**D.K.T.E. Society's**

# TEXTILE & ENGINEERING INSTITUTE

**(An Autonomous Institute)**
**Rajwada, Ichalkaranji – 416115.**

# Syllabus
# For
# Final Year B. Tech. Computer Science & Engineering
**(With effect from 2019-20)**

# TEXTILE & ENGINEERING INSTITUTE
(An Autonomous Institute)
Rajwada, Ichalkaranji – 416115.
## Final Year B. Tech. Computer Sc. & Engineering
(With effect from Academic Year 2019-20)

# Semester – VII

| Course Code | Course Name | Group | Teaching Scheme Hours/Week | | | | Examination Scheme and Marks | | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | | | Practical | | | |
| | | | Theory | Tutorial | Practical | Total | SE | ISE | SEE | CIE | SEE | Total | |
| CSL401 | High Performance Computing Architecture | D | 3 | 1 | - | 4 | 25 | 15 | 60 | - | - | 100 | 4 |
| CSL402 | Data warehouse & Business Intelligence | D | 3 | - | - | 3 | 25 | 15 | 60 | - | - | 100 | 3 |
| CSLEL1 | Elective 1 | D | 3 | 1 | - | 4 | 25 | 15 | 60 | - | - | 100 | 4 |
| CSLEL2 | Elective 2 | D | 3 | - | - | 3 | 25 | 15 | 60 | - | - | 100 | 3 |
| CSP409 | AI and Deep Learning Lab | D | 2 | - | 2 | 4 | - | - | - | 50 | 50 | 100 | 3 |
| CSP410 | Data warehouse & BI Lab | D | - | - | 2 | 2 | - | - | - | 50 | 50 | 100 | 1 |
| CSPEL2 | Elective 2 Lab | D | - | - | 2 | 2 | - | - | - | 50 | - | 50 | 1 |
| CSD414 | Project-I | F | - | - | 4 | 4 | - | - | - | 50 | 50 | 100 | 4 |
| | **Total** | | **14** | **2** | **10** | **26** | **100** | **60** | **240** | **200** | **150** | **750** | **23** |

**Abbreviations:**

| | |
|---|---|
| CIE: | Continuous Internal Evaluation |
| SEE: | Semester End Examination |
| SE-I: | Semester Examination-I |
| SE-II: | Semester Examination-II |

**Group Details**

| | | | |
|---|---|---|---|
| A | Basic Science | E | Open electives |
| B | Engineering Science Humanities, Social Science and Management | F | Seminar/Training/Project |
| C | | | |
| D | Professional Subjects - core and Electives | | |

| CSLEL1 | Elective 1 |
|---|---|
| CSL403 | Image Processing |
| CSL404 | Human Computer Interaction |
| CSL405 | Adhoc Wireless and Sensor Network |

| CSLEL2 | Elective 2 |
|---|---|
| CSL406 | Cloud Computing |
| CSL407 | Internet of Things |
| CSL408 | Big Data and Hadoop |

| CSPEL2 | Elective 2 Lab |
|---|---|
| CSP411 | Cloud Computing Lab |
| CSP412 | Internet of Things Lab |
| CSP413 | Big Data and Hadoop Lab |

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## Final Year B. Tech. Computer Sc. & Engineering
(With effect from Academic Year 2019-20)

# Semester – VIII

| Course Code | Course Name | Group | Teaching Scheme Hours/Week | | | | Examination Scheme and Marks | | | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | | | Practical | | | |
| | | | Theory | Tutorial | Practical | Total | SE | ISE | SEE | CIE | SEE | Total | |
| CSL415 | Real Time Operating System | D | 3 | - | - | 3 | 25 | 15 | 60 | - | - | 100 | 3 |
| CSL416 | Project Management and finance | D | 3 | - | - | 3 | 25 | 15 | 60 | - | - | 100 | 3 |
| CSLEL3 | Elective 3 | D | 3 | - | - | 3 | 25 | 15 | 60 | - | - | 100 | 3 |
| CSLEL4 | Elective 4 | D | 3 | - | - | 3 | 25 | 15 | 60 | - | - | 100 | 3 |
| CSP423 | Advanced Web Development Lab | D | 2 | - | 2 | 4 | - | - | - | 50 | 50 | 100 | 3 |
| CSP424 | Mobile Application Development Lab | D | 1 | - | 2 | 3 | - | - | - | 50 | 50 | 100 | 2 |
| CSPEL4 | Elective 4 Lab | D | - | - | 2 | 2 | - | - | - | 50 | - | 50 | 1 |
| CSD428 | Project-II | F | - | - | 8 | 8 | - | - | - | 50 | 50 | 100 | 8 |
| | Total | | 15 | | 14 | 29 | 100 | 60 | 240 | 200 | 150 | 750 | 26 |

**Abbreviations:**

| | | | | |
|---|---|---|---|---|
| CIE: | Continuous Internal Evaluation | | | |
| SEE: | Semester End Examination | | | |
| SE-I: | Semester Examination-I | | | |
| SE-II: | Semester Examination-II | | | |

**Group Details**

| | | | |
|---|---|---|---|
| A | Basic Science | E | Open electives |
| B | Engineering Science Humanities, Social Science and Management | F | Seminar/Training/Project |
| C | Professional Subjects - core and Electives | | |
| D | | | |

| CSLEL3 | Elective 3 |
|---|---|
| CSL417 | Agile Technology |
| CSL418 | Software Testing and Quality Assurance |
| CSL419 | Mainframe Technology |

| CSLEL4 | Elective 4 |
|---|---|
| CSL420 | Cyber Security |
| CSL421 | Information Retrieval |
| CSL422 | Parallel Computing |

| CSPEL4 | Elective 4 Lab |
|---|---|
| CSP425 | Cyber Security Lab |
| CSP426 | Information Retrieval Lab |
| CSP427 | Parallel Computing Lab |

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| **Final Year B. Tech. Computer Sc. & Engineering** |||
| **CSL401 : High Performance Computer Architectures** |||
| **Teaching Scheme:**<br>**TH: 03 Hours/Week**<br>**TUT: 01 Hours/Week** | **Credits**<br>**04** | **Examination Scheme**<br>**SE : 25**<br>**ISE : 15**<br>**SEE  : 60** |

**Prerequisite:**

**Course Objectives:**

1. To understand different Parallel Architectures
2. To understand  performance measures  for evaluation of parallel architectures
3. To understand  multitasking and multiprogramming  architectures
4. To understand  modes of programming  parallel architectures

**Course Outcomes:**

On completion of the course, student will be able to-
1. To classify parallel architectures
2. To evaluate parallel architectures
3. Program  parallel architectures

**Course Contents**

| Unit 1 | Introduction | 07 Hours |
|---|---|---|

Architectures and its classification, Evolution of parallel processors, current & future trends towards parallel processors. Principles of pipelining and array processing. Scalar and vector pipelines. Architectural development tracks.

| Unit 2 | Pipeline Processors | 06 Hours |
|---|---|---|

Classification of pipelined processors, Instruction Pipeline design, performance evaluation factors. Vector processing concepts, pipelined vector processors, Cray type vector processor -design example. Array processors

| Unit 3 | Multithreading | 06 Hours |
|---|---|---|

Introduction to Associative memory processors, examples – STARAN. Multithreaded arch –principles of multithreading, Scalable and multithreaded architectures Latency hiding techniques. Scalable coherent multiprocessor model with distributed shared memory

| Unit 4 | Multiprocessing | 06 Hours |
|---|---|---|

Various topologies, static and dynamic type of networks with examples. Loosely coupled and tightly coupled architectures. Cluster computing as an application of loosely coupled architecture. Example –CM*

| Unit 5 | Data Flow Architectures | 07 Hours |
|---|---|---|

Dataflow Architectures: Concepts of data flow computing, static and dynamic dataflow architectures. Dataflow operators, data flow language properties, advantages & potential problems

| Unit 6 | Parallel Programming | 07 Hours |
|---|---|---|

Parallel programming models, parallel languages and compilers, code optimization and scheduling, loop parallelization and pipelining.

**Books:**

**Text Books :**

1. Advanced computer architecture – Kai Hwang (MGH)
2. Computer Architecture and Parallel Processing – Kai Hwang and Briggs (MGH).
3. Advanced Computer Architectures ,Parallelism, Scalability, Programmability, Kai Hwang & Naresh Jotwani, 2nd Edition  McGrawHill Education.

**Reference Books :**

1. Parallel and Distributed Systems 2nd Edition Arun Kulkarni, Napur Prasad Giri, Wiley Publications.

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### *(An Autonomous Institute)*
## Final Year B. Tech. Computer Sc. & Engineering
## CSL402: Data warehouse and Business Intelligence

| Teaching Scheme:<br>TH: 03 Hours/Week | Credits<br>03 | Examination Scheme<br>SE : 25<br>ISE : 15<br>SEE  : 60 |
|---|---|---|

**Prerequisite:  Database Systems(ITL302),  Advance Database Systems(ITL311)**

**Course Objectives:**

1. To Introduce Business Intelligence systems, its architecture and use of it as a decision  making systems
2. To Introduce Extract Transform and Load System in Business Intelligence systems
3. To Introduce Designing Dimensional model, Fact table and dimension tables and correlate them using various models like star schema, snow flack schema
4. To Introduce various Analytical and Reporting Tools

**Course Outcomes:**

On completion of the course-

1. Students should be able to explain components of BI architecture and working of Business Intelligence systems.
2. Students should be able to explain fact tables and dimension tables, explain dimensional modeling & steps in design of dimensional modeling.
3. Students should be able to explain components of ETL and working of ETL Systems
4. Students should be able to explain BI  analytical tools & reporting tools, applications and design of BI analytical tools and reporting tools

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Introducing the Technical Architecture:** | **08 Hours** |
| The value of architecture, Technical Architecture overview, Back room Architecture, Presentation Server Architecture, Front room Architecture, Infrastructure, Metadata, Security. | | |
| **Unit 2** | **Introducing Dimensional Modeling:** | **07 Hours** |
| Making the Case for Dimensional Modeling, Dimensional Modeling primer, Enterprise Data Warehouse Bus Architecture, More on Dimensions & Facts. | | |
| **Unit 3** | **Designing the Dimensional Modeling:** | **06 Hours** |
| Modeling Process overview, Getting Organized, Four Step Modeling Process, Design the Dimensional Model. | | |
| **Unit 4** | **Introducing Extract, Transformation & Load** | **06 Hours** |
| Round up the requirements, the 34subsystems of ETL, Extracting Data, Cleaning & Conforming data, Delivering Data for Presentation | | |
| **Unit 5** | **Introducing Business Intelligence Applications:** | **07 Hours** |
| Importance of B.I. Applications, Analytical cycle for B.I, Types of B.I. Applications, Navigating Applications via the B.I portal. | | |
| **Unit 6** | **Designing & Developing B.I Applications:** | **05 Hours** |
| B.I. Application resource planning, B.I. Application Specification, B.I. Application Development, B.I. Application maintenance | | |
| **Books:** | | |
| **Text Books :** | | |
| 1. Ralph Kimball, "The Data Warehouse Lifecycle toolkit', 2nd edition, Wiley India | | |

