure of shared memory space – replacement strategy – heterogeneous DSM – advantages of DSM.

UNIT-III

Synchronization: Introduction – clock synchronization – event ordering – mutual exclusion. Resource management: Introduction – desirable features of a good global scheduling algorithm – task management approach – load balancing approach – load sharing approach.

UNIT-IV

Distributed file system: Introduction – desirable features of a good distributed file system – file models – file accessing models.

Naming: Introduction – desirable features of a good naming system – fundamental terminologies and concepts.

UNIT- V

Security: Introduction – potential attacks to computer system – cryptography.

TEXT BOOK

1. Pradeep K. Sinha.1997. Distributed Operating Systems Concepts and Design, 1st Edition, Prentice Hall of India, New Delhi.

REFERENCES

- 1. Paul J. Fortier. 1998. Design of Distributed Operating System concepts and Technology, 1st Edition, Tata McGraw Hill, New Delhi.
- 2. Andrew S. Tanenbaum. 1995. Distributed Operating System. Pearson Education, New Delhi.

- 1. http://staff.um.edu.mt/csta1//courses/lectures/csm202/os17.html
- 2. http://www.inf.uni-konstanz.de/dbis/teaching/ss06/os/ch14-wrongNumber.pdf
- 3. https://www.cs.columbia.edu/~smb/classes/s06-4118/l26.pdf

Semester-III L T P C

15CSP305B DISTRIBUTED DATABASE MANAGEMENT SYSTEM 4 0 0 4

Course Objectives

- To expose the students to the architecture, design, and implementation of massive-scale data systems.
- To understand foundational concepts of distributed database theory including design and architecture, security, integrity, query processing and optimization, transaction management, concurrency control, and fault tolerance.
- To know about parallel database systems and their architecture
- To create optimized query execution plan.
- To efficiently distribute and manage the data.
- To manage distributed access control

Course Outcomes(COs)

- 1. Understand the DDBMS architecture models and complicating factors.
- 2. Design good performing distributed database schemas.
- 3. Create optimized query execution plan.
- 4. Efficiently distribute and manage the data.
- 5. Manage distributed access control
- 6. Know how to make security to the databases.

UNIT I

Introduction: Distribute Data Processing- What is Distributed Database System?-Promises of DDBMSs -Complicating Factors -Problem -Distributed DBMS Architecture-DBMS Standardization- Architectural Models for DDBMSs - DDBMSs Architecture.

UNIT II

Distributed Database Design: Design Strategies- Top-Down Design Process- Bottom Up Design Process-Distribution Design Issues – Fragmentation-Allocation -Semantic Data Control-View Management- Data Security- Semantic Integrity Control- Centralized Semantic Integrity Control- Distributed Semantic Integrity Control.

UNIT III

Query Processing: Query Processing Problem- Objectives of Query Processing-Complexity of Relational Algebra Operations-Characterization of Query Processors-Layers of query processing-Query decomposition and data Localization- Query Optimization –Centralized query optimization –Join ordering in Fragment Queries – Distributed query optimization Algorithms.

UNIT IV

Transaction Management: Definition of a Transaction-Properties of Transaction- Types of Transaction- Distributed Concurrency Control- Serialization Theory- Taxonomy of Concurrency Control Mechanisms- Locking Based Concurrency Control MechanismsTimestamp –Based Concurrency Control Mechanisms-Optimistic Concurrency Control Algorithms-Deadlock Management-Relaxed Concurrency Control-Distributed Reliability DBMS Reliability - Reliability Concepts and Measures-Failures and Fault Tolerance in Distributed Systems-Failures in Distributed DBMS-Local Reliability Protocols-Distributed Reliability Protocols –Dealing With Site Failures- Network Portioning

UNIT V

Parallel Database Systems: Database Servers-Parallel Architectures –Parallel DBMS Techniques –Parallel Execution Problems-Parallel Execution For Hierarchical Architecture-Distributed Object Database Management Systems –Fundamental Object Concepts And Object Models- Object Distribution Design-Architectural Issues- Object Management –Distributed Object Storage-Object Query Processing-Transaction Management.

Техт Воок

1. Tamer Ozus M,Patrick Valduriez,S.Sridhar.2006. Principle Of Distributed Database Systems, 1st Edition , Pearson Education.

