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Description generated with very high confidence

**Course Plan**

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| **Department :** | Data Science and Computer Applications |
| **Course Name & code :** | **Computer Networks**  & **MCA 5151** |
| **Semester & branch :** | III Semester & MCA |
| **Name of the faculty :** | Mr. Nirmal Kumar Nigam, Mr. Vinayak M. Mantoor |
| **No of contact hours/week:** | |  |  |  |  | | --- | --- | --- | --- | | **L** | **T** | **P** | **C** | | 4 | 0 | 0 | 4 | |

**Course Outcomes (COs)**

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|  | ***At the end of this course, the student should be able to:*** | **No. of Contact Hours** | **Marks** |
| CO1: | Understand the organization of the computer network topology and OSI reference model | 3 | 6 |
| CO2: | Discuss the significances of MAC protocols and various inter-connecting devices of the network | 4 | 8 |
| CO3: | Design a network topology by configuring the routers with suitable IP addresses and routing mechanisms to enable the seamless communication between the devices. | 17 | 38 |
| CO4: | Identify an effective protocol for an end-to-end communication and explain the significance and purpose of different type of protocols | 19 | 40 |
| CO5: | Demonstrate the understanding of client-server applications and application layer protocols | 5 | 8 |
|  | **Total** | 48 | 100 |

**Assessment Plan**

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| **Components** | **Assignments** | **Sessional Tests** | **End Semester/**  **Make-up Examination** |
| **Duration** | 20 to 30 minutes | 60 minutes | 180 minutes |
| **Weightage** | 20 % (4 X 5 marks) | 30 % (2 X 15 Marks) | 50 % (1 X 50 Marks) |
| **Typology of Questions** | Understanding; Applying; Analyzing; Evaluating; Creating | Remembering;  Understanding; Applying | Understanding; Applying; Analyzing; Evaluating; Creating |
| **Pattern** | Answer one randomly selected question from the problem sheet (Students can refer their class notes) | MCQ (10 marks):  10 questions of 0.5 marks each  Short Answers (10 marks): questions of 2 or 3 marks | Answer all 5 full questions of 10 marks each. Each question may have 2 to 3 parts of 3/4/5/6/7 marks |
| **Schedule** | As notified by Associate Director (Academics) at the start of each semester | Calendared activity | Calendared activity |
| **Topics Covered** | Assignment 1 (L 1-12& T **y1-y2**) **(CO1 CO2)** | Test 1  (L 1-21& T **b1-b2**)  **(CO1 CO2 CO3 CO4)** | Comprehensive examination covering full syllabus. Students are expected to answer all questions **(CO1-CO5)** |
| Assignment 2 (L **13-24**& T **y3-y4**) **(CO2 CO3 CO4)** |
| Assignment 3 (L 25-34& T **y5-y6**) **(CO3 CO4)** | Test 2  (L 22-38& T **b3-b4**)  **(CO3 CO4)** |
| Assignment 4 (L 35-44& T **y7-y8**) **(CO4 CO5)** |

