

## Ph.D. Coursework Paper II

Paper Title: Recent Advances in Computer Science  
Attempt 5 questions with one question from each section

Max Marks: 100  
Time: 2.5 hours

### UNIT – I:

**Big Data:** Definition and Explanation. Characteristics of Big Data (Basic, 3V and 5V). Why Big Data is important? Types of Big Data: Structured, Semi-structured, and unstructured.  
**Big Data Technology Foundation:** Physical Infrastructure (Generation, Computation, Communication, and Storage), Security Infrastructure. Current trends and Challenges.

### UNIT – II:

**Cloud Computing:** Overview, Evolution and Characteristics. How Cloud Computing works? Pros and Cons of Cloud Computing. Challenges of Cloud Computing. Comparison with traditional computing architecture (Client/Server). Comparison with other recent computing trends (Grid, Cluster and Distributed Computing).

**Virtualization:** Introduction to virtualization, types and implementation levels.

**Cloud Computing Architecture:** Cloud computing stack, Introduction to Cloud Service Models - Software as a Service (SaaS), Platform as a Service (PaaS), and Infrastructure as a Service (IaaS). Introduction to Cloud Deployment Models – Public Cloud, Private Cloud, Hybrid Cloud, and Community Cloud. Services provided at various levels.

### UNIT – III:

IoT Definition: Overview, Application, Potential and Challenges, Architecture, M2M vs IoT. Internet vs IoT: Layers, Protocols, Packet-services, Performance parameters of Packet-networks (Web, P2P, Sensor Networks, & Multimedia).

### Unit - IV :

Definition of learning systems. Goals and applications of machine learning. Aspects of developing a learning system: training data, concept representation, function approximation. The concept learning task. Concept learning as search through a hypothesis space. General-to-specific ordering of hypotheses. Finding maximally specific hypotheses. The importance of inductive bias.

### Unit - V:

Blockchain: Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

## References:

1. "Big Data for Dummies", Judith Hurwith, Alan Nugent, Fern Halper, and Marcia Kaufman, John Wiley & Sons, 2013.
2. "Big Data – Principles and best practices of scalable real-time data systems", Nathan Marz and James Warren, Dreamtech Press, 2016.
3. "Cloud Computing Bible", Barrie Sosinsky, Wiley-India, 2010.
4. "Cloud Computing: Principles and Paradigms", Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011.
5. "Designing Internet-of-Things", Adrain McEwen, & Hakim Cassimally, Wiley.
6. "The Internet of Things", Samuel Greengard, MIT Press.
7. "The Silent Intelligence: The Internet of Things", Daniel Kellmerit & Daniel Obodovski, DND Ventures LLC.
8. "Internet of Things: A hands on approach", Arhdeep Bahga, & Vijay Madiseti, Orient Blackswan.
9. Machine Learning, Tom Mitchell, McGraw Hill
10. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).