REFERENCES

- 1. Ceri.1985.Distributed Databases Principles and Systems , 1st Edition Mchraw Hill Pub.
- 2. Tamer Ozus M,Patrick Valduriez,S.Sridhar.2006. Principle Of Distributed Database Systems, 1st Edition, Pearson Education.

- 1. en.wikipedia.org/wiki/Distributed_computing
- 2. www.webopedia.com/TERM/D/distributed_computing.html
- 3. www.tech-faq.com/distributed-computing.shtml

WEB SERVICES

Course Objectives

- To describe basic standards that enable web services: SOAP, WSDL, and UDDI
- To know the role of web services in commercial applications
- To understand the principles of web service provision
- To design of web services and applications to use them within a service-oriented architecture.
- To use of BPEL (Business Process Execution Logic) and WSDL (Web Service Description Language) for implementing web services
- To develop a web service using Apache Axis Soap Server and Tomcat application Server.

Course Outcomes(COs)

- 1. Understand the basic standards that enable web services: SOAP, WSDL, and UDDI
- 2. Analyze the role of web services in commercial applications
- 3. Understand the principles of web service provision
- 4. Design of web services and applications to use them within a service-oriented architecture.
- 5. Use of BPEL (Business Process Execution Logic) and WSDL (Web Service Description Language) for implementing web services
- 6. Develop a web service using Apache Axis Soap Server and Tomcat application Server.

UNIT-I

Introduction: What are Web Services – Importance of web services – Web services and enterprises. XML Fundamentals: XML Documents - Namespaces – Schema – Processing XML.

UNIT-II

SOAP: SOAP Model – messages – Encoding – RPC – Alternative SOAP encodings – Document, RPC, Literal, Encoded – SOAP, Web Services and the REST Architecture. WSDL: Structure – Using SOAP and WSDL. UDDI: UDDI Business Registry – Specification – Data Structures – Life cycle Management – Dynamic Access Point Management.

UNIT-III

Advanced Web Services Technologies and Standards: Conversation – Overview – Web Services Conversation Language – WSCL Interface Components. Workflow-Business Process Management – Workflow and Workflow Management systems – BPEL.

Transaction – ACID transaction – Distributed Transaction – OASIS Business-Transaction Protocol.

UNIT-IV

Security – Security Basics – Security Issues – Types of Security Attacks – WS–Security. Mobile and Wireless – Mobile Web Services – Challenges with mobile – Proxy Based Mobile Systems -Direct Mobile Web service access - J2ME Web Services.

UNIT-V

Building Real World Enterprise Web Service and Applications: Real World Web Service Application Development – Development of Web services and Applications onto Tomcat application Server and Axis Soap Server.

TEXT BOOK

 Sandeep Chatterjee, James Webber. 2010. Developing Enterprise Web Services: An Architect's Guide, 3rd Edition, Pearson Education, New Delhi. (Page Nos: 1-11, 17-67, 69-94, 98-117, 119-138, 145-163, 175-221, 249-262, 271-283, 305-335, 377-415)

REFERENCES

- 1. Eric A Marks and Mark J Werrell. 2003. Executive Guide to Web Services, 1st Edition, John Wiley and Sons, New Delhi.
- 2. Keith Ballinger. 2003. NET Web Services: Architecture and Implementation with .Net.1st Edition, Pearson Education, New Delhi

- 1. www.w3schools.com/webservices/default.asp
- 2. en.wikipedia.org/wiki/Web_service
- 3. www.webservices.org/

- To Expose students to software and hardware capabilities of wireless applications.
- To provide an overview of Wireless Communication networks area and its applications in communication engineering.
- To appreciate the contribution of Wireless Communication networks to overall technological growth.
- To explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
- To enable students to compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.
- To design a wireless application using WML

Course Outcomes(COs)

- 1. Understand software and hardware capabilities of wireless applications.
- 2. Analyze Wireless Communication networks area and its applications in communication engineering.
- 3. Appreciate the contribution of Wireless Communication networks to overall technological growth.
- 4. Explain the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks.
- 5. Compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.
- 6. Design and Develop a wireless application using WML

UNIT-I

Mobile Data Introduction: The Rise of Mobile Data-Key Services for the Mobile Internet- Overview of the WAP-The origins of the WAP- WAP architecture-WAP Internal Structure-Components of the WAP Standards- WAP Gateways-Network Infrastructure Services Supporting WAP Clients-WAP Architecture Design Principles – Relationship with other standards.

