

# Computer Science & Systems Engineering

## Syllabus for Qualifying Examination for PhD Submission

### Research Issues in Software Engineering, Networks and Security

1. **Advances in Software Engineering:** Principles of software engineering, Software Requirements Engineering, Software Architecture and Design, Software Quality Assurance and Testing, Software Project Management
2. **Information and Network Security:** Introduction to Network Security, User Authentication Mechanisms and Public Key Infrastructure, Symmetric and Asymmetric Key Cryptographic Techniques, IP Security, Fire walls and Practical Implementation of Cryptography & Security, Crptosystems basics, Digital Forensics
3. **Computer Networks:** Basics concepts and types of Computer Networks, Design Issues in Networks, Internet Transport Protocols, Network Devices, Advanced Concepts in Networks; Over View of Cellular Networks, Sensor Networks, Virtual Private Networks, Delay Tolerant Networks DTN, Ipv6, ..
4. **Mobile Adhoc Networks and Wireless Sensor Networks:** Introduction to MANETS, Medium Access Protocols, Network Protocols, End-End Delivery and Security, Cross Layer Design and Integration Of Adhoc For 4g, Wireless sensor Networks, deployment, coverage, energy efficient, security issues, network simulators like NS2/3 ,OMNet++, JSim etc.,

#### References:

1. Software Engineering, Ian Sommerville, seventh edition, Pearson education, 2004.
2. Requirements Engineering: A Good Practice Guide”, Ian Sommerville, Peter Sawyer , ISBN: 978-0-471-97444-4, John Wiley & Sons, 1997.
3. Software Architecture: Perspectives on an Emerging discipline, Shaw, M., Garlan, PHI.
5. Network Security Essentials: Applications and Standards, William Stallings PEA.
6. Cryptography and Network Security, AtulKahate, Tata McGraw Hill
7. Computer Forensics, David Cowen
8. The basics of digital forensics: the primer for getting started in digital forensics, J. Sammons
9. Computer Networks, Andrews S Tanenbaum,, Edition 5, PHI, ISBN:-81-203-1165-5
10. Ad hoc Wireless Networks Architectures and protocols, C.Siva Ram Murthy and B.S.Manoj, 2nd edition, Pearson Education. 2007
11. Ad hoc Networking, Charles E. Perkins, Addison – Wesley, 2000

## Research Issues in AI and Data Engineering

1. **Artificial Intelligence & Machine Learning:** Heuristic search techniques for state space search, Reasoning under Uncertainty and Fuzziness, Natural Language Processing, Neural Network Learning, Genetic Algorithms
2. **Data Mining:** Data Preprocessing, Dimensionality Reduction, Research trends in Association analysis, Classification, Cluster analysis, and Outlier Analysis
3. **Big data Analysis:** 4v's of Big Data, Drivers for Big Data, Big Data Analytics Application, Big Data Architecture components, Advanced Analytics Platform, Implementation of Big Data Analytics
4. **Digital Image Processing and Visual Computing:** Image preprocessing, Image Processing filters, Image Segmentation & Analysis, Image Restoration & Reconstruction, Image Compression & Object Recognition, Image Compression using Wavelets, Applications

### Reference Books:

1. Artificial Intelligence – Elaine Rich, Kevin Knight and Shivashankar B Nair, TMH publishers
2. Artificial Intelligence : Structures and Strategies for Complex problem Solving -- George F Luger, Pearson Education
3. Machine Learning, Tom Mitchell , McGraw Hill,
4. Introduction to Data Mining by Pang-Ning Tan, Michael Steinbach, Vipin Kumar.
5. Data Mining Concepts and Techniques by Jaiwei Han, Micheline Kamber, Jian Pei.
6. Big Data Analytics- Disruptive technologies for changing the game by Dr.Arvind Sathi.
7. Mining of Massive datasets by Jure Leskovec, Anand Rajaraman, Jeffrey D.Ullman
8. Digital Image Processing and Computer Vision, Sonka, lavac, Boyle, Cenage Learning.
9. Digital Image Processing, R.C. Gonzalez, R.R. Woods(TMh).