**Reference Books :**

1. Data Warehousing: Fundamentals for IT Professionals by Paulraj Ponniah; 2nd Edn. Publisher: Wiley, John & Sons, Incorporated
2. Star Schema: The Complete Reference by Christopher Adamson, Mc-Graw Hill Osborne Media
3. The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling by Ralph Kimball Corporate Information Factory by W. H. Inmon
4. Data Warehousing in the Real World – Anahory & Murray, Pearson

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## Final Year B. Tech. Computer Sc. & Engineering
### CSL403: Image processing

| Teaching Scheme:<br>TH: 03 Hours/Week<br>TUT: 01 Hours/Week | Credits<br>04 | Examination Scheme<br>SE : 25<br>ISE : 15<br>SEE : 60 |
|---|---|---|

**Prerequisite:**

**Course Objectives:**

1. To learn the fundamental concepts of Digital Image Processing
2. To study basic image processing operations.
3. To cover the basic analytical methods which are widely used in image processing

**Course Outcomes:**

On completion of the course, student will be able to-

1. Describe the basic issues and the scope of image processing, and the roles of image processing and systems in a variety of applications.
2. Explore different techniques in image acquisition and color transformation
3. Understand how digital images are represented
4. Evaluate the mathematical principles of digital image enhancement
5. Explore and apply the concepts of Edge detection, segmentation and object recognition

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Introduction** | **06 Hours** |
| Concept of digital image processing, steps in image processing, components of image processing system, Applications areas. | | |
| **Unit 2** | **Digital Image Fundamentals** | **07 Hours** |
| Image sensing and acquisition, Basic concept of sampling and quantization, representations of digital image, spatial and grey level resolution, zooming and shrinking of image, Basic relationship between pixels. | | |
| **Unit 3** | **Colour Image Processing** | **06 Hours** |
| Colour fundamentals, colour models, RGB colour model, CMY colour model, HSI colour model, pseudo-colour image processing: intensity slicing, grey level to colour transformation | | |
| **Unit 4** | **Edge Detection And Segmentation** | **07 Hours** |
| Detection of discontinuities: point, line and edge detection, Thresholding, Region based segmentation | | |
| **Unit 5** | **Image Enhancement In Spatial Domain** | **07 Hours** |
| Basic grey level transformations, image negation, log transformations, power law transformations, piece wise linear transformations, histogram processing, histogram equalization, histogram matching, Image enhancement using arithmetic and logical operations | | |
| **Unit 6** | **Object Recognition** | **06 Hours** |
| Patterns and Pattern Classes, Recognition Based on Decision-Theoretic Methods, Matching, Optimum Statistical Classifiers, Structural Methods, Matching Shape Numbers, String Matching. | | |
| **Books:** | | |
| **Text Books :** | | |

1. R.C.Gonzalez and R.E.Woods, "Digital Image Processing", Addison-Wesley Longman, Inc, 1999

**Reference Books :**

2. A.K.Jain, "Digital Image Processing", PHL
3. 2. M.Sonka, V.Hlavac, and R.Boyle – Image processing, Analysis and Machine vision, Thomson Asia pvt. Ltd, 1999.

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| **Final Year B. Tech. of Computer Science & Engineering** |
| **CSL404 : Human Computer Interaction** |

| Teaching Scheme:<br>**TH : 03 Hours/Week**<br>**TUT: 01 Hours/Week** | Credits<br>04 | **Examination Scheme**<br>**SE: 25**<br>**ISE: 15**<br>**SEE : 60** |
|---|---|---|

**Prerequisite: --**

**Course Objectives:**
1. To learn principles of UI
2. To learn human computer interface design
3. To learn Screen designing techniques
4. To learn Windows based UI interfaces
5. To learn software tools and hardware's in HCI designing

**Course Outcomes:**

On completion of the course, student will be able to-
1. Explain principles of User Interface
2. Demonstrates HCI design process
3. Demonstrate screen designing techniques
4. Apply windows based UI interfaces
5. Select and apply different software's and hardware HCI designing

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Introduction** | **07 Hours** |
| Importance of user Interface - definition, importance of good design. Benefits of good design. A brief history of Screen design, The graphical user interface - popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user - Interface popularity, characteristics- Principles of user interface. | | |
| **Unit 2** | **Design process** | **06 Hours** |
| Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business junctions. | | |
| **Unit 3** | **Screen Designing** | **08 Hours** |
| Design goals - Screen planning and purpose, organizing screen elements, ordering of screen data and content - screen navigation and flow - Visually pleasing composition - amount of information - focus and emphasis - presentation information simply and meaningfully - information retrieval on web - statistical graphics - Technological consideration in interface design. | | |
| **Unit 4** | **Windows** | **07 Hours** |
| New and Navigation schemes selection of window, selection of devices based and screen based controls. Components - text and messages, Icons and increases - Multimedia, colours, uses problems, choosing colours. | | |
| **Unit 5** | **Software tools** | **06 Hours** |
| Specification methods, interface - Building Tools. Components - text and messages, Icons and increases - Multimedia, colors, uses problems, choosing colors. | | |
| **Unit 6** | **Interaction Devices** | **05 Hours** |
| Keyboard and function keys - pointing devices - speech recognition digitization and generation - image and video displays -drivers. | | |
| **Books:** | | |
| **Text Books:** | | |

1) Wilbert O Galitz; The essential guide to user interface design; 2nd Edition; Wiley DreamTech, 2002.

2) Ben Shneidermann; Designing the user interface; 3rd Edition; Pearson Education, 2009.

**Reference Books:**
1) Alan Dix, et.al; Human - Computer Interaction; 3rd Edition; Pearson Education, 2003.
2) Prece, Rogers and Sharps; Interaction Design; 3rd Edition; Wiley Dreamtech, 2011.
3) Soren Lauesen; User Interface Design; Pearson Education, 2005.
4) D.R.Olsen; Human -Computer Interaction; 1st Edition; Cengage Learning, 2009.

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| **CSL405 : Adhoc Wireless and Sensor Networks** |

| Teaching Scheme:<br>TH : 03 Hours/Week<br>TUT: 01 Hours/Week | Credits<br>04 | Examination Scheme<br>SE: 25<br>ISE: 15<br>SEE : 60 |
|---|---|---|

**Prerequisite: --**Computer Networks

**Course Objectives:**
1) To introduce cellular and Ad Hoc wireless networks
2) To introduce routing protocols in Ad Hoc wireless networks
3) To introduce  Transport layer and security protocols for ad hoc wireless networks
4) To introduce sensor networks and its routing algorithms
5) To introduce sensor networks infrastructure and sensor tasking

**Course Outcomes:**
On completion of the course, student will be able to-
1) Describe issues and design goals in  Ad Hoc wireless networks
2) Explain and classify various routing protocols in  Ad Hoc wireless networks
3) Describe design issues and classify transport layer protocols and   security protocols  in  Ad Hoc wireless networks
4) Describe challenges and routing protocols in sensor networks
5) Explain  sensor networks infrastructure management and sensor tasking and control techniques

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Introduction** | **07 Hours** |
| Cellular and Ad Hoc wireless networks, Applications, Issues in Ad Hoc wireless networks, MAC Protocols for ad hoc wireless networks – Introduction, Issues in designing MAC protocol, Design goals of MAC protocol, Classification of MAC protocols, Contention based protocols. | | |
| **Unit 2** | **Routing protocols for ad hoc wireless networks** | **06 Hours** |
| Introduction, Issues in designing a routing protocol for ad hoc wireless networks, Classification of routing protocols, Table driven, on-demand Hybrid routing protocols, Issues in designing a multicast routing protocol, Operation of multicast routing protocols, An architecture reference model for multicast routing protocols, Classification of multicast routing protocols | | |
| **Unit 3** | **Transport layer and security protocols for ad hoc wireless networks** | **07 Hours** |
| Introduction, Design issues and goals, Classification of transport layer solutions, TCP over ad hoc wireless networks, Security in ad hoc wireless networks, Network security requirements, Issues and challenges in security provisioning, Network security attacks, Key management, Secure routing | | |
| **Unit 4** | **Introduction to Sensor Networks and Routing Algorithms** | **08 Hours** |
| Unique Constraints and Challenges , Advantages of Sensor Networks,Sensor Network Applications, Medium Access Control , The S-MAC Protocol , IEEE 802.15.Standard and ZigBee: General Issues , Geographic, Energy-Aware Routing , Unicast Geographic Routing , Routing on a Curve , Energy-Minimizing Broadcast , Energy-Aware Routing to a Region , Attribute-Based Routing , Directed Diffusion , Rumor Routing , Geographic Hash Tables | | |
| **Unit 5** | **Sensor Network Infrastructure Establishment** | **05 Hours** |
| Topology Control , Clustering , Time Synchronization , Clocks and Communication Delays, Interval Methods, Reference Broadcasts, Localization and Localization Services, Ranging Techniques , Range-Based Localization Algorithms, Other Localization Algorithms , Location Services. | | |
| **Unit 6** | **Sensor Tasking and Control** | **06 Hours** |

| |
|---|
| Task-Driven Sensing , Roles of Sensor Nodes and Utilities , Information-Based Sensor Tasking , Sensor selection , Joint Routing and Information Aggregation, Moving center of aggregation , Multi-step information-directed routing , Sensor group management |
| **Books:** |
| **Text Books:** |

**Text Books:**

3) Ad Hoc wireless Networks – Architecture and Protocols by C.S.R.Murthy& B.S. Manoj, Pearson Education

4) Feng Zhao and LeonidesGuibas, "Wireless sensor networks ", Elsevier publication - 2004

**Reference Books:**

5) Ad Hoc Wireless Networks – A communication Theoretic perspective by O.K.Tonguz&G.Ferrari, Wiley India
6) Ad Hoc Mobile Wireless Networks – Protocols and Systems by C. K. Toh (Pearson Education)
7) Ad Hoc Networking by Charles E. Perkins (Pearson Education)
8) Introduction to Wireless and Mobile Systems, 2nd Edition, by Dharma Prakash Agrawal & Qing-An Zeng (CENGAGE Learning)
9) William Stallings, "Wireless Communications and Networks ", Pearson Education – 2004

