

Annexure **‘CD-01’**

**Course Title: Computer Networks**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **L** | **T** | **P/S** | **SW/FW** | **No. of PSDA** | **TOTAL CREDIT UNITS** |
| 4 | 0 | 2 | 0 | 0 | 5 |

**Course Code:**

**Credit Units: 5**

**Course Level: UG (BCA)**

**Course Objectives:** To develop basic understanding of students about network models and various networking algorithms.

**Prerequisites:** NIL

**Course Contents/syllabus:**

|  |  |  |
| --- | --- | --- |
|  | **Weightage** | **Teaching Hours** |
| **Unit I: Introduction** | **25%** | **18 H** |
| Data communications concepts: Digital and analog transmissions-Modem, parallel and serial transmission, synchronous and asynchronous communication. Modes of communication: Simplex, half duplex, full duplex.  Types of Networks: LAN, MAN, WAN Network Topologies: Bus, Star, Ring, Mesh, Tree, Hybrid Communication Channels: Wired transmissions: Telephone lines, leased lines, switch line, coaxial cables-base band, broadband, optical fiber transmission. Communication Switching Techniques: Circuit Switching, Message Switching, Packet Switching. |  |  |
| **Unit II: Network Models and Data Link Layer** | **25%** | **18 H** |
| Network Reference Models: OSI Reference Model, TCP/IP Reference Model, Comparison of OSI and TCP/IP Reference Models. Transmission impairments – Attenuation, Distortion, Noise. Multiplexing – Frequency division, Time division, Wavelength division.  Data Link Layer Design Issues: Services provided to the Network Layer, Framing, Error Control (error detection and correction code), Flow Control, Data Link Layer in the Internet (SLIP, PPP) |  |  |
| **Unit III: MAC Sub Layer & Network Layer** | **25%** | **18 H** |
| MAC sub layer: CSMA/CD/CA, IEEE standards (IEEE802.3 Ethernet, Gigabit Ethernet, IEEE 802.4 Token Bus, IEEE 802.5 Token Ring) Network Layer: Design Issues, Routing Algorithms: Optimality Principle, Shortest Path Routing, Congestion Control Policies, Leaky bucket and token bucket algorithm, Concept of Internetworking. |  |  |
| **Unit IV: Transport & Application Layer** | **25%** | **18 H** |
| Transport Layer: Design issues, Elements of transport protocols – Addressing, Connection establishment and release, Flow control and buffering, Introduction to TCP/UDP protocols.  Session, Presentation and Application Layers: Session Layer – Design issues, remote procedure call. Presentation Layer – Design issues, Data compression techniques, Cryptography. Application Layer – Distributed application (client/server, peer to peer, cloud etc.), World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), HTTP as an application layer protocol. |  |  |

**Course Learning Outcomes: After studying this course students will be able to:**

1. Highlight the characteristics of various protocols.
2. Define different network technologies and their application.
3. Identify Hardware and software components for designing network.
4. Evaluate and compare the performance of different network media

**Pedagogy for Course Delivery:**

Lectures: 62 sessions

Presentation / Seminar: 2

Mid Term/End Term: 2 sessions

Quiz: 6 sessions

Labs: 36 sessions

Total: 108 sessions

**Lab/ Practical details, if applicable: (36 hours)**

1. Familiarization with networking components and devices: LAN Adapters, Hubs, Switches, Routers etc.
2. Familiarization with transmission media and tools: Coaxial cable, UTP cable, Crimping tool, Connectors etc.
3. Preparing straight and cross cables
4. Study of various LAN topologies and their creation using network devices, cables and computers
5. Configuration of TCP/IP Protocols in Windows and Linux
6. Implementation of resource sharing (file, printer etc.)
7. Designing and implementing class A, B and C networks
8. Subnet planning and its implementation
9. To configure dynamic IP address for a computer connected to a LAN
10. Use of commands like ping, ipconfig for trouble shooting network related problems
11. Develop a program to compute the Hamming Distance between any two code words
12. Installation of FTP server and client
13. To configure proxy server
14. Familiarization with network simulation tools.

**Assessment/ Examination Scheme:**

|  |  |  |
| --- | --- | --- |
| **Theory L/T (%)** | **Lab/Practical/Studio (%)** | **End Term Examination** |
| 80% | 20% | 100% |

**Assessment/Examination Scheme: Theory**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **CONTINUOUS EVALUATION FORMAT** | | | | **FINAL EXAM** | |
| **TYPE OF ASSESSMENT** | **Surprise Tests MCQ based Best of 4 (minimum 6 tests)** | **Term paper** | **Seminar/**  **presentation/**  **Assignment** | **Mid semester Test** | **End semester Exam**  **(Subjective)** | **End Semester Exam**  **(MCQ)** |
| WEIGHTAGE  (%) | 16 | 4 | 5 | 25 | 25 | 25 |

Minimum # of Surprise test for up to 1 credit = 3

Minimum # of Surprise test for more than 1 credits = 6

**Laboratory Assessment:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Continuous Assessment/Internal Assessment** | | | **End Term Examination** | | |
| **Components (Drop down)** | **Minor Experiment/ Spotting** | **Lab Record including Attendance, Ethics, Precautions, Interactions** | **Viva-voce** | **Major Experiment (Practical)** | **Viva** | **Total** |
| **Weight age (%)** | 20 | 15 | 15 | 35 | 15 | 100 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Bloom’s Level >** | **Understanding** | **Applying** | **Analyzing** | **Evaluating** |
| **Course Learning Outcomes**  **`**  **Assessment type**  **/PSDA** | **CLO1**  To highlight the characteristics of various protocols. | **CLO2**  To define different network technologies and their application. | **CLO3**   1. To analyze and identify hardware and software components for designing network | **CLO4**  To evaluate and compare the performance of different network media |
| **Mid-Term Test** | **√** | **√** |  |  |
| **End-Term Test** | **√** | **√** | **√** | **√** |
| **Quiz 1** | **√** |  |  | **√** |
| **Quiz 2** | **√** | **√** |  |  |
| **Quiz 3** |  | **√** | **√** |  |
| **Quiz 4** |  |  | **√** |  |
| **Quiz 5** |  |  | **√** | **√** |
| **Quiz 6** |  |  |  | **√** |
| **HA1** |  |  |  | **√** |
| **HA2** |  |  |  | **√** |

**Text / Reference Books:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **AUTHOR** | **TITLE** | **Publisher** | **Year of publication** | **ISBN** |
| Behrouz A. Forouzan | Data Communication and Networking | TMH | 2017 | 978-1259064753 |
| William Stallings | Data and Computer Communication | Pearson | 2017 | 978-9332586932 |
| Andrew S. Tanenbaum | Computer Networks | Pearson | 2013 | 978-9332518742 |
| Douglas Comer | Internetworking with TCP/IP | Pearson | 2015 | 978-9332550100 |
| W. Richard Stevens | TCP/IP Illustrated | Pearson | 2014 | 978-9332535954 |