UNIT-II

The Wireless Markup Language: Overview-The WML Document Model-WML Authoring-URLS Identity Content-Mark Up Basics- WML Basics-Basic Content-Events, Tasks and Binding.

UNIT-III

Variables –Other Content you can include-Controls-Miscellaneous Markup- Sending Information-Application Security-Other Data; The Meta element- Document Type Declarations- Errors and browsers Limitations-Content generation- WML Version Negotiation.

UNIT-IV

User Interface Design: Making Wireless Applications, Easy to Use- Website Design-Computer Terminals Vs Mobile Terminals-Designing a usable WAP site-structured usability method-user interface design guidelines- Design guidelines for selected WML Elements.

UNIT-V

Wireless Telephony Applications: Overview of the WTA Architecture- WTA Client Frame Work –WTA Server and Security- Design Considerations- Application Creation Tool Box- Future of WTA Enhancements.

The Mobile Internet Future: Better Content- Easier Access-Beyond Browsing – Beyond Cellular- Mobile Data Unleashed.

TEXT BOOK

Sandeep Singhal et al, 2007. The Wireless Application Protocol, 1st Edition. Pearson Education, New Delhi.

Charles Arehart-Nirmal Chidambarametal.Professional WAP, 1st Edition. Shroff Publishers & Distributers Pvt Ltd, New Delhi.

REFERENCES

Dale BulBrook. 2004. WAP – A Beginner's Guide, 1st Edition. TMH Publication, New Delhi.

Ruseyev S. 2003. WAP Technology & Applications, 1st Edition. Eswar Publications, New Delhi.

Web Sites :

www.en.wikipedia.org/wiki/Wireless_Application_Protocol www.wap.com www.w3schools.com/wap/

15CSP305E

WAN TECHNOLOGIES

Course Objectives

- To describe common WAN protocols and interfaces like PPP.
- To demonstrate basic routing and network troubleshooting.
- To understand Frame delay and congestion control mechanisms
- To learn about ISDN and ISDN devices
- To analyze about VPN and its mechanisms
- To understand Asynchronous Transfer Mode (ATM) and VoIP standards and Devices

Course Outcomes(COs)

Upon successful completion of this course, the student will be able to:

- 1. Describe common WAN protocols and interfaces.
- 2. Demonstrate basic routing and network troubleshooting.
- 3. Understand Frame delay and congestion control mechanisms
- 4. Learn about ISDN and ISDN devices
- 5. Analyze about VPN and its mechanisms
- 6. Understand Asynchronous Transfer Mode (ATM) and VoIP standards and Devices

Unit I

Introduction to WAN Technologies: Point To Point Links – Circuit & Packet Switching – Virtual Circuits – Dialup Services – WAN Devices. Dialup Technology: Background – Dialup Connectivity – Dialup Methods – Benefits and Drawbacks.

Unit II

Point-To-Point Protocol: PPP Encapsulation – Link Operation – LCP Packet Formats – LCP Configuration Options. X.25: Devices and Protocol Operation – Protocol Suite – LAPB Frame Format – X.21 Address Format.

Unit III

Frame Relay: Frame Relay Devices – Virtual Circuits – Congestion Control Mechanisms – Local Management Interface – Frame Format. Integrated Services Digital Network: ISDN Devices – ISDN Channels – Services – ISDN Interfaces – ISDN Specification – Signaling System 7. Virtual Private Networks: Background – Layer 2 Tunneling Protocol – Operational Mechanisms – Adding More Security.

Unit IV

Asynchronous Transfer Mode: Standards – ATM Devices and the Network Environment – Cell Header Format – ATM Services – Switching Operations – Reference Model – Addressing – Connections – ATM and Multicasting – Quality of Service – Signaling and Connection Establishment – Connection Management Messages – PNNI – Integrated Local Management Interface – LAN Emulation – Multiprotocol Over ATM – Physical Layer Architecture. MPLS/Tag Switching: Operations – Switching Architecture – Hierarchical Routing – Multicast Routing – Label Switching With ATM – Quality of Service and Traffic Engineering.

Unit V

Voice/Data Integration Technologies: Introduction – Advances in Applications – Voice Networking – Voice Over ATM – Voice Over Frame Relay – VOIP Standards – VOIP Technology and Future Communications – SGCP – The Simple Control Interface – Gateway Control Interface – Gateway Control Functions – Encoding of the Session Description – SGCP Transmission Over UDP – Security Requirements – Cash Flows – MGCP Overview – General SIP Tutorial. Digital Subscriber Line: ADSL, Signaling and Modulation – DSL Technologies.

