**MAHATMA GANDHI UNIVERSITY**



**SCHEME AND SYLLABI**

**FOR**

**M.TECH DEGREE PROGRAMME**

**IN**

**COMPUTER SCIENCE AND ENGINEERING**

**WITH SPECIALIZATION IN**

**COMPUTER SCIENCE AND ENGINEERING**

**(2013 ADMISSION ONWARDS)**

**SEMESTER III**

|  |  |  |  |  |  |  |  |  |  |  |  |
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| **Sl. No.** | **Course No.** | **Subject** | **Hrs / Week** | | | **Evaluation Scheme (Marks)** | | | | | **Credits (C)** |
| **L** | **T** | **P** | **Sessional** | | | **ESE** | **Total** |
| **TA** | **CT** | **Sub Total** |  |
| 1 | **MCPRM 301** | Research Methodology | 4 | 0 | 0 | 25 | 25 | 50 | 100 | 150 | 4 |
| 2 | **MCSCS 302** | Big Data Processing | 4 | 0 | 0 | 25 | 25 | 50 | 100 | 150 | 4 |
| 3 | **MCSCS 303** | Mini Project or Industrial Training | 0 | 0 | 16 | 25 | 25 | 50 | 100 | 150 | 7 |
| Master’s Thesis Phase - I | 0 | 0 | 3 | 25 | 0 | 25 | 25 | 50 |
| **Total** | | | **8** | **0** | **19** | **100** | **75** | **175** | **325** | **500** | **15** |

**SEMESTER IV**

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| **Sl. No.** | **Course No.** | **Subject** | **Hrs / Week** | | | **Evaluation Scheme (Marks)** | | | | | **Credits (C)** |
| **L** | **T** | **P** | **Sessional** | | | **ESE** | **Total** |  |
| **TA** | **CT** | **Sub Total** |  |  |  |
| 1 | **MCSCS 401** | **Master’s Thesis** | **0** | **0** | **27** | **100** | **0** | **100** | **100** | **200** | **12** |
| 2 | **MCSCS 402** | **Master’s Comprehensive Viva** | **0** | **0** | **0** | **0** | **0** | **0** | **100** | **100** | **3** |
| **Total** | | |  |  |  |  |  |  |  | **300** | **15** |
| **Grand Total of four Semesters** | | | | | | | | | | **3000** | **80** |

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| **MCSCS 302** | **BIG DATA PROCESSING** | **L** | **T** | **P** | **C** |  |
|  |  | **4** | **0** | **0** | **4** |  |

**Module 1**

**Big Data and Hadoop**- Hadoop Ecosystem- Core components-Hadoop distributions-Developing enterprise applications. HDFS- HDFS Architecture-Applicability of HDFS-Using HDFS files-Hadoop specific file types-HDFS federation and high availability.HBase-High Level HBase Architecture-HBase schema design-New HBase Features-Managing metadata with HCATALOG.

**Module 2**

**MapReduce-** Processing data with MapReduce- Execution pipeline-Designing MapReduce implementations-Using MapReduce as a framework for parallel processing-Face Recognition Example-Simple Data Processing with MapReduce-Inverted Indexes Example-Building joins with MapReduce-Road Enrichment Example-Link Elevation Example-Building iterative MapReduce Applications-Solving Linear Equation Example-To MapReduce or not to MapReduce?-Common MapReduce Design Gotchas.

**Module 3**

**Hive-**Features - Hive architecture –Hive in the hadoop ecosysytem – Datatypes and file formats –primitive and collection datatypes – HiveQL–databases in Hive – Creating, Altering, Partitioning and managing tables

**Pig-**Features and uses- Comparison with Map-Reduce-Execution modes-Pig Latin commands- Developing Pig script-Joining Data sets- Join,Cogroup concepts- User Defined Functions-Controlling Execution-Pig Latin Preprocessor.

**Module 4**

**Oozie**-Functional Components-Oozie Job Execution Model-Scheduling workflow using Oozie coordinator-Oozie coordinator components and variables-Oozie coordinator lifecycle operation.