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| **Final Year B. Tech. Computer Sc. & Engineering** | | | |
| **CSL406- Cloud Computing** | | | |
| **Teaching Scheme:** <br> TH: 03 Hours/Week | | **Credits** <br> **03** | **Examination Scheme** <br> SE : 25 <br> ISE : 15 <br> SEE : 60 |
| **Prerequisite:** Computer Networks,  Operating System-I,  Information Security | | | |
| **Course Objectives:** <br><br> 1. Basics of cloud computing <br> 2. Key concepts of virtualization. <br> 3. Different Cloud Computing services <br> 4. Cloud Implementation, Programming and Mobile cloud computing and Key components of Amazon Web Services | | | |
| **Course Outcomes:** <br> On completion of the course, student will be able to- <br>    1. Define Cloud Computing and memorize the different Cloud service and deployment models <br>    2. Describe importance of virtualization along with their technologies <br>    3. Use and Examine different cloud computing services <br>    4. Describe the key components of Amazon web Service and Analyse the components of open stack & Google Cloud platform and understand Mobile Cloud Computing | | | |
| **Course Contents** | | | |
| **Unit 1** | **Introduction to Cloud** | | **05 Hours** |
| Getting to know the Cloud, Cloud and other similar configurations, Components of Cloud Computing, Cloud Types and Models: Private Cloud, Community Cloud, Public Cloud, Hybrid Clouds | | | |
| **Unit 2** | **Virtualization** | | **07 Hours** |
| Introduction and benefits, Implementation Levels of Virtualization, Virtualization at the   OS Level, Virtualization Structure, Virtualization Mechanism, Open Source Virtualization Technology, Xen Virtualization Architecture, Binary Translation with Full Virtualization, Para virtualization, Virtualization of CPU, Memory and I/O Devices, Hardware support for Virtualization in Intex x86 Processor. | | | |
| **Unit 3** | **Cloud Computing Services and Data Security in Cloud** | | **08 Hours** |
| Infrastructure as a Service, Platform as a Service, Software as a Service, Database as a Service , Specialized Cloud Services, Challenges with Cloud Data, Challenges with Data Security, Data Confidentiality and Encryption, Data availability, Data Integrity, Cloud Data Management Interface, Cloud Storage Gateways, Cloud firewall, Virtual Firewall. | | | |
| **Unit 4** | **Open Source Cloud Implementation Administration and Deployment Techniques** | | **08 Hours** |
| Open Source Eucalyptus Cloud Architecture, Open Stack Cloud Architecture, Cloud Administration and Management, Bundling or Uploading Virtual machine images on the Cloud Controller, GUI Access to VM instances over SSH, Cloud deployment techniques. | | | |
| **Unit 5** | **Cloud Applications** | | **07 Hours** |
| Scientific Applications in – Healthcare, Biology, Geo-Science; Business Applications in– CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming | | | |
| **Unit 6** | **Advanced Topics in Cloud Computing** | | **06 Hours** |
| Energy Efficiency in Clouds, Market Based Management of Clouds, Federated Clouds / Inter Cloud, Third Party Cloud Services | | | |
| **Books:** | | | |

**Text Books :**

1. Cloud Computing Black Book- Jayaswal, Kallakurchi, Houde, Shah, Dreamtech Press.
   (chapter 1 to 4)
2. Mastering Cloud Computing, Buyya R, Vecchiola C, Selvi S T, McGraw Hill Education (India), 2013.
   (chapter 5 to 6)

**Reference Books :**

1. Cloud Computing for Dummies – Judith Hurwitz
2. Buyya R, Broberg J, Goscinski A, "Cloud Computing - Principles and Paradigms", Wiley, 2011.

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| **Final Year B. Tech. Computer Sc. & Engineering** |||
| **CSL407: Internet of Things** |||
| **Teaching Scheme:** <br> TH: 03 Hours/Week | **Credits** <br> **03** | **Examination Scheme** <br> SE : 25 <br> ISE : 15 <br> SEE  : 60 |

**Prerequisite:**  Data Communication

**Course Objectives:**

1.  To understand the application areas of IOT
2.  To get basic knowledge of different technologies used in IOT .
3.  To Know the specifications and functionalities of various protocols/standards of Internet of Things
4.  To Understand basics of embedded devices

**Course Outcomes:**

On completion of the course, student will be able to-

1.  To explain the application areas of Internet of Things
2.  To discuss different technologies used in Internet of Things
3.  To explain the specifications and functionalities of various protocols/standards of Internet of Things
4.  To describe basics of embedded devices

**Course Contents**

| Unit 1 | **Introduction to the Internet of Things** | **06 Hours** |
|---|---|---|
| What is the Internet of Things? About objects/things in the IoT, The identifier in the IoT , Examples of applications, Enabling technologies of IoT, Identification technology,  Sensing and actuating technology , Other technologies,  Connected objects' communication. . |||
| **Unit 2** | **Radio Frequency Identification Technology** | **05 Hours** |
| Introduction, Principles of RFID, Components of an RFID system, Reader, RFID tags, RFID  Middleware, Issue. |||
| **Unit 3** | **Wireless Sensor Networks** | **07 Hours** |
| The node: Communication, Computation, Sensing, Energy, Connecting nodes: Radio basics, Common misconceptions, Reliable communication in practice: channel hopping, Networking nodes, Medium access control, Multi-hop routing Securing communication. |||
| **Unit 4** | **Communication Technologies** | **06 Hours** |
| WPAN Technologies for IoT: Introduction to  Zigbee/IEEE 802.15.4 ,  Bluetooth and its Low-Energy Profile ,  IEEE 802.15.6 WBANs,  NFC , Comparison of WPAN Technologies., LTE, data rate, range, power, computations/bandwidth, QoS. |||
| **Unit 5** | **IoT Architecture and  Protocols** | **08 Hours** |
| Layered Architecture for IoT: Three layers and five layers Architecture, Protocol Architecture of IoT, Fog architecture of a smart IoT gateway.  Protocols: Message Queue Telemetry Transport, Constrained Application Protocol, Advanced Message Queuing Protocol Data Distributed Services, Representational State Transfer, Extensible Messaging and Presence Protocol. |||
| **Unit 6** | **Prototyping Embedded Devices** | **06 Hours** |
| Electronics: Sensors, Actuators, Scaling Up the Electronics. Embedded Computing Basics: Microcontrollers, System-on-Chips, Choosing Your Platform.  Arduino: Developing on the Arduino, Some Notes on the Hardware, Openness Raspberry Pi: Cases and Extension Boards, Developing on the aspberry Pi, Some Notes on the Hardware, Openness |||

**Books:**

**Text Books :**

1. The Internet of Things:  Connecting Objects to the Web,  Hakima Chaouchi,  Wiley  Publications
2. BUILDING THE INTERNET OF THINGS WITH IPv6 AND MIPv6 by DANIEL MINOLI
3. Designing the Internet of Things , Adrian McEwen (Author), Hakim Cassimally

**Reference Books :**

1. Interconnecting Smart Objects with IP: The Next Internet, Jean-Philippe Vasseur, Adam Dunkels, Morgan Kuffmann

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| **Final Year B. Tech. Computer Sc. & Engineering** | | | |
| **CSL408: Big Data and Hadoop** | | | |
| **Teaching Scheme:** TH: 03 Hours/Week | | **Credits** 03 | **Examination Scheme** SE : 25 ISE : 15 SEE  : 60 |

**Prerequisite:** Data Structures, Java Programming, Database Engineering

**Course Objectives:**

1. To Introduce Java concepts required for development of map reduce programs.
2. To Apply data modelling techniques to large data sets
3. To understand architectural concepts of Hadoop and map reduce paradigm
4. To Create applications for Big Data analytics

**Course Outcomes:**

On completion of the course, student will be able to-

1. 1. Explain Java concepts required for development of map reduce programs.
2. Applying data modelling techniques to large data sets.
3. Describe architectural concepts of Hadoop and map reduce paradigm.
4. Create applications for Big Data analytics

**Course Contents**

| **Unit 1** | **Introduction to Big Data** | **07 Hours** |
|---|---|---|

What Is Big Data?, Driving the growth of Big Data, Differentiating between Big Data and traditional enterprise, relational data, Challenges of Bid Data,  Elements of Big data, Big data analytics, Big Data Stack, Virtualization and Big data, virtualization approaches

| **Unit 2** | **Working with Big Data** | **08 Hours** |
|---|---|---|

Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop (Namenode, Datanode, Secondary Namenode, JobTracker, Task Tracker), Introducing and Configuring Hadoop cluster (Local, Pseudo-distributed mode, Fully Distributed mode), Configuring XML files.

| **Unit 3** | **Writing Map Reduce Programs** | **06 Hours** |
|---|---|---|

A Weather Dataset, Understanding Hadoop API for MapReduce Framework (Old and New), Basic programs of Hadoop MapReduce: Driver code, Mapper code, Reducer code, RecordReader, Combiner, Partitioner.

| **Unit 4** | **Hadoop I/O** | **06 Hours** |
|---|---|---|

The Writable Interface, Writable Comparable and comparators, Writable Classes: Writable wrappers for Java primitives, Text, BytesWritable, NullWritable, ObjectWritable and GenericWritable, Writable collections, Implementing a Custom Writable: Implementing a RawComparator for speed, Custom comparators.

| **Unit 5** | **Pig** | **06 Hours** |
|---|---|---|

Hadoop Programming Made Easier Admiring the Pig Architecture, Going with the Pig Latin Application Flow, Working through the ABCs of Pig Latin, Evaluating Local and Distributed Modes of Running Pig Scripts, Checking out the Pig Script Interfaces, Scripting with Pig Latin.

| **Unit 6** | **Applying Structure to Hadoop Data with Hive** | **06 Hours** |
|---|---|---|

Saying Hello to Hive, Seeing How the Hive is Put Together, Getting Started with Apache Hive, Examining the Hive Clients, Working with Hive Data Types, Creating and Managing Databases and Tables, Seeing How the Hive Data Manipulation

Language Works, Querying and Analyzing Data.

**Books:**

**Text Books :**

1. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
2. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly
3. Hadoop in Action by Chuck Lam, MANNING Publication
4. Hadoop for Dummies by Dirk deRoos, Paul C.Zikopoulos, Roman B.Melnyk,Bruce Brown, Rafael Coss

**Reference Books :**

1. A.K.Jain, "Digital Image Processing", PHL
2. 2. M.Sonka, V.Hlavac, and R.Boyle – Image processing, Analysis and Machine vision, Thomson Asia pvt. Ltd, 1999.