Text Books

- 1. Ed Taylor. "*Networking Handbook*", 1ST Edition, New Delhi: Tata McGraw Hill, 2000 (Chapter 5,6,9,10)
- 2. CISCO Systems. "*Internetworking Technologies Handbook*", New Delhi: Techmedia, 2001.(Chapter 3,10,12, 15,17,18,19, 21, 27,28)

Reference Book

1. Behrouz A. Forouzan. "*Data Communication and Networking*", 3rd Edition, New Delhi: Tata McGraw Hill, 2003

		Semester-III
		LTPC
15CSP311	J2EE LAB	0 0 4 2

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications
- To impart expertise in Web Application Development using J2EE.

Course Outcomes(COs)

- 1. Understand the In-depth concepts of JEE
- 2. Understand the in-depth Life cycle of servlets and JSP.
- 3. Learn how to communicate with databases using Java.
- 4. Handle Errors and Exceptions in Web Applications
- 5. Use NetBeans IDE for creating J2EE Applications
- 6. Understand J2EE as an architecture and platform for building and deploying webbased, n-tier, transactional, component-based enterprise applications

List of Programs

- 1. Create a sign in form in servlets.
- 2. Write a servlet Program to lock a server.
- 3. Write a servlet program that returns list of information in table format.
- 4. Design a counter that counts number of times user has visited the site in current browsing session.
- 5. Write a program to retrieve cookies information
- 6. Build a JAVA Bean for opening an applet from JAR file.
- 7. Write a program to add controls in BEAN.
- 8. Design a counter in JAVA BEAN.
- 9. Write a program to stream contents of a file using JSP.
- 10. Write a program to insert an applet into JSP page.

		Semester-III
		LTPC
15CSP312	LINUX LAB	0 0 4 2

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Course Objectives

- To understand the concepts and principles that underlies modern operating systems
- To practice component to relate theoretical principles with operating system implementation.
- To learn about processes and processor management
- To learn about concurrency and synchronization
- To understand memory management schemes, file system and secondary storage management security and protection etc.
- To use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.

Course Outcomes(COs)

At the end of the course the student will be in a position to –

- 1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.
- 2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.
- 3. Understand basics of various OS related concepts, from programmer's point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.
- 4. Develop applications where several processes need to communicate with each other to complete a task.
- 5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.
- 6. Write programs which employs advanced concepts like multithreading.

List of Programs

- 1. To write a Linux program to display process deadlock state.
- 2. To write a program to display the allocated memory.
- 3. To write a program to simulate the DOS Command-Copy.
- 4. To write a program to implement signal handling.
- 5. To write a simple Linux program using thread.
- 6. To write a program to display the date & time using TCP Sockets.
- 7. To write a program to display the date & time using UDP Sockets.
- 8. To write a program to display the cpu scheduling
- 9. To write a Linux program to create a lock file.
- 10. To write a program to display the user information

- to list the defining characteristics of an intelligent agent and how an agent differs from an object
- to understanding Agent architectures at Micro and Macro level
- to Develop agent understanding with different kinds of Ontologies and how they work together
- to understand how multiagents interact using pure and mixed strategy, Nash equilibria; zero-sum and other interactions; how cooperation Occurs in the Prisoner's dilemma.
- to understanding Coalition formation in Multiagent Environment using coalitional games; coalition structure generation
- to understanding allocation of scarce resources through auction types; combinatorial auctions and winner determination

Course Outcomes(COs)

After completing the course the students should:

- 1. be able to use important tools and technologies used in artificial intelligence and multi agent systems
- 2. be able to develop intelligent multi-agent systems
- 3. be able to assess the value of, and to a suitable extent utilize, existing solutions as a part of a programming project
- 4. Be able to model, analyze and critically evaluate distributed systems using agentbased abstractions and related concepts.
- 5. understand how multiagents interact using pure and mixed strategy, Nash equilibria; zero-sum and other interactions; how cooperation Occurs in the Prisoner's dilemma.
- 6. understanding Coalition formation in Multiagent Environment using coalitional games; coalition structure generation

UNIT I

Introduction – Intelligent Agents – Environments – Intelligent agents – Agents and Objects – Agents and Expert Systems – Agents as Intentional Systems – Abstract Architectures for Intelligent Agents – How to tell an agent what to do – Synthesizing Agents

