GISM – Informatics – 2022

1. Cloud computing. Cloud model characteristics, service models, deployment models. Advantages and disadvantages of cloud computing, security.
2. Basic paradigms of computer networks. Classification of computer networks, basics of data communications, and principles of network development.
3. Network models and architectures, philosophy of layered architecture, history, and concepts of RM ISO/OSI, an overview of layers and their basic role, evaluation of RM ISO/OSI.
4. Internet infrastructure. Internet Service Providers (ISPs), Point of Presences (POPs), Networks Access Points (NAP), Local Area Network (LAN), Wide Area Network (WAN). IP addresses, DNS.
5. Operating system (OS) functions and categories. Overview of the main OS platforms across devices. OS architectures, services, and security.
6. Security concepts. Security approaches and principles. Types of attacks.
7. Public key cryptography. Hash functions. Digital signature. Certificates. Symmetric (private) methodology. Asymmetric (public) methodology.
8. Authentication and authorization. Means of authentication. Two-factor authentication. Types of authentication attacks.
9. Fundamentals of intellectual property law. Contracts, proprietary rights, and trade secrets. Digital Millennium Copyright Act. Patent protection. Piracy, intrusions, and tools to prevent them. Open source.
10. Threats and vulnerabilities. Psychology of computer criminals. The insider threat. Information warfare. Penetrating computer systems and networks. Malicious code.
11. Threats and vulnerabilities II. Denial-of-service attacks. Social engineering and low-tech attacks. Spam, phishing, and Trojans attacks. Web-based vulnerabilities. Physical threats to the information security.
12. Data Backup. Backup media and techniques. Hardware failure protection. RAID.
13. Data management. File processing vs. database processing. Advantages and disadvantages of the database. Database Management Systems (DBMS). Database system structure.
14. Data models. Relational model, hierarchical model, network model, object-oriented model, entity-relationship model.
15. The relational algebra. Basic operations. Relational calculus – tuples, domains.
16. Big data evolution. Failure of traditional databases to handle big data. 3Vs of big data. Sources and types of big data.
17. Big data infrastructure, life cycle, technology, and applications.
18. Information systems software. Software concepts. System software, application software, embedded software. Software licensing.

19. Decision-making system. Model-driven decision (simulation, AI). Data-driven decisions (OLAP, data mining, predictive analytics). Group decisions (group support and communication software).
20. Managing information systems. The information systems department structure, CIO. Information systems security. Types of security, categories of security, information security policy, BYOD.

Recommended literature

BALUSAMY, Balamurugan, et al. *Big Data: Concepts, Technology, and Architecture*. John Wiley & Sons, 2021. *(Chapter 1)*

BIRJE, Mahantesh N., et al. Cloud computing review: concepts, technology, challenges and security. *International Journal of Cloud Computing*, 2017, 6.1: 32-57.

BOSWORTH, S.; KABAY, M.E.; WHYNE, E. *Computer security handbook, set*. John Wiley & Sons, Incorporated, 2014. *(Chapters 11, 12-16, 18-22, 24)*
http://www.mekabay.com/courses/academic/csh6_lecture_notes/index.htm

CHAUHAN, S. R.; JANGRA, S. *Computer Security and Encryption: An Introduction*. Stylus Publishing, LLC, 2020. (*Chapters 1, 2 and 3*)

ISHWARYA, K. R.; JEYARAM, G.; VIDHYA, V. *Database management systems*. Alpha Science International Limited, 2016. (*Chapters, 1, 2, and 3*)

MALLACH, Efrem G. *Information systems: What every business student needs to know*. 2nd Edition. CRC Press, 2020. (*Chapters 4, 9, and 12*)

TANENBAUM, A. S., WETHERALL, D. J., *Computer Networks* (eBook, Global Edition). Pearson, 2021, ISBN: 1292374012 (*Chapters 1 and 8*)