**SUBJECT NAME: Networking**                                    **Credit: 4**
**SUBJECT CODE: BCAC603**

**COURSE OBJECTIVE:**

The course aims to provide BCA students with a foundational understanding of computer networks, their architecture, and functionality. This course covers essential networking concepts, including network types, topologies, protocols, and models like OSI and TCP/IP. Students will learn how data is transmitted across networks, explore various communication mediums, and understand error detection and correction mechanisms.

The course also introduces addressing schemes, routing algorithms, and transport layer protocols, enabling students to grasp how devices communicate in a networked environment. Emphasis is placed on practical knowledge of network configuration, troubleshooting, and security basics to ensure reliable and secure data transmission.

By the end of the course, students will be able to design, analyze, and implement small-scale networks, preparing them for advanced studies and professional roles in the field of computer networking and IT infrastructure management.

| Course Outcome | |
|---|---|
| CO1 | Explain the fundamental concepts of computer networks, including types, topologies, and communication protocols. |
| CO2 | Analyze and compare networking models such as OSI and TCP/IP to understand data flow across layers. |
| CO3 | Demonstrate knowledge of addressing schemes, subnetting, and routing algorithms for efficient data communication. |
| CO4 | Configure and troubleshoot small-scale networks using appropriate tools and techniques. |
| C05 | Apply basic network security principles to ensure secure and reliable data transmission. |

**DETAILED SYLLABUS:**

| Module No. | Topics Covered | Duration (Hours) | Marks |
|---|---|---|---|
| M1 | Introduction: Definition and Importance of Networking, Components of the network, Network Topology: LAN, MAN, WAN<br>Network Topologies (Star, Ring, Bus, Mesh), Reference Models: OSI and TCP/IP reference model, A comparison of the OSI and TCP/IP reference models | 6 | 6 |
| M2 | Physical Layer: Data Transmission Concepts, Transmission Media: Guided Media (Twisted pair, Co-axial cable, Optical fiber); Unguided Media (Radio, VHF, microwave, satellite, Infrared),Encoding Schemes: NRZ, Manchester, Differential Manchester; Multiplexing Techniques: FDM, TDM, WDM, Switching Techniques: Circuit, Packet, and Message Switching | 10 | 12 |
| M3 | Data link layer: Data Link layer issues, Flow control (stop and wait protocol, sliding window Flow control),Error Detection Algorithms: Parity Check, CRC, Checksum, Error Correction: Hamming Code<br>Error control(Stop and wait ARQ, Go-back-N ARQ, Selective reject ARQ), HDLC, Multiple Access Protocols (ALOHA, Collision Free Protocols).<br>IEEE Standards for LAN (IEEE802.3, IEEE802.4, IEEE802.5). | 11 | 15 |
| M4 | Network Layer: Network Layer: Routing algorithm (Shortest path algorithm, Flow based Routing, Distance vector routing, Broadcast routing, Multicast routing); IP Addressing: IPv4 and IPv6, Subnetting and CIDR, Routing Protocols: RIP, OSPF, BGP, NAT and ICMP. | 10 | 12 |
| M5 | Transport Layer: Functions of Transport Layer, Protocols: TCP (3-Wayand 4-way Handshaking), UDP, Port Addressing, Congestion Control Mechanisms: Leaky Bucket, Token Bucket | 8 | 10 |
| M6 | Application Layer Protocols: DNS, HTTP, HTTPS, FTP, SMTP, POP3, IMAP; Network Applications: Remote Login (Telnet, SSH), File Sharing (NFS, SMB), Domain Name server, Simple network management Protocol. | 8 | 10 |
| M7 | Emerging Networking concepts: Cloud Networking Basics, Internet of Things (IoT) Networking Protocols: MQTT, CoAP; Software-Defined Networking (SDN) Concepts | 4 | 5 |
| | INTERNAL EXAMINATION | 3 | 30 |
| | TOTAL | 60 | 100 |

**SUGGESTED READING:**

- S. Tanenbaum, Computer Networks, Pearson Education India, 5th Edition
- William Stallings, Data and Computer Communications, Pearson Education India, 9th Edition
- James F. Kurose, Computer Networking: A Top-Down Approach, Pearson Education India, 7th Edition
- Larry L. Peterson, Computer Networks: A Systems Approach, Elsevier, 5th Edition
- Behrouz A. Forouzan, Data Communications and Networking, McGraw-Hill Education, 5th Edition
- Rajendra Prasad, Introduction to Computer Networks, Wiley India, 1st Edition