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|---|---|---|
| **(An Autonomous Institute)** | | |
| **Final Year B. Tech. of Computer Science and Engineering** | | |
| **CSP409: AI and Deep Learning Lab** | | |
| **Teaching Scheme:** <br> TH: 02 Hours/Week <br> PR: 02 Hours/Week | **Credits** <br> **03** | **Examination Scheme** <br> CIE: 50 <br> SEE : 50 |

**Prerequisite:** Machine Learning, Data Science

**Course Objectives:**
1. Understand the basic concepts of artificial intelligence and deep learning networks
2. Introduce different models of deep learning to work with various types of inputs.
3. Learn effects of different parameters and hyper-parameters on deep learning model output.

**Course Outcomes:**
On completion of the course, student will be able to-
1. Describe basic concepts of artificial intelligence and deep learning.
2. Develop different deep learning models for given tasks.
3. Devise the correct parameters and hyper-parameters of developed model for getting improved results.

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Neural Network and Deep Learning** | **03 Hours** |
| Introduction to AI, ML and Deep Learning, A brief history, Need of Deep Learning, Basics of neural network, Data representation for neural network, Gradient based optimization, anatomy of neural network. | | |
| **Unit 2** | **Introduction to Tensorflow, Keras and hyperparameters** | **05 Hours** |
| **Tensorflow:** Introduction, Downloading and installation of Tensorflow, The computation graph, Modelling cyclic dependencies, Building and running visualization, Computing graph and distribution, Simple math operation and distribution, Tensors, Rank of tensors, Tensor math, Numpy and tensors, Tensorflow example, **Keras:** Introduction, Models, Layers, Pre-processing, Deep Learning case studies, **Hyperparameters:** Learning rate, No of iterations, hidden layers, hidden units, choice of activation function, momentum, mini batch size, Overfitting and underfitting, regularization | | |
| **Unit 3** | **Convolutional Neural Networks** | **04 Hours** |
| The convolutional operation, The max pooling operation, Training a convnet from scratch on a small dataset, Using pre-trained convnet, Visualizing what convnet learn | | |
| **Unit 4** | **Sequence Models** | **04 Hours** |
| One hot encoding, Using word embeddings, A recurrent layer in Keras, Understanding the LSTM and GRU layers, Example of LSTM in Keras, Advanced use of Recurrent Neural Network | | |
| **Unit 5** | **Advanced Deep Learning Best Practices** | **04 Hours** |
| Going beyond the sequential model: The Keras functional API, Inspecting and monitoring deep-learning models using Keras callbacks and TensorBoard,  Getting the most out of your models | | |
| **Unit 6** | **Generative Deep Learning** | **04 Hours** |
| Text generation with LSTM, DeepDream, Neural Style Transfer, Generating images with variational autoencoders, Introduction to generative adversarial network. | | |

**Text Books:**
1. Deep Learning with Python by Francois Chollet,  Manning Publications

**Reference Books:**
5. Deep Learning by Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press Book

**Course:**
1. Deep Learning Specialization by Deeplearning.ai

| Experiment List: |
| --- |
| It should consist of minimum 8-10 experiments. Some of sample experiments are listed below: |

1. Installing of Anaconda or Miniconda and working with Tensorflow and Keras
2. Introduction and working with Google Colab for using GPUs and TPUs for large projects
3. Developing simple perceptron (single layer neural network)
4. Developing simple multilayer neural network for different tasks
5. Designing and developing basic CNN for given task
6. Using transfer learning in CNN
7. Designing and developing simple RNN for given task
8. Designing and developing RNN with LSTM for given task
9. Designing and developing RNN with GRU for given task
10. Designing and developing model for Text generation using LSTM
11. Designing and developing model for Neural style transfer
12. Designing and developing model for generating images

## D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji
### *(An Autonomous Institute)*
## Final Year B. Tech. Computer Sc. & Engineering
## CSP410: Data warehouse &Business Intelligence Lab

| Teaching Scheme:<br>PR: 02 Hours/Week | Credits<br>01 | Examination Scheme<br>CIE: 50<br>SEE : 50 |
|---|---|---|

**Prerequisite:   Database Systems, Data Science**

**Course Objectives:**

1. To Introduce Extract Transform and Load System in Business Intelligence systems
2. To Introduce Designing Dimensional model, Fact table and dimension tables and correlate them using various models like star schema, snow flack schema
3. To Introduce various Analytical and Reporting Tools

**Course Outcomes:**

On completion of the course, -

1. Students should be able to install and configure BI Systems
2. Students should be able to design fact and dimension table and design dimensional model.
3. Students should be able to  profile and preprocess data &  demonstrate ETL process
4. Students should be able to  apply analytical and reporting tools for various BI tasks

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Install and configure BI Systems** | **00 Hours** |
| Students are expected to  Install and configure BI Systems like MS SQL Server, Pentaho, PowerBI, Oracle | | |
| **Unit 2** | **Identify and design fact and dimension tables** | **00 Hours** |
| Students are expected to identify facts and dimension for the given business process | | |
| **Unit 3** | **Designing the Dimensional Modeling:** | **00 Hours** |
| Students are expected to design dimensional model for the given business process | | |
| **Unit 4** | **Data profiling and preprocessing** | **00 Hours** |
| Students are expected to profile and preprocess the given business data using various tools | | |
| **Unit 5** | **Demonstration of ETL** | **00 Hours** |
| Students are expected to  demonstrate ETL process using various tools | | |
| **Unit 6** | **Data modeling and OLAP query using SQL Server** | **00 Hours** |
| Students are expected to  model data and execute OLAP queries using SQL server | | |
| **Unit 7** | **Demonstration of Classification and Clustering using Weka** | **00 Hours** |
| Students are expected to  demonstrate  Classification and Clustering using Weka | | |
| **Unit 8** | **Creating BI reports using reporting various reporting tools** | **00 Hours** |
| Students are expected to  create BI reports using various reporting tools | | |

**Books:**

**Text Books :**

1. Ralph Kimball, "The Data Warehouse Lifecycle toolkit', 2nd edition, Wiley India.

**Reference Books :**

1. Data Warehousing: Fundamentals for IT Professionals by Paulraj Ponniah; 2nd Edn. Publisher: Wiley, John & Sons, Incorporated
2. Star Schema: The Complete Reference by Christopher Adamson, Mc-Graw Hill Osborne Media

3. The Data Warehouse Toolkit: The Complete Guide to Dimensional Modeling by Ralph Kimball Corporate Information Factory by W. H. Inmon
4. Data Warehousing in the Real World – Anahory & Murray, Pearson.

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| **(An Autonomous Institute)** |||
| **Final Year B. Tech. of Computer Sci. & Engg.** |||
| **CSP411: Cloud Computing Lab** |||
| **Teaching Scheme:** <br> **Practical: 02 Hours/Week** | **Credits** <br> **01** | **Examination Scheme** <br> **CIE:50** <br> **SEE:--** |

**Prerequisite: --Computer Network, Operating System, Information Security**

**Course Objectives:**
4. To provide students with the fundamentals and essentials of Cloud Computing.
5. Understand the importance of virtualization in distributed computing and how this has enabled the development of Cloud Computing.
6. Understand the importance of protocols and standards in computing.

**Course Outcomes:**
On completion of the course  Students should be able to -
1. Identify the appropriate cloud services for a given application.
2. Assess the comparative advantages and disadvantages of Virtualization technology.
3. Analyze authentication, confidentiality and privacy issues in cloud computing.
4. Understand the importance of protocols and standards in management for cloud services.

| Course Contents ||
|---|---|
| Exp 1 | **Launch a Linux VM:** Launch then connect to a Linux instance in the cloud. |
| Exp 2 | **Deploy Code to a Virtual Machine:** <br><br> Learn how to easily deploy code to virtual machines in the cloud. |
| Exp3 | **Create and Connect to a MySQL Database** <br><br> Create an environment to run your MySQL database, connect to the database, and delete the DB. |
| Exp 4 | **Store and Retrieve a File** <br><br> Securely store and access files at scale in the AWS Cloud. |
| Exp 5 | **Run a Serverless "Hello, World!"** <br><br> Learn the basics of running code on AWS Lambda without provisioning or managing servers. |
| Exp 6 | **Set up a Continuous Deployment Pipeline** <br><br> Create an automated software release pipeline that deploys a live sample app. |
| Exp 7 | **Build a Serverless Application** <br><br> Develop, build, and deploy a Node.js serverless web application using an IDE. |
| Exp 8 | **Launch a Web Application** <br><br> Get a sample PHP application up and running with AWS Elastic Beanstalk (EB). |

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| **D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji**<br>**(An Autonomous Institute)**<br>**Final Year B. Tech. of Computer Science and Engg.**<br>**CSP412:  Internet of Things Lab** | | |
| **Teaching Scheme:**<br><br>**PR.: 02 Hours/ Week** | **Credits: 01** | **Examination Scheme**<br><br>**CIE: 50** |

**Prerequisite:**

1. Web Technology -I

**Course Objectives:**

1. To study about the Raspberry pi and Arduino hardware
2. To learn about how to Install and configure Operating System on Raspberry pi and Arduino
3. To create an application on different hardware/Board.
4. To learn about the  IoT Application  on different hardware/Board

**Course Outcomes:**

On completion of the course, student will be able -

1. To explain the Raspberry pi and Arduino hardware.
2. To Install and configure Operating System on Raspberry pi and Arduino.
3. To Design and develop an application on different hardware/Board.
4. To Design and develop an IoT application on different hardware/Board.

| | | Course Contents |
|---|---|---|
| S.N. | Exp No. | |
| 01 | E01 | Study of Raspberry pi and Arduino hardware. |
| 02 | E02 | Installation of Operating System on Raspberry pi and Arduino. |
| 03 | E03 | LED Interfacing with Arduino. |
| 04 | E04 | LED Interfacing with Raspberry Pi. |
| 05 | E05 | LCD Interfacing with Arduino. |
| 06 | E06 | LCD Interfacing with Raspberry Pi. |
| 07 | E07 | IoT Application (Cloud based) LED Interfacing with Arduino. |
| 08 | E08 | IoT Application (Cloud based) LED Interfacing with Raspberry Pi. |
| 09 | E09 | Ultra Sonic sensor interfacing SR04 with Arduino. |
| 10 | E10 | Ultra Sonic sensor interfacing SR04 with Raspberry Pi. |

**Books:**

**Text Books:**

1. The Raspberry Pi User Guide by Eben Upton
2. Programming Arduino: Getting Started with Sketches by simon Monk

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| **Final Year B. Tech. Computer Sc. & Engineering** |||
| **CSP413: Big Data and Hadoop Lab** |||
| **Teaching Scheme:** TH: 02 Hours/Week | **Credits** 01 | **Examination Scheme** CIE: 50 |
| **Prerequisite:** Data Structures, Java Programming, Database Engineering |||
| **Course Objectives:** <br> 1. To Introduce Java concepts required for development of map reduce programs. <br> 2. To understand architectural concepts of Hadoop and map reduce paradigm. <br> 3. To Create applications for Big Data analytics |||
| **Course Outcomes:** <br> On completion of the course, student will be able to- <br> 1. Explain Java concepts required for development of map reduce programs. <br> 2. Describe architectural concepts of Hadoop and map reduce paradigm. <br> 3. Create applications for Big Data analytics. |||
| **Course Contents** |||