UNIT II

Deductive Reasoning Agents – Agents as Theorem Provers – Agent-Oriented Programming – Concurrent MetateM

Practical Reasoning Agents – Proactical Reasoning Equals Deliberation Plus Means-Ends Reasoning – Means-Ends Reasoning – Implementing a Practical Reasoning Agent -Homer – The Procedural Reasoning System

Reactive and Hybrid Agents- Brooks and the Subsumption Architecture – The Limitations of Reactive Agents – Hybrid Agents

UNIT III

Multiagent Interactions – Utilities and Preferences – Multiagent Encounters – Dominant Strategies and Nash Equilibria – Competitive and Zero-Sum Interactions – The Prisoner's Dilemma – Other Symmetric 2 x 2 Interactions – Dependence Relations in Multiagent Systems

Reaching Agreements – Mechanism Design – Auctions – Negotiation – Argumentation Communication – Speech Acts – Agent Communication Languages – Ontologies for Agent Communication – Coordination Languages

UNIT IV

Cooperative Distributed Problem Solving – Task Sharing – Combining Task and Result Sharing – Handling Inconsistency – Coordination – Multiagent planning and Synchronization

UNIT V

Methodologies – Agent-Oriented Analysis and Design Techniques – Pitfalls of Agent Development – Mobile Agents, Applications of Agents

Техт Воок

1. Michael Wooldridge.2002. An Introduction to Multiagent Systems, John Wiley & Sons Ltd.

REFERENCE BOOKS

- 1. Gerhard Weiss. Multi-agent Systems A Modern Approach to Distributed Artificial Intelligence, MIT Press
- 2. Walter Brenner et al, Intelligent Software agents, Springer Verlag
- 3. Nicholas R. Jennings, Michael Wooldridge, Agent Technology: Foundations, Applications and markets, Springer Verlag Publishing.

- To introduce basic concepts and principles about software design and software architecture.
- To understand design issues followed by coverage on design patterns.
- To get an overview of architectural structures and styles.
- to know practical approaches and methods for creating and analyzing software architecture are presented.
- To analyze the interaction between quality attributes and software architecture.
- To gain experiences with examples in design pattern application and case studies in software architecture.

Course Outcomes(COs)

A student who successfully completes this course should at the minimum be able to:

- 1. Design and motivate software architecture for large scale software systems
- 2. Recognize major software architectural styles design patterns and frameworks
- 3. Understand design issues followed by coverage on design patterns.
- 4. Generate architectural alternatives for a problem and select among them
- 5. Use well-understood paradigms for designing new systems
- 6. Identify and assess the quality attributes of a system at the architectural level

UNIT I

Introduction – Software Architecture – Software Design levels – An Engineering Discipline for Software – The status of Software Architecture – Architectural styles – Pipes and filters – Data Abstraction and Object-oriented organization – Event based, implicit invocation – Layered systems – Repositories – Interpreters – Process Control – Other Familiar Architecture – Heterogeneous Architectures.

UNIT II

Case studies - Key word is Context – Instrumentation Software – Mobile Robotics – Cruise Control – Three Vignettes in Mixed Style

UNIT III

Shared Information Systems – Database Integration – Integration in Software Development Environments – Integration in the Design of Buildings – Architectural structures for shared Information Systems

UNIT IV

Guidance for User-Interface Architectures – The quantified Design Space – The value of Architectural formalism – Formalizing the Architecture of a specific system –

Formalizing an Architectural Style – Formalizing an Architectural Design Space – Towards a Theory of Software Architecture – Z Notation

UNIT V

Requirements for Architecture – Description Languages – First class connectors – Adding Implicit Invocation to Traditional Programming Languages – Tools for Architectural Design – UniCon – Exploiting Style in Architectural Design Environments – Beyond definition/Use: Architectural Interconnection

TEXT BOOKS

1. Mary Shaw, David Garlan, Software Architecture – Perspectives on an Emerging Discipline, Prentice Hall of India, Eastern Economy Edition.

2. Software Architecture: Foundations, Theory and Practice, Richard N.

Taylor, Nenad Medvidovic, Eric M. Dashofy, 2010, Wiley India Pvt. Limited.

REFERENCES

Boris Beizer. 1990. Software Testing Techniques (2nd Edition), Van Nostrand Reinhold.