ST. ALOYSIUS COLLEGE(AUTONOMOUS), JABALPUR

Reaccredited 'A+ 'Grade by NAAC(CGPA:3.68/4.00)
College with Potential for Excellence by UGC
DST-FIST Supported & STAR College Scheme by DBT

Faculty of Science

Bachelor of Science (B.Sc.), III Semester
SUBJECT: COMPUTER SCIENCE
Paper-Elective
Computer Networks & Information Security
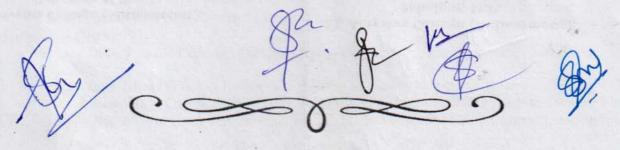
Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand the uses and types of computer networks, including broadband, mobile, wireless, and enterprise networks.	U, R
CO 2	Learn about PAN, LAN, MAN, and WAN technologies.	U, R, An
CO 3	Gain knowledge of OSI and TCP/IP models, data link layer protocols, and switching techniques.	U, R, An
CO4	Master routing algorithms, IP addressing, and congestion management.	U, An, Ap
CO5	Understand security principles, types of attacks, and security technologies like firewalls and cryptographic tools.	An, AP, R, U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	40	60	100
Practical	1	40	60	100
Total	4		200	

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)
Practical	3 Internal Exams (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of the Semester)

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Bachelor of Science (B.Sc.)   **Subject: Computer Science**
III Semester   **Paper: Elective, Computer Networks & Information Security**

Content of the Course

No. of Lectures (in hours per week): 2 Hrs. per week

Total No. of Lectures: 60 Hrs.   Maximum Marks: 60

Units	Topics	No. of Lectures
I	Introduction to Computer Network: Use of Computer network: Access to information, person-to-person communication electronic commerce, internet of things. Types of computer networks: Broadband access network, Mobile and wireless network, content delivery network, transit network, Enterprise network. Network Technology: Personal Area Network Local Area Network, Metropolitan Area Network, Wide Area Network, example of network (Internet, Mobile network, wireless network); Reference Model: OSI, TCP/IP, Critique of the OSI and TCP/IP reference models.	10
II	Physical Layer: Guided Transmission Media: Twisted pairs, coaxial cable, Fiber Optics; Wireless transmission: The electromagnetic spectrum, frequency hopping spread spectrum, direct sequence, spread spectrum, ultra deb communication; Cellular Network: Common concepts- cells, handoff, 1G 2G,3G,4G & 5G technology.	10
III	Data Link Layer: Service Provided to Network Layer: Data Link Control: Framing, Flow and Error Control; Error detecting codes, Error-correcting codes; Data Link Protocols: Basic transmission and receipt, simplex link layer protocol, full duplex, sliding window protocol, Packet over SONET, ADSL, Point-to-Point Protocol. Switching Techniques: Packet Switching, Circuit Switching, Datagram Networks, VirtualCircuit Networks, and Structure of a Switch. Network Devices & Drivers: Router, Modem, Repeater, Hub, Switch, Bridge and Gateway (fundamental concepts)	10
IV	Network Layer: Routing Algorithm: Optimality, Principal of Shortest path algorithm, Flooding, Distance Vector Routing, Broadcast Routing; Congestion in network, traffic management approaches; IP addresses, IPv4 Addresses, IP v6 Addresses. Network Security and Information Security: Fundamentals of network and information security: principles of security and attack. Security Goals (Confidentiality, Integrity, and Availability). Overview of Security Threats and Vulnerability: Types of attacks on Confidentiality, Integrity and Availability.	15

References

Textbooks:
- Andrew S. J. Wetherall, Computer Networks, 6th Edition, (2021), Pearson.
- J Mattord, Principles of Information Security, Fourth Edition, 6th Indian Reprint.
- Praveen Kinnar Shur la, Surya Prakash Tripathi, Ritendra Goe l "Introduction to Information Security and Cyber Laws", 2014. Dreamtech Press.
- Books published by Hindi Granth Academy, Bhopal.

Reference Books:
- Kurose James F., Ross Keith W., Computer Networking, A 4 op-Down Approach, Sixth Edition, 2017. Pearson
- Micki Krausc. Harold F. Tipton, Handbook of Information Security Management, Vol. 1-3, CRC Press LLC.
- B. A. Forouzan: Data Communications and Networking. Fourth edition, TMH Publishing Company Ltd.
- Basta W. Halton, Computer Security: Concepts, Issues and Implementation, Cengage Learning India.

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List of Practical

- Study of UTP cable
  - Color code of UTP cable Categories of UTP n/w cable
  - Shielding of n/w cable
  - Maximum length for which data cable can be usedCrimping of RJ45 connector and punching of datacable
- Knowledge of Structured Cabling and its componentsInformation Information outlet with box
  - Network Rack (4U, 6U, 9U, 12U, 24U, 32U, 42U)
  - Patch Panel
  - Rack Management
- Study of Optical Fiber cable
  - Different cores of OF C (6 core, 12, 24 core) Multimode & Single mode OFC cable Shielding of OFC
  - Splicing/Termination of OFC. OTDR Testing
  - LIU fix
  - LIU management (pigtail/fiber patchcord) and MediaConverter.
  - FP module.
  - Rules of OFC laying
- Use of tools
  - Crimping tool
  - Punching tool
  - Nose plier
  - Wire stripping and cable cutter
  - Multi-meter
- Configuration/management of Local Area Network
  - Implementation of File and printer sharing Installationof ft server and client
  - Connect the computers to Local Area Network.
  - Configuring Class, A IP address on LAN Connection inComputer LAB and use the following tools:
    - Ping, ipconfig, getmac, hostname, nslookup,tracert, systeminfo.
    - routing using packet tracer software
    - Dynamic routing using packet tracer
    - Implementation of Subnetting in Class A, B, C
    - Ping between 2 s2'stems using IPv6