Minimum 6 to 8 experiments to be performed based on following guidelines :

1. Write Generic Program using Java.
2. Installation of Hadoop System.
3. Implementation of file management tasks in Hadoop System (HDFS).
4. Hadoop YARN Administration command and User commands.
5. Basic MapReduce program to understand MapReduce Paradigm.
6. Hadoop Hive DDL commands, like create database, View, Drop, Alter,
7. Hadoop Hive DML commands like Insert, delete, update, data retrieval queries, Join-inner and outer.
8. Working with operators in Pig- FOREACH, ASSERT, FILTER, GROUP, ORDER BY, DISTINCT, JOIN, LIMIT, SAMPE, SPLIT, FLATIEN

# D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji
**(An Autonomous Institute)**
## Final Year B. Tech. of Computer Science and Engineering
### CSD414 : Project - I

| Teaching Scheme:<br>PR: 04 Hours/Week | Credits<br>04 | Examination Scheme<br>CIE: 50<br>SEE: 50 |
|---|---|---|

**Prerequisite: - Software Engineering, Mini Projects – I, II, III**

**Course Objectives:**
1. Identify the area of project work
2. Recognize the need and ability to engage in lifelong learning
3. Function effectively on teams and to communicate effectively
4. Able to prepare the technical report

**Course Outcomes:**
On completion of the course, student will be able to-
1. Explain the need of a software project for the society
2. Identify requirement analysis like functional and technical requirements for the project
3. Come up with design documents for the project consisting of Architecture, Dataflow diagram, class diagram, Algorithmic descriptions of various modules, collaboration diagram, ER Diagrams, Database Design Documents, Sequence Diagram, Use Case Diagram
4. Able to demonstrate analysis and design.
5. Prepare the technical report consisting of Requirement specification, Analysis and Design of Project

## Course Contents

The project work is to be carried out in two semesters of Final Year Computer Science and Engineering. The project should be undertaken preferably by group of 4-5 students who will jointly work and implement the project in the two semesters.

In Semester VII, the group will select a project with the approval of the Guide (staff member) and submit the name of the project with a synopsis of the proposed work of not more than 02 to 08 pages before second week of August in the academic year. The group is expected to complete detailed system design, analysis, data flow design, procurement of hardware and/or software, implementation of a few modules of the proposed work at the end of semester –VIII as a part of the term work submission in the form of a joint report.

The term work assessment will be done jointly by teachers appointed by Head of the Institution.

The oral examination will be conducted by an internal and external examiner as appointed by the COE.

**Note:**
1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.

**The Continuous internal evaluation (CIE) is to be done as follows.**
1. Mid term assessment – 10 marks.
2. End term assessment – 10 marks.
3. Final performance evaluation to be done by guide – 30 marks.

**Semester End Exam :**
The semester end exam will be conducted by examiners appointed by exam coordinator.

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| **Final Year B. Tech. of Computer Sc. & Engineering** | | |
| **CSL415: Real Time Operating System** | | |
| **Teaching Scheme:** TH: 03 Hours/Week | **Credits** 03 | **Examination Scheme** SE: 25 ISE: 15 SEE: 60 |

**Prerequisite: --**

**Course Objectives:**
1. To learn and describe basic concepts of real time systems.
2. To explain hardware considerations and software engineering concepts for design of real time systems.
3. To describe real time operating system concepts and applications.

**Course Outcomes:**
On completion of the course, students will be able to-
1. Describe basic concepts of real time systems.
2. Explain hardware considerations and software engineering concepts for design of real time systems.
3. Describe real time operating system concepts and applications.

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Basic Real Time Concepts** | **03 Hours** |
| Terminology, Real Time System Design issues, Examples of Real-Time Systems. | | |
| **Unit 2** | **Hardware Considerations** | **05 Hours** |
| Basic Architecture, Hardware Interfacing, Central Processing Unit, Memory, Input / Output, Other special devices. | | |
| **Unit 3** | **Real-Time Operating Systems** | **10 Hours** |
| Real-Time Kernels, Theoretical Foundation of Real-Time Operating System, Scheduling ,Inter Task Communication and synchronization, System Services for Application Programs, Memory Management, Selecting Real Time Operating Systems ,Case study : POSIX . | | |
| **Unit 4** | **Software Requirements Engineering** | **08 Hours** |
| Requirements - Engineering process, Types of Requirements, Requirements Specification for Real-Time Systems, Formal Methods in Software Specification, Structured Analysis and Design, Object-Oriented Analysis and the Unified Modeling, Organizing the Requirements Document, Organizing and Writing Requirements, Requirements Validation and Review. | | |
| **Unit 5** | **Metrics & Cost Estimation** | **08 Hours** |
| Lines of Code, McCabe's Metric, Halstead's Metric, and Function points, Feature Points, Metric for Object –Oriented Software. Fault Tolerance, Cost Estimation using COCOMO, Basic COCOMO, Detailed COCOMO, COCOMO II model. | | |
| **Unit 6** | **Study of Commercial RTOS** | **05 Hours** |
| Architecture of RT Linux, Initialization Task Management in RT Linux, Scheduling, Memory Management, Task Synchronization. | | |
| **Books:** | | |
| **Text Books:** | | |
| 1. Real- Time Systems Design and Analysis. by Phillip A. Laplante – 3rd Edition (For Units 1, 2, 3, 4,5)  2. Embedded Real Time Systems: Concepts, Design and Programming - Dr. K.V.K. Prasad - Black Book, Edition: 2014 (Unit 6) | | |
| **Reference Books:** | | |
| 1. Real Time Systems Theory and Practice, Rajib Mall, Pearson Education. | | |

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| **Final Year B. Tech. Computer Sc. & Engineering** | | | |
| **CSL416 :  Project Management and Finance** | | | |
| **Teaching Scheme:** <br> **TH: 03 Hours/Week** | | **Credits** <br> **03** | **Examination Scheme** <br> **SE : 25** <br> **ISE : 15** <br> **SEE  : 60** |

**Prerequisite:**

**Course Objectives:**

1. Provide students with a basic understanding of project management principles and practices.
2. Demonstrate competency in the creation and management of a project plan
3. Understanding impact of Scope, Time, and finance management.
4. Understanding the software quality metrics and quality assurance.
5. Develop strategies to calculate risk factors involved in IT projects

**Course Outcomes:**

1. Student will be able to describe Documents used in project management at each stages of project
2. Students will be able to develop the scope of work and Work Breakdown structure and develop and describe the use of a Gantt chart and milestones in monitoring and measuring progress project
3. Student will be  able to gain exposure to project control and management, using standard tools of cost and schedule variance analysis
4. Student will be able to appreciate the elements of risk and quality in projects.
5. Students will be able to acquaint with the basic concepts of management of business finance.

| **Course Contents** | | |
|---|---|---|
| **Unit 1** | **Introduction to Project Management** | **05 Hours** |
| Introduction to Project Management : Project, project management(PM), role of project manager, project management profession, system view of PM, organization, stakeholders, project phases and lifecycle, context of IT projects, process groups, mapping groups to knowledge areas | | |
| **Unit 2** | **Project Integration Management** | **06 Hours** |
| Strategic planning and project selection, Developing a Project Management Plan, Directing and Managing Project Work, Monitoring and Controlling Project Work, Performing Integrated Change Control, Closing Projects or Phases | | |
| **Unit 3** | **Project ,Time and Cost management:** | **07 Hours** |
| Planning Scope Management, Collecting Requirements, Defining Scope, Creating the Work Breakdown Structure, Validating Scope, Controlling Scope Planning Schedule Management, Defining Activities, Sequencing and Estimating Activity, Resources & Duration, Developing & Controlling Schedule Basic Principles of Cost Management, Planning Cost Management, Estimating Costs, Determining the Budget, Controlling Costs | | |
| **Unit 4** | **Quality and  Risk management** | **07 Hours** |
| Quality and Human Resource management: Importance, quality - planning assurance control, tools and Techniques, modern quality management and improving IT project quality. Risk management: importance, risk management planning, sources of risk, risk identification, qualitative and quantitative risk analysis, risk response planning, risk monitoring and control. | | |
| **Unit 5** | **Communication and  Human Resource  management** | **07 Hours** |
| Communication and Risk management: Importance, communication planning, information distribution, performance reporting, managing stakeholders, suggestions for improving project communication. Human Resource management: Importance, keys to managing people, human resource planning, acquiring, developing and managing project team. | | |
| **Unit 6** | **Finance Management** | **07 Hours** |

Financial Management: Meaning, nature and scope of finance; financial goal profit Vs. Wealth maximisation; Finance functions – investment, financing and dividend decisions.  Capital Budgeting: Features of Capital Budgeting, Importance of Capital Budgeting; Evaluations Techniques of Projects: Traditional Techniques: Pay Back Period, ARR, Time Adjusted Techniques: NPV, IRR, PI; Risk and Uncertainty in Capital Budgeting.

**Books:**

**Text Books :**

1. Information Technology Project Management  – Kathy Schwalbe (Cengage Learning – India Edition)

**Reference Books :**

**1.** Project Management Core Textbook – Mantel Jr., Meredith, Shafer, Sutton with Gopalan (Wiley India Edition
2. Project Management- A systems Approach to planning, scheduling and controlling -Harold Kerzner (John Wiley & Sons, Inc.)
3. Financial Management: Text and Problems by M Y Khan & P K Jain, Publisher: TMH, New Delhi.
4. Financial Management Theory & Practice by Prasanna Chandra, Publisher: TMH, New Delhi.