**Lesson Plan**

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| **L. No.** | **Topics** | **Course Outcome Addressed** |
| **L0** | Introduction to the Course Computer Network | CO |
| **L1** | Networks-Definition, classification & topology | CO1 |
| **L2** | Network Models- layered architecture, Layer-to-Layer communication | CO1 |
| **L3** | ISO/OSI, TCP/IP layered models and comparison | CO1 |
| **L4** | LAN-Ethernet LAN Technology-IEEE 802.3 | CO2 |
| **L5** | Data Link Layer- Access method | CO2 |
| **L6** | Addresses, connecting devices and Switching Concepts | CO2 |
| **L7** | Introduction to Network Layer- Network Service provided and issues | CO2 |
| **L8** | Classful Addressing- binary, decimal, 256 base number representation and operations | CO3 |
| **L9** | Address Blocks and 2-level addressing, Extracting Block Information. | CO3 |
| **L10** | Network Address, Network mask, Subnetting | CO3 |
| **L11** | Classless addresses and Address Block allocation. | CO3 |
| **L12** | Classless Address Block allocation. | CO3 |
| **L13** | Supernetting, examples | CO3 |
| **L14** | Special address and Network Address Translation | CO3 |
| **L15** | Different delivery and forwarding methods | CO3 |
| **L16** | Examples on forwarding classful addresses with subnetting | CO3 |
| **L17** | Examples on Forwarding with Classless Addressing, Structure of a Router | CO3 |
| **L18** | Introduction to Internet Protocol, Datagram, packet format, examples | CO4 |
| **L19** | IP fragmentation issues and examples | CO4 |
| **L20** | IP Options and some examples | CO4 |
| **L21** | Checksum calculation, verification and Security. | CO4 |
| **L22** | Need for address resolution, methods, ARP working | CO4 |
| **L23** | ARP packet format and operation | CO4 |
| **L24** | Introduction to ICMP, packet format, error messages | CO4 |
| **L25** | ICMP query messages | CO4 |
| **L26** | Unicasting, Multicasting and its uses, Multicast Addresses in IPv4 | CO4 |
| **L27** | Delivery of Multicast Packets at Data Link Layer | CO4 |
| **L28** | IGMP format and messages | CO4 |
| **L29** | Introduction to routing, inter and intra domain routing | CO3 |
| **L30** | Distance vector routing (DVR), Bellman-Ford algorithm | CO3 |
| **L31** | DVR example and problems with DVR | CO3 |
| **L32** | Routing Information Protocol (RIP) | CO3 |
| **L33** | Link State Routing, Building Routing Tables | CO3 |
| **L34** | Formation of Shortest Path Tree using Dijkstra Algorithm | CO3 |
| **L35** | Example-Calculation of Routing Table from Shortest Path Tree | CO3 |
| **L36** | Introduction-Transport Layer Service, UDP packet. | CO4 |
| **L37** | UDP example, checksum, UDP Applications | CO4 |
| **L38** | TCP services, TCP features, Segment format | CO4 |
| **L39** | TCP Connection establishment, SYN flooding, Data transfer, Termination | CO4 |
| **L40** | Flow Control-Sender window, Receiver window, Example | CO4 |
| **L41** | Error control- Cumulative Acknowledgment (ACK). Generating Acknowledgments | CO4 |
| **L42** | Congestion Control-Slow Start, Congestion Avoidance, Congestion Detection | CO4 |
| **L43** | TCP Timers-Retransmission Timer | CO4 |
| **L44** | IPv6 Notation & address block allocations | CO5 |
| **L45** | IPv6 packet format and Transition from IPv4 to IPv6 | CO5 |
| **L46** | Client-Server paradigm, Connectionless Iterative Server, Connection-Oriented Concurrent Server | CO5 |
| **L47** | Host Configuration, previous protocols, DHCP-Operations, same network, different network | CO5 |
| **L48** | UDP ports, Error message Packet format, Static Address Allocation, Dynamic Address Allocation, DNS | CO5 |
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**References:**

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| 1. | **Behrouz A. Forouzan, TCP/IP Protocol Suite, 4th Edition, Tata McGraw Hill, 2010** |
| 2. | **Tannenbaum, A.S, Computer Networks, 5th Edition, Prentice Hall of India EE Edition, 2011.** |
| 3. | **Behrouz A. Forouzan, Data Communications and Networking, 5th Edition, Tata McGraw Hill, 2013** |
| 4. | **Leon Garcia and Widjala, Communication Networks, 5th Edition, Tata McGraw Hill, 2017** |
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| **Submitted by:** | **Vinayak m mantoor & nirmal kumar nigam** |

**(Signature of the faculty)**

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| **Date:** | **28-07-2023** |

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| **Approved by:** | **dr. radhika m pai