**Spark-**Spark Architecture-Spark Streaming-Streaming Operator-Spark SQL-Resilient Distribution Dataset(RDD).

**References**

1. Boris Lublinsky Kevin T. Smith Alexey Yakubovich ,PROFESSIONAL Hadoop® Solutions
2. Tom White ,“Hadoop: The Definitive Guide”, O'Reilly Media 3rd Edition,May6, 2012
3. Chuck Lam , “Hadoop in Action” ,Manning Publications; 1st Edition ,December, 2010
4. Donald Miner, Adam Shook, “MapReduce Design Patterns”, O'Reilly Media ,November 22, 2012
5. Edward Capriolo ,Dean Wampler ,Jason Rutherglen, “Programming Hive”, O'Reilly Media; 1 edition , October, 2012
6. Alan Gates , “Programming Pig”, O'Reilly Media; 1st Edition ,October, 2011
7. Snehalatha, Scheduling Workflows using Oozie Coordinator, DeveloperIQ Magazine, August 28, http://developeriq.in/articles/2013/aug/28/scheduling-workflows-using-oozie-coordinator/
8. Spark Streaming, Data-Intensive systems: Real-Time Stream Processing, Duke University Department of Computer Science 2012 at http://www.cs.duke.edu/~kmoses/cps516/dstream.html

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| **MCSCS 303** | **MINI PROJECT/ INDUSTRIAL TRAINING & MASTER’S THESIS PHASE-1** | **L** | **T** | **P** | **C** |
| **0** | **0** | **19** | **7** |

In Industrial Training/Mini Project the student shall undergo Industrial training of one month duration or Mini Project of two months duration. Industrial training should be carried out in an industry / company approved by the institution and under the guidance of a staff member in the concerned field. At the end of the training, he / she has to submit a report on the work being carried out. The mini project is designed to develop practical ability and knowledge about practical tools/techniques in order to solve the actual problems related to the industry, academic institutions or similar area. Students can take up any application level/system level project pertaining to a relevant domain. Projects can be chosen either from the list provided by the faculty or in the field of interest of the student. For external projects, students should obtain prior permission after submitting the details to the guide and synopsis of the work. The project guide should have a minimum qualification of ME/M.Tech in relevant field of work. At the end of each phase, presentation and demonstration of the project should be conducted, which will be evaluated by a panel of examiners. A detailed project report duly approved by the guide in the prescribed format should be submitted by the student for final evaluation. Publishing the work in Conference Proceedings/ Journals with National/ International status with the consent of the guide will carry an additional weightage in the review process.

In Master’s Thesis Phase-I, the students are expected to select an emerging research area in the field of specialization. After conducting a detailed literature survey, they should compare and analyze research work done and review recent developments in the area and prepare an initial design of the work to be carried out as Master’s Thesis. It is mandatory that the students should refer National and International Journals and conference proceedings while selecting a topic for their thesis. He/She should select a recent topic from a reputed International Journal, preferably IEEE/ACM. Emphasis should be given for introduction to the topic, literature survey, and scope of the proposed work along with some preliminary work carried out on the thesis topic.

Students should submit a copy of Phase-I thesis report covering the content discussed above and highlighting the features of work to be carried out in Phase-II of the thesis. The candidate should present the current status of the thesis work and the assessment will be made on the basis of the work and the presentation, by a panel of internal examiners in which one will be the internal guide. The examiners should give their suggestions in writing to the students so that it should be incorporated in the Phase–II of the thesis.

Both Mini project/Industrial training and Master’s Thesis-1 undergo an evalution by a panel of examiners including atleast one external examiner appointed by university and internal examiner.

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| **MCSCS 401** | **MASTER’S THESIS** | **L** | **T** | **P** | **C** |
| **0** | **0** | **27** | **12** |

In the fourth semester, the student has to continue the thesis work and after successfully finishing the work, he / she has to submit a detailed bounded thesis report. The evaluation of M Tech Thesis will be carried out by a panel of examiners including atleast one external examiner appointed by university and internal examiner. The work carried out should lead to a publication in a National / International Conference or Journal. The papers received acceptance before the M.Tech evaluation will carry specific weightage.

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| **MCSCS 402** | **MASTER’S COMPREHENSIVE VIVA** | **L** | **T** | **P** | **C** |
| **0** | **0** | **0** | **3** |

A comprehensive viva-voce examination will be conducted at the end of the fourth semester by a panel of internal examiner and external examiners appointed by the university to assess the candidate’s overall knowledge in the respective field of specialization.