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| **Final Year B. Tech. Computer Sc. & Engineering** |||
| **CSL417: Agile Technology** |||
| **Teaching Scheme:**<br>TH: 03 Hours/Week | **Credits**<br>**03** | **Examination Scheme**<br>SE : 25<br>ISE : 15<br>SEE : 60 |

**Prerequisite: Software Engineering**

**Course Objectives:**

1. Understand the background and driving forces for taking an Agile approach to software development
2. Understand the business value of adopting Agile approaches
3. Understand the Agile development practices
4. Learn unit tests using Test Driven Development
5. Introduce design principles and refactoring to achieve Agility with different tools
6. Introduce testing activities within an Agile project

**Course Outcomes:**

On completion of the course, student will be able to-

1. Describe fundamental concepts of agile methodology
2. Explain agile development practices related with agile testing and testing based design and development.
3. Describe current industry trends with agile technology

**Course Contents**

| Unit 1 | Fundamentals of Agile | 06 Hours |
|:---|:---|:---|

The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools

| Unit 2 | Agile Scrum Framework | 07 Hours |
|:---|:---|:---|

Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management

| Unit 3 | Agile Testing | 06 Hours |
|:---|:---|:---|

The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester

| Unit 4 | Agile Software Design and Development | 07 Hours |
|:---|:---|:---|

Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design,

| Unit 5 | Refactoring and version control | 06 Hours |
|:---|:---|:---|

Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control

| Unit 6 | Industry Trends | 07 Hours |
|:---|:---|:---|

Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies

**Books:**

**Reference Books :**
1. Great big agile by Jeff Dalton, Apress
2. Agile Software Development with Scrum By Ken Schawber, Mike Beedle, Pearson
3. Agile Testing: A Practical Guide for Testers and Agile Teams By Lisa Crispin, Janet Gregory, Addison Wesley
4. Agile Software Development, Principles, Patterns and Practices By Robert C. Martin Prentice Hall publication
5. Agile Software Development: The Cooperative Game, By Alistair Cockburn, Addison Wesley publication
6. User Stories Applied: For Agile Software By Mike Cohn Publisher: Addison Wesley

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| **Final Year B. Tech. Computer Sc. & Engineering** | | | |
| **CSL418: Software Testing and Quality Assurance** | | | |
| **Teaching Scheme:**<br>TH: 03 Hours/Week | | **Credits**<br>**03** | **Examination Scheme**<br>SE : 25<br>ISE : 15<br>SEE  : 60 |

**Prerequisite:  Software Engineering**

**Course Objectives:**

1. To provide knowledge about fundamentals of software testing and software quality
2. To understand the fundamentals of software verification.
3. To understand and evaluate metrics and models used in software testing
4. To understand and compare testing web applications and desktop applications
   To understand, compare and Choose from various software project assessment methods

**Course Outcomes:**

On completion of the course, student will be able -

1. To explain fundamentals of software testing and software quality
2. To perform software verification on different software engineering product generated by each phase in SDLC
3. To describe basics of measurement, measurement attribute, metrics and models in software testing
4. To explain regression testing, object oriented testing and web application testing in all respects.

| Course Contents | | |
|---|---|---|
| **Unit 1** | | **04 Hours** |
| **Introduction:** Some Software Failures, Testing Process, Some Terminologies, Limitations of Testing, The V Shaped software life cycle model | | |
| **Unit 2** | | **08 Hours** |
| **Software Verification:** Verification Methods, SRS document verification, SDD document verification, Source code reviews, User documentation verification, Software project audit<br>**Creating test cases from SRS and Use cases:** Use Case Diagram and Use Cases, Generation of test cases from use cases, Guidelines for generating validity checks, strategies for data validity, Database testing | | |
| **Unit 3** | | **07 Hours** |
| **Regression Testing:** What is regression testing? , Regression Test cases selection, Reducing the number of test cases, Risk analysis, Code coverage prioritization techniques<br>**Object oriented testing:** What is Object orientation? , What is object oriented testing?, Path testing, State based testing, Class testing | | |
| **Unit 4** | | **06 Hours** |
| **Measurement**- what is it and why do it?, Measurement in everyday life, Measurement in software engineering, scope of software metrics<br>**Metrics and Models in Software testing:** Software Metrics, Categories of Metrics, Object oriented Metrics used in testing, what should we measure during testing, Software Quality attributes prediction models | | |
| **Unit 5** | | **07 Hours** |
| **Measuring Internal Product Attribute Size:** Aspects of software size, Length, Reuse, Functionality<br>**Measuring External Product Attributes:** Modeling software quality, measuring aspects of software quality | | |
| **Unit 6** | | **07 Hours** |

**Testing Web applications:** What is web testing?, functional testing, UI testing, Usability Testing, configurations and compatibility testing, security testing, performance testing, database testing, post deployment testing, web metrics.

**Automated Test data generation:** Automated Test Data generation, Approaches to test data generation, Test data generation tools

**Books:**

**Text Books :**

1. Software testing: Yogesh Singh, Cambridge University Press, First Edition
2. Software Metrics – A Rigorous & Practical approach: Norman Fenton, Shari Lawrence Pfleeger, 2nd Edition (Thomson Press)

**Reference Books :**

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Foundations of Software testing: Aditya P. Mathur, Pearson, Second Edition
3. Software Testing: Ron Patton, Pearson (SAMS), Second Edition
4. Software Quality , Mordechai Ben Menachem, Garry S. Marliss ,BS Publications

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| **D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji** | |
| **(An Autonomous Institute)** | |
| **Final Year B. Tech. of Computer Science and Engineering** | |
| **CSL419: Mainframe Technology** | |

| Teaching Scheme: TH: 03 Hours/Week | Credits 03 | Examination Scheme SE: 25 ISE: 15 SEE : 60 |
|---|---|---|

**Prerequisite:**

**Course Objectives:**

Provide knowledge to the students

1. About the mainframe system in terms of software and hardware.
2. About concepts of and different types of operating systems on mainframe system
3. About Job Control Language and different Job Control Language statements.
4. About COBOL and DB2.

**Course Outcomes:**

On completion of the course, student will be able to-

1. Explain the use and evolving role of the mainframe in today's business world
2. Express the concepts and role of different types of operating systems on Mainframe
3. Demonstrate the concepts of JCL and COBOL by writing JCL statements for COBOL program.
4. Express the concepts of DB2 in mainframe world

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Introduction to IBM Mainframe** | **06 Hours** |
| Overview of Computer Architecture, Classification of computers, Mainframe key features, benefits, mainframe evolution, Mainframe OS terminology, concept of address space, Hardware configurations, Multiprocessing, Applications, Characteristic Features of Mainframe Operating System, Roles in the Mainframe World. | | |
| **Unit 2** | **z/OS, MVS and VSAM** | **06 Hours** |
| z/Os and other Mainframe operating systems, What is z/OS, Overview of z/OS facilities, virtual Storage and other Mainframe Concepts, Workload management, MVS Concepts , Address Spaces ,Addressing Mode and Residence Mode , Multiple Virtual Storage, Multiprogramming ,MVS/370 Address Space Organizations, How data sets are stored, Catalogs ,Data Set Organization, VSAM Basics. | | |
| **Unit 3** | **Introduction to JCL** | **06 Hours** |
| Introduction to Job Control language-Mainframe information representation and storage, sequential and partitioned datasets, Indexed files, structure of JCL , JOB statement , EXEC statement ,JOB and EXEC statements, DD statement , JCL procedures and symbolic parameters, IBM utility programs | | |
| **Unit 4** | **COBOL Programming I** | **07 Hours** |
| Introduction, History, coding format for COBOL programs, structure of COBOL program, character set, COBOL words, data names and identifiers, literals, figurative constants, continuation of lines, language description notation, IDENTIFICATION DIVISION, ENVIRONMENT DIVISION, DATA DIVISION-Level structure, data description entries, USAGE Clause, REDEFINES Clause, RENAMES Clause, SIGN Clause ,FILE SECTION, WORKING-STORAGE SECTION, Editing, PROCEDURE DIVISION and basic verbs - Structure, MOVE, Arithmetic and Sequence Control Verbs, Input and Output Verbs, Conditional Verb | | |
| **Unit 5** | **COBOL Programming II** | **06 Hours** |
| Table Handling - OCCURS Clause and Subscripting, Assigning values to table elements, Multidimensional Tables, PERFORM verb and Table Handling, Indexed Tables and Indexing, SET verb, SEARCH verb. Statements for Sequential Files- OPEN, CLOSE, WRITE, REWRITE. Miscellaneous verbs- SORT, MERGE, STRING, UNSTRING. | | |
| **Unit 6** | **Overview of DB2** | **08 Hours** |
| Introduction to DB2 , Major components of DB2- System Service component, Locking Service component, Database Service component, DB2 Application program preparation and Execution,DB2 Objects- Databases, Table spaces, Stored tables, Indexes, Index spaces, Storage groups, View, Buffer pool. DB2 SQL | | |

programming – Types of SQL statements, DCL, DDL, DML, Advanced SQL topics ,UPDATE operations, Aggregate functions

**Text Books:**
1. IBM Mainframe Handbook – Alexis Leon. ( For Unit 1, 2, 3, 6)
2. K. Roy and D. Ghosh Dastidar, "Cobol Programming", Tata McGraw Hill, Second Edition.. ( For Unit 4 ,5 )

**Reference Books:**
1. Introduction to the New Mainframe z/OS Basics- Mike Ebbers, John Kettner, Wayne O'Brien,Bill Ogden.- Redbooks
2. http://www.redbooks.ibm.com/redbooks/pdfs/sg246366.pdf ( For Unit 1, 2)

## D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji
### *(An Autonomous Institute)*
## Final Year B. Tech. Computer Sc. & Engineering
## CSL420: Cyber Security

| Teaching Scheme:<br>TH: 03 Hours/Week | Credits<br>03 | Examination Scheme<br>SE: 25<br>ISE: 15<br>SEE : 60 |
|---|---|---|

**Prerequisite:**

Data Communication & Networking, Information Security

**Course Objectives:**

1. To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks
2. To examine secure software development practice
3. To understand key terms and concepts in I.T. ACT
4. To incorporate approaches for incident analysis and response.

