Elective Course 6: Cloud Computing and Virtualization

Course Type:	PS: Program Specialisation	Course Credits:	2
Course Code:	S3SE514	Course Duration:	30 Hours

Course Objective:

- To introduce emerging technologies such as IoT, cloud computing, and virtualization and their business applications.
- To equip students with conceptual and technical knowledge to evaluate digital infrastructure solutions.
- To develop analytical capabilities for designing scalable, secure, and cost-effective digital ecosystems.
- To foster understanding of integration challenges, data management, and service deployment models.
- To cultivate strategic insights into the competitive advantages offered by these technologies across industries.

Course Outcomes:

- CO1: To provide an in-depth understanding of IoT, cloud computing, and virtualization with a business perspective.
- CO2: To analyse real-world applications of these technologies across different industries.
- CO3: To identify business opportunities and challenges in implementing IoT and cloud- based solutions.
- CO4: To evaluate cost, security, and efficiency factors in adopting these technologies.
- CO5: To develop strategic insights into leveraging IoT, cloud, and virtualization for competitive business advantages.

Unit/ Module	Content	CO Mapping	Hours Assigned
1	Introduction to IoT and Cloud Computing - Definition and evolution of IoT & cloud computing, Key characteristics & differences from traditional computing, Business drivers behind IoT & cloud adoption, IoT Ecosystem: Sensors, actuators, networks, cloud platforms,	CO1,	5

	IoT network protocols (Wi-Fi, LPWAN, 5G, Bluetooth, Zigbee), Cloud models: IaaS, PaaS, SaaS & deployment strategies		
2	IoT for Business and Industry Applications - IoT in Industry 4.0 & Smart Manufacturing, IoT in Retail & Customer Engagement, IoT in Healthcare & Smart Cities, IOT use in across the sector	CO2, CO5	5
3	**Cloud Computing for Business Transformation -** Cloud adoption strategies & challenges, Cloud- based business applications (ERP, CRM, HRMS), Hybrid & multi-cloud strategies	CO3, CO4	5
4	**Virtualization Technologies & Business Efficiency -** Fundamentals of virtualization (VMs, containers, hypervisors), Virtualization in cloud computing & VDI, Cost & performance benefits of virtualization, Virtualization challenges & best practices with case studies	CO2, CO3	5
5	**IoT and Cloud Integration for Smart Business -** IoT-Cloud convergence & cloud IoT platforms, Edge & Fog computing for business applications, AI-driven IoT solutions & predictive analytics, IoT & Cloud in supply chains & logistics with case studies	CO3, CO5	5
6	**Emerging Trends, Risks & Future with related case studies-** Future trends: 5G IoT, blockchain, quantum computing, Business risks & security challenges, Sustainability & green computing in IoT & cloud	CO4, CO5	5

Textbooks:

1. Internet of Things: Principles and Paradigms | Rajkumar Buyya, Amir Vahid Dastjerdi | Morgan Kaufmann
2. Internet of Things: A Hands-on Approach | Arshdeep Bahga, Vijay Madisetti | Universities Press
3. Cloud Computing: Concepts, Technology & Architecture | Thomas Erl, Zaigham Mahmood, Ricardo Puttini | Prentice Hall
4. Cloud Computing | Dr. Kumar Saurabh | Wiley India

Reference Books:

1. Virtualization Technologies: A Complete Guide | Gerardus Blokdyk | Emereo Publishing
2. Cloud Computing Bible | Barrie Sosinsky | Wiley
3. Mastering Cloud Computing: Foundations and Applications Programming | Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi | McGraw Hill Education India
4. Architecting the Internet of Things | Dieter Uckelmann, Mark Harrison, Florian Michahelles | Springer
5. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things | David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton, Jerome Henry | Cisco Press