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|  | **MSc(IT) Session 2018-20 Sem-2****(List of Courses to be Offered)** |  |
| **Sr. No** | **C.Code** | **Course Title** | **Cr. Hr** |
| 1 | MIT-502 | Object Oriented Programming | 4(3-1) |
| 2 | MIT-504 | Introduction to Database Systems | 3(2-1) |
| 3 | MIT-506 | Operating Systems | 3(2-1) |
| 4 | MIT-508 | Introduction to Software Engineering | 3(3-0) |
| 5 | MIT-510 | Technology Management | 3(3-0) |
| 6 | MIT-512 | Theory of Automata | 3(3-0) |
| **Total** | **19** |

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| **Object Oriented Programming** |
| **Course Contents:** |
| Introduction to object oriented design, history and advantages of object oriented design, introduction to object oriented programming concepts, classes, objects, data encapsulation, constructors, destructors, access modifiers, const vs non-const functions, static data members & functions, function overloading, operator overloading, identification of classes and their relationships, composition, aggregation, inheritance, multiple inheritance, polymorphism, abstract classes and interfaces, generic programming concepts, function & class templates, standard template library, object streams, data and object serialization using object streams, exception handling.  |
| **Reference Material:** |
| 1. Starting Out with C++ from Control Structures to Objects, 9th Edition, Tony Gaddis 2. C++ How to Program, 10th Edition, Deitel & Deitel. 3. Object Oriented Programming in C++, 3rd Edition by Robert Lafore 4. Java: How to Program, 9th Edition by Paul Deitel 5. Beginning Java 2, 7th Edition by Ivor Horton 6. An Introduction to Object Oriented Programming with Java, 5th Edition by C. Thomas Wu  |

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| **Introduction to Database Systems** |
| **Credit Hours:** | 4(3-1) | **Prerequisites:** | None |
| **Course Code:** | CSI-406 |  |  |
| **Tools to be Used:** |
| MS Access, Oracle, SQL Server |
| **Course Contents:** |
| * Basic database concepts,
* Database approach vs file based system,
* database architecture, three level schema architecture,
* data independence,
* relational data model,
* attributes, schemas, tuples, domains, relation instances, keys of relations,
* integrity constraints,
* relational algebra,
* selection, projection, Cartesian product,
* types of joins,
* normalization,
* functional dependencies,
* normal forms,
* entity relationship model, entity sets, attributes, relationship, entity-relationship diagrams,
* Structured Query Language (SQL),
* Joins and sub-queries in SQL,
* Grouping and aggregation in SQL,
* concurrency control,
* database backup and recovery,
* indexes,
* NoSQL systems.
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| **Teaching Methodology:** |
| Lectures, Written Assignments, Practical labs, Semester Project, Presentations  |
| **Reference Materials:** |
| 1. Database Systems: A Practical Approach to Design, Implementation, and Management, 6th Edition by Thomas Connolly and Carolyn Begg 2. Database Systems: The Complete Book, 2nd Edition by Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom 3. Database System Concepts, 6th Edition by Avi Silberschatz, Henry F. Korth and S. Sudarshan. 4. Database Management Systems, 3rd Edition by Raghu Ramakrishnan, Johannes Gehrke  |

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| **Operating Systems** |
| **Course Contents:** |
| Operating systems basics, system calls, process concept and scheduling, inter-process communication, multithreaded programming, multithreading models, threading issues, process scheduling algorithms, thread scheduling, multiple-processor scheduling, synchronization, critical section, synchronization hardware, synchronization problems, deadlocks, detecting and recovering from deadlocks, memory management, swapping, contiguous memory allocation, segmentation & paging, virtual memory management, demand paging, thrashing, memory-mapped files, file systems, file concept, directory and disk structure, directory implementation, free space management, disk structure and scheduling, swap space management, system protection, virtual machines, operating system security  |
| **Reference Material:** |
| 1. Operating Systems Concepts, 9th edition by Abraham Silberschatz 2. Modern Operating Systems, 4th edition by Andrew S. Tanenbaum 3. Operating Systems, Internals and Design Principles, 9th edition by William Stallings  |

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| **Introduction to Software Engineering** |
| **Course Contents:** |
| Nature of Software, Overview of Software Engineering, Professional software development, Software engineering practice, Software process structure, Software process models, Agile software Development, Agile process models, Agile development techniques, Requirements engineering process, Functional and non-functional requirements, Context models, Interaction models, Structural models, behavioral models, model driven engineering, Architectural design, Design and implementation, UML diagrams, Design patterns, Software testing and quality assurance, Software evolution, Project management and project planning, configuration management, Software Process improvement.  |
| **Reference Material:** |
| 1. Software Engineering, Sommerville I., 10th Edition, Pearson Inc., 2014 2. Software Engineering, A Practitioner’s Approach, Pressman R. S.& Maxim B. R., 8th Edition, McGraw-Hill, 2015.  |

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| **Technology Management** |
| **Course Contents:** |
| Introduction to Technology Management, TM activities and tools, The TM framework, TM activities behind technological capabilities. TM Activities: Identification, Selection, Acquisition, Exploitation, Protection, Learning. TM Tools. TM Tools-Patent Analysis. TM Tools-Portfolio Management. TM Tools- Roadmapping. TM Tools-Value Analysis/Value Innovation. TM-Functions: Planning and Forecasting, Decision Making, Organizing, Leading Technical People. |
| **Reference Material:** |
| 1. Technology Management: Activities and Tools by Dilek Cetindamar, Rob Phaal, and David Probert, Palgrave Macmillan (April 27, 2010). ISBN-10: 0230233341 (TB1)2. Managing Engineering and Technology by Lucy C. Morse And Daniel L. Babcock, Prentice Hall; 5th Edition (August 20, 2009). ISBN-10: 0136098096 (TB2)3. Management of Technology: Managing Effectively in Technology- Intensive Organizations by Hans J. Thamhain, Wiley; 2nd Edition (May 25, 2005). ISBN-10: 04714155104. Managing Information Technology by Carol V. Brown, Daniel W. DeHayes, Jeffrey A. Hoffer, Wainright E. Martin, and William C. Perkins, Prentice Hall; 7th Edition (March 18, 2011). ISBN-10: 01321463205. Technology Management: Activities and Tools by Dilek Cetindamar, Rob Phaal, and David Probert, Palgrave Macmillan (April 27, 2010). ISBN-10: 0230233341 |

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| **Theory of Automata** |
| **Course Contents:** |
| Finite State Models: Language definitions preliminaries, Regular expressions/Regular languages, Finite automata (FAs), Transition graphs (TGs), NFAs, Kleene’s theorem, Transducers (automata with output), Pumping lemma and non-regular language Grammars and PDA: CFGs, Derivations, derivation trees and ambiguity, Simplifying CFLs, Normal form grammars and parsing, Decidability, Context sensitive languages, grammars and linear bounded automata (LBA), Chomsky’s hierarchy of grammars Turing Machines Theory: Turing machines, Post machine, Variations on TM, TM encoding, Universal Turing Machine, Defining Computers by TMs.  |
| **Reference Material:** |
| 1. Introduction to computer theory, Daniel I. A. Cohen, 2nd Edition 2. Automata, Computability and Complexity: Theory and Applications, by Elaine Rich, 2011 3. An Introduction to Formal Languages and Automata, by Peter Linz, 4th edition, Jones & Bartlett Publishers, 2006 4. Theory of Automata, Formal Languages and Computation, by S. P. Eugene, Kavier, 2005, New Age Publishers  |