**Course Outcomes:**

On completion of the course, student will be able to-

1. Explain the cyber security concepts.
2. Describe the cyber security vulnerabilities and prevention techniques.
3. Explain the different rules and regulations under I.T. ACT.
4. Explain the concepts of digital forensics & incident management

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Computer and Network Security** | **07 Hours** |
| **Introduction to Computer Security** - Introduction, How Seriously Should You Take Threats to Network Security?, Identifying Types of Threats, Basic Security Terminology, Concepts and Approaches, Online Security Resources<br>**Networks and the Internet :** Introduction, Network Basics, How the Internet Works, Basic Network Utilities , Advanced Network Communications Topics, | | |
| **Unit 2** | **Cyber Frauds, DoS, Viruses** | **06 Hours** |
| **Cyber Stalking, Fraud, and Abuse:** Introduction, How Internet Fraud Works, Identity Theft, Cyber Stalking, Protecting Yourself Against Cyber Crime. **Denial of Service Attacks:** Introduction, DoS, Illustrating an Attack, **Malware:** Introduction, Viruses, Trojan Horses, The Buffer-Overflow Attack.The Sasser Virus/Buffer Overflow, Spyware, Other Forms of Malware, Detecting and Eliminating Viruses and Spyware, | | |
| **Unit 3** | **Techniques Used by Hackers** | **08 Hours** |
| Introduction, Basic Terminology, The Reconnaissance Phase, Actual Attacks, Malware Creation, Penetration Testing | | |
| **Unit 4** | **Computer Security Technology** | **07 Hours** |
| Introduction, Virus Scanners, Firewalls, Antispyware, IDS, Digital Certificates, SSL/TLS, Virtual Private Networks, Wi-Fi Security, | | |
| **Unit 5** | **I.T. ACT** | **06 Hours** |
| Introduction, Cyber Security Regulations, Roles of International Law, the state and Private Sector in Cyberspace, Cyber Security Standards. The INDIAN Cyberspace, I.T. Act | | |
| **Unit 6** | **Introduction to Forensics** | **05 Hours** |
| Introduction, General Guidelines, Finding Evidence on the PC, Finding Evidence in System Logs , Getting Back Deleted Files, Operating System Utilities, Operating System Utilities,<br>Mobile Forensics: Cell Phone Concepts | | |
| **Books:** | | |

**Text Books :**

1. Computer Security Fundamentals - Chuck Easttom , Pearson ,third edition.

**Reference Books :**

1. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3 rd edition , 2014.
2. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.
3. John Sammons, The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Paperback, February 24, 2012.
4. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
5. Network intrusion alert: an ethical hacking guide to intrusion detection, Ankit Fadia, Manu Zacharia, Thomson Course Technology PTR, 2007.
6. Ethical Hacking, Thomas Mathew, OSB Publisher, 2003.
7. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
8. Dave Shackleford, Virtualization Security: Protecting Virtualized Environments, John Wiley & Sons, 2012.
9. BRAGG, Network Security: The Complete Reference, McGraw Hill Professional, 2012

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| **Final Year B. Tech. Computer Sc. & Engineering** | | |
| **CSL421 :  Information Retrieval** | | |
| **Teaching Scheme:** <br> **TH : 03 Hours/Week** | **Credits** <br> **03** | **Examination Scheme** <br> **SE: 25** <br> **ISE: 15** <br> **SEE : 60** |

**Prerequisite: --** Machine Learning

**Course Objectives:**

1. To introduce need of Information Retrieval
2. To introduce  Information Retrieval Modeling and IR Queries
3. To introduce  Information Retrieval Evaluation
4. To introduce  text classification and web  retrieval

**Course Outcomes:**

On completion of the course, student will be able to-

1. Explain  need and issues in Information retrieval(IR)
2. Identify, explain and analyze IR models
3. Identify, explain and analyze IR  evaluation  techniques
4. Explain preprocessing and queries in IR
5. Explain techniques for Text Classification and Web retrieval

| **Course Contents** | | |
|---|---|---|
| **Unit 1** | **Introduction to  Information Retrieval** | **05 Hours** |
| Information Retrieval in Libraries and Digital Libraries, The IR Problem, The IR System, How the Web Changed Search. User Interfaces for Search, Search Interfaces Today, Visualization in Search Interfaces | | |
| **Unit 2** | **Information Retrieval Modeling** | **08 Hours** |
| IR Models: Modelling and Ranking, Characterization of an IR Model, A Taxonomy of IR Models, Classic Information Retrieval: Basic Concepts, The Boolean Model, Term Weighting, TF-IDF Weights, Document Length Normalization, The Vector Model, Set-Based Model, Extended Boolean Model, Generalized Vector Space Model , Latent Semantic Indexing Model, The Hypertext Model, Structured Text Retrieval | | |
| **Unit 3** | **Information Retrieval Evaluation** | **06 Hours** |
| Retrieval Metrics: Precision and Recall, , MAP, MRR, F, User Oriented Measures, DCG: Discounted Cumulated Gain, BPREF: Binary Preferences | | |
| **Unit 4** | **Document formats, Document preprocessing and IR Queries** | **08 Hours** |
| Metadata, Text Document Format, Markup Languages, RDF: Resource Description Framework, Text Properties, Information Theory, Text Similarity, Document Preprocessing , Lexical Analysis of the Text , Elimination of Stopwords, Stemming , Keyword Selection, Queries: Languages & Properties, Query Languages: Keyword-Based Querying, Structural Queries, Query Protocols, Query Properties | | |
| **Unit 5** | **Text Classification and Indexing** | **07 Hours** |
| Text classification problem, Naive Bayes text classification, Feature selection, Mutual information, χ 2 Feature selection, Frequency-based feature selection Feature selection for multiple classifiers, Evaluation of text classification, Inverted Indexes | | |
| **Unit 6** | **Web Retrieval** | **05 Hours** |
| The Web ,Characteristics , Structure of the Web , Modeling the Web , Link Analysis, Search Engine Architectures, Search Engine Ranking, Managing Web Data, Search Engine User Interaction, Browsing, Beyond Browsing | | |
| **Books:** | | |
| **Text Books:** | | |

1) Modern Information Retrieval The Concepts and Technology behind Search by Ricardo Baeza-Yates Berthier Ribeiro-Neto  Second edition Addison-Wesley 2011
2) Introduction to Information Retrieval by C.D. Manning, P. Raghavan, H. Schütze. Cambridge UP, 2008

**Reference Books:**

1) Search Engines: Information Retrieval in Practice by Bruce Croft, Donald Metzler, Trevor Strohman Pearson 2010
2) Information Retrieval: Implementing and Evaluating Search Engines. Stefan Buttcher, Charlie Clarke, Gordon Cormack, MIT Press, 2010.

| D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji | | |
|---|---|---|
| **(An Autonomous Institute)** | | |
| **Final Year B. Tech. of Computer Science and Engineering** | | |
| **CSL422: Parallel Computing** | | |
| **Teaching Scheme:** TH: 03 Hours/Week | **Credits** 03 | **Examination Scheme** SE: 30 ISE: 10 SEE : 60 |

**Prerequisite:** C programming language, Data Structure, Algorithms

**Course Objectives:**
1. Understand basic concept of parallelism
2. Introduce CUDA to work with parallel computing
3. Learn different strategies to improve performance
4. Understand parallel computing with design solution of some parallel problem statement.

**Course Outcomes:**
On completion of the course, student will be able to-
1. Describe basics concepts of parallel computing
2. Explain fundamentals of parallel algorithm design and parallel programming
3. Describe different paradigms used in parallel computing

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Introduction to parallel computing and platforms** | **06 Hours** |

Motivating parallelism, scope of parallel computing, Implicit Parallelism: Trends in Microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines, Routing Mechanisms for Interconnection Networks, Impact of Process-Processor Mapping and Mapping Techniques

| **Unit 2** | **Principals of parallel algorithm design** | **06 Hours** |
|---|---|---|

Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models

| **Unit 3** | **Basic Communication Operations** | **06 Hours** |
|---|---|---|

One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and Reduction, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, All-Reduce and Prefix-Sum Operations, Scatter and Gather, All-to-All Personalized Communication, Circular Shift, Improving the Speed of Some Communication
Operations

| **Unit 4** | **Analytical Modeling of Parallel Programs** | **07 Hours** |
|---|---|---|

Sources of Overhead in Parallel Programs, Performance Metrics for Parallel Systems, The Effect of Granularity on Performance, Scalability of Parallel Systems, Minimum Execution Time and Minimum CostOptimal Execution Time, Asymptotic Analysis of Parallel Programs, Other Scalability Metrics

| **Unit 5** | **Programming Using the Message-Passing Paradigm** | **07 Hours** |
|---|---|---|

Principles of Message-Passing Programming, The Building Blocks: Send and Receive Operations, MPI: the Message Passing Interface, Topologies and Embedding, Overlapping Communication with Computation, Collective Communication and Computation
Operations, Groups and Communicators

| **Unit 6** | **Programming Shared Address Space Platforms** | **07 Hours** |
|---|---|---|

Thread Basics, Why Threads?, The POSIX Thread API, Thread Basics: Creation and Termination, Synchronization Primitives in Pthreads, Controlling Thread and Synchronization Attributes, Thread Cancellation, Composite Synchronization Constructs, Tips for Designing Asynchronous Programs, OpenMP: a Standard for Directive Based Parallel
Programming

| | |
|---|---|
| **Text Books:** | |
| 1. | Introduction to Parallel Computing, By Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Addison Wesley publication, Second Edition |
| **Reference Books:** | |
| 1. | Programming Massively Parallel Processors A Hands-on Approach by David Kirk, Wen-mei Hwu, Morgan Kaufmann Publisher, Second Edition |
| 2. | Parallel Computer Architecture: A Hardware/Software Approach, by David Culler, Jaswinder Pal Singh , Anoop Gupta,1st edition, Elsevier Publication. |
| 3. | Parallel Computing: Theory and Practice, by Michael Quinn, McGraw Hill Education India Private Limited Publication. |

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| **Final Year B. Tech. of Computer Science and Engineering** |
| **CSP423: Advanced Web Development Lab** |

| Teaching Scheme: TH: 02 Hours/Week PR: 02 Hours/Week | Credits 03 | Examination Scheme CIE : 50 SEE : 50 |
|---|---|---|

**Prerequisite:** Web Technology

**Course Objectives:**
1. Introducing Angular for developing modern, complex, responsive and scalable web applications
2. Understanding full architecture behind an Angular application
3. Understanding single-page applications with modern JavaScript frameworks

**Course Outcomes:**

On completion of the course, student will be able to-
1. Explain the concepts of advanced web development.
2. Devise an architecture for solving the given problem.
3. Develop a web application using Angular and other back end technologies.

| Course Contents | | |
|---|---|---|
| **Unit 1** | **Introduction to Typescript** | **03 Hours** |
| Overview, Environment Setup, Basic syntax, Type, Variables, Operators, Decision Making, Function, Loops, Function, Numbers, String, Array, Tuples, Union, Interfaces, Classes, Objects, Namespaces, Modules, Ambients. | | |
| **Unit 2** | **Fundamentals of Angular** | **03 Hours** |
| First App, Routing, Managing Data, Form, Deployment, Environment Setup, Architectural Overview, Introduction to modules, Introduction to components, Introduction to services and DI | | |
| **Unit 3** | **Working with Angular- Part-I** | **06 Hours** |
| Displaying data, Template syntax, User Inputs, Lifecycle hooks, Component interaction, component style, Angular element, Dynamic components, Attribute Directives and structural directives, Pipes. | | |
| **Unit 4** | **Working with Angular- Part-II** | **06 Hours** |
| Introduction, Reactive forms, Template Driven Forms, Form Validation, Dynamic Forms, Bootstraping, NgModules introduction, JSModules vs NgModules, Frequently used NgModules, Types of feature modules, Entry component, Feature Modules, Providers, Singaltone Services, Sharing NgModule, NgModule API, HTTP Client, Routing and navigation. | | |
| **Unit 5** | **NodeJS and ExpressJs** | **04 Hours** |
| NodeJs architecture ,Modules: Built-in and custom, Event loop, Asynchronous application , Testing node application, Introduction to ExpressJs, Routing, Template engines, Middleware, Web Application components, Error handling, Testing application Express application | | |
| **Unit 6** | **Mongodb** | **02 Hours** |
| Relational vs NoSQL DB, MongoDB fundamentals, Data modeling , Aggregation pipeline, Grid FS, Performance optimization | | |

**Reference Books:**
1. MEAN Web Development by Amos Haviv, Packt publishing
2. Full Stack JavaScript Development with MEAN By Colin J. Ihrig, Sitepoint publishing
3. Getting MEAN with Mongo, Express, Angular, and Node by Simon Holmes, Manning Publishing

**Web Resources:**
1. https://www.tutorialspoint.com/typescript/
2. https://www.w3schools.com/angular/default.asp
3. https://angular.io/
4. https://www.w3schools.com/nodejs/default.asp
5. https://expressjs.com/
6. https://www.mongodb.com/

## D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji
### (An Autonomous Institute)
## Final Year B. Tech. of Computer Science and Engineering
### CSP424: Mobile Application Development Lab

| Teaching Scheme:<br>TH: 01 Hour/Week<br>PR: 02 Hours/Week | Credits<br>02 | Examination Scheme<br>CIE : 50<br>SEE : 50 |
|---|---|---|

**Prerequisite:** JAVA, Network Protocols.

**Course Objectives:**
1. To study about the android architecture and the tools for developing android Applications
2. To learn about how to Install and configure Android application development tools
3. To create an android application.
4. To learn about the user interfaces used in android applications

**Course Outcomes:**

On completion of the course, student will be able to-
1. Install and configure Android application development tools.
2. Design and develop user Interfaces for the Android platform.
3. Design and develop database based android application.
4. Apply Java programming concepts to Android app development

## Course Contents

In this course, students will perform minimum 10 numbers of experiments using android application development tools. The sample list of experiments is given below.

| S.N | EXPT NO. | EXPERIMENT DESCRIPTION |
|---|---|---|
| 01 | E01 | Installation of Android SDK, emulator. |
| 02 | E02 | Creating simple project and study of android project structure and installing apk on mobile device/tablet, configuring mobile device/tablet in Android Studio with developer option and running app directly on mobile device/tablet. |
| 03 | E03 | Write a program to use of different layouts. |
| 04 | E04 | Write a program to study Intents for switching between activities. |
| 05 | E05 | Write a program to use of Intents for SMS and Telephony. |
| 06 | E06 | Write a program to study and demonstrate Broadcast Receiver. |
| 07 | E07 | Program to demonstrate Buttons, Text Fields, Checkboxes, Radio Buttons, and Toggle Buttons with their events handler. |
| 08 | E08 | Program to demonstrate Spinners, Touch Mode, Alerts, Popups, and Toasts with their events handler. |
| 09 | E09 | Program to demonstrate Touch Mode, Menus with their events handler. |
| 10 | E10 | Program to demonstrate notification with their action. |
| 11 | E11 | Write a program to study and use of SQLite database. |
| 12 | E12 | Study of publishing app to the Android Market. |

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| **Final Year B. Tech. of Computer Science & Engineering** | | |
| **CSP425: Cyber Security Lab** | | |
| **Teaching Scheme:** PR: 02 Hours/Week | **Credits** 01 | **Examination Scheme** CIE: 50 |

**Prerequisite: -  Data Communication & Networking Lab, Information Security**

**Course Objectives:**

1. To understand the different terminologies of cyber security.
2. To ensure how to check security of web applications.
3. To understand how to use different techniques to analyze the cyber-attacks.

**Course Outcomes:**

On completion of the course, student will be able to-

1. Explain the different terminologies of cyber security.
2. Analysis of different tools to identify possibilities of cyber threats.
3. Use of the safe application to prevent the cyber-attacks.

## Experiment List

**Sample Experiment List:**

1. Demonstration of the features of firewall in providing network security and to set Firewall Security in windows.
2. Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome)
3. Demonstrate different types of vulnerabilities for hacking a websites /Web Applications.
4. Analysis the Security Vulnerabilities of E-commerce services.
5. Analysis the security vulnerabilities of E-Mail Application.
6. Demonstration of steps to protect your personal computer system by creating User Accounts with Passwords and types of User Accounts for safety and security.
7. Demonstrate the steps to remove Passwords from Microsoft Word.
8. Demonstrate various methods of protecting and securing databases.
9. Demonstrate "How to make strong passwords" and "passwords cracking techniques".
10. Demonstrate the steps to hack a strong password.

**Reference Books:**

1. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3 rd edition , 2014.
2. Keith J. Jones, Richard Bejtlich, Curtis W. Rose, Real Digital Forensics: Computer Security and Incident Response, Paperback – Import, 2005.
3. John Sammons, The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics Paperback, February 24, 2012.
4. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
5. Network intrusion alert: an ethical hacking guide to intrusion detection, Ankit Fadia, Manu Zacharia, Thomson Course Technology PTR, 2007.
6. Ethical Hacking, Thomas Mathew, OSB Publisher, 2003.
7. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George Kurtz, McGraw-Hill, 2005.
8. Dave Shackleford, Virtualization Security: Protecting Virtualized Environments, John Wiley & Sons, 2012.
9. BRAGG, Network Security: The Complete Reference, McGraw Hill Professional, 2012.

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|---|---|---|
| **(An Autonomous Institute)** |||
| **Final Year B. Tech. of Computer Science and Engineering** |||
| **CSP426 :  Information Retrieval Lab** |||
| **Teaching Scheme:**<br>**PR : 02 Hours/Week** | **Credits**<br>**01** | **Examination Scheme**<br>**CIE:50** |

**Prerequisite: --** Machine Learning

**Course Objectives:**
1. To introduce  Information Retrieval Modeling
2. To introduce  text classification and web  retrieval
3. To introduce  Information Retrieval Evaluation

**Course Outcomes:**

On completion of the course, student will be able to-
1. Implement text and  web documents preprocessing techniques
2. Implement various  IR models
3. Implement text and web feature selection techniques
4. Implement text and web classification and indexing techniques
5. Evaluate  text and web classification techniques

| Course Contents |
|---|
| 1.  Implementation of text and web documents preprocessing techniques |
| 2.  Implementation of text and hypertext models |
| 3.  Implementation of text and web feature selection techniques |
| 4.  Implementation of text and web page classification techniques |
| 5.  Implementation of text and web pages Indexing techniques |
| 6.  Evaluate  text and web classification techniques |
|  |

**Books:**

**Text Books:**
1) Modern Information Retrieval The Concepts and Technology behind Search by Ricardo Baeza-Yates Berthier Ribeiro-Neto  Second edition Addison-Wesley 2011
2) Introduction to Information Retrieval by C.D. Manning, P. Raghavan, H. Schütze. Cambridge UP, 2008

**Reference Books:**
1) Search Engines: Information Retrieval in Practice by Bruce Croft, Donald Metzler, Trevor Strohman Pearson 2010
2) Information Retrieval: Implementing and Evaluating Search Engines. Stefan Buttcher, Charlie Clarke, Gordon Cormack, MIT Press, 2010.

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| **(An Autonomous Institute)** |
| **Final Year B. Tech. of Computer Science and Engineering** |
| **CSL427: Parallel Computing Lab** |

| Teaching Scheme:<br>PR: 02 Hours/Week | Credits<br>01 | Examination Scheme<br>CIE: 50 |
|---|---|---|

**Prerequisite:** Data Structures, Algorithms

**Course Objectives:**
1. Understand design and development aspects of parallel program for given problem statement
2. Understand the speed up gained due to parallelism over sequential program

**Course Outcomes:**

On completion of the course, student will be able to-
1. Describe basic concepts of parallel programming
2. Devise a parallel algorithm for solving different problems in parallel.
3. Develop a parallel program to identify speed up gained over sequential algorithm

Following sample experiments can be considered for experiment list. Experiments should be done through OpenMP, MPI and CUDA programming.

1. Implementation of Vector addition in parallel.

2. Implementation parallel matrix-matrix multiplication.

3. Implementation of prefix sum.

4. Implementation of parallel sorting algorithms and comparison with sequential algorithms.

5. Implementation of different graph algorithms in parallel.

**Reference Books:**
1. Programming Massively Parallel Processors A Hands-on Approach by David Kirk, Wen-mei Hwu, Morgan Kaufmann Publisher, Second Edition
2. Parallel Computer Architecture: A Hardware/Software Approach, by David Culler, Jaswinder Pal Singh , Anoop Gupta,1$^{st}$ edition, Elsevier Publication.
3. Parallel Computing: Theory and Practice, by Michael Quinn, McGraw Hill Education India Private Limited Publication.

## D.K.T.E. Society's Textile and Engineering Institute, Ichalkaranji
### (An Autonomous Institute)
## Final Year B. Tech. of  Computer Science and Engineering
### CSD428 : Project - II

| Teaching Scheme:<br>PR: 08 Hours/Week | Credits<br>08 | Examination Scheme<br>CIE:  50<br>SEE: 50 |
|---|---|---|

**Prerequisite: - Project - I**

**Course Objectives:**
1. Students should learn to design and develop usable User Interface
2. Students should learn to analyze and apply emerging technologies in development of a project
3. Students should learn to test the modules in Project
4. Students should learn to  demonstrate working of project

**Course Outcomes:**
On completion of the course, student will be able to-
1. Design and develop usable User Interface
2. Analyze and apply emerging technologies in development of a project
3. Test the modules in Project
4. Demonstrate working of project

### Course Contents

The group will continue to work on the project selected during the semester VII and submit the completed project work to the department at the end of semester VIII as mentioned below.
1. The workable project.
2. The project report in the bound journal complete in all respect with the following : -
   i. Problem specifications
   ii. System definition – requirement analysis.
   iii. System design – dataflow diagrams, database design
   iv. System implementation – algorithm, code documentation
   v. Test results and test report.
   vi. In case of object oriented approach – appropriate process be followed.

CIE will be jointly assessed by a panel of teachers appointed by head of the Institution. SEE examination will be conducted by internal and external examiners as appointed by the COE.

**Note:**
1. Project work should be continually evaluated based on the contributions of the group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.
3. Care should be taken to avoid copying and outsourcing of the project work.

**The Continuous internal evaluation (CIE) is to be done as follows.**
1. Mid term assessment – 10 marks.
2. End term assessment – 10 marks.
3. Final performance evaluation to be done by guide – 30 marks.

**Semester End Exam :**
The semester end exam will be conducted by examiners appointed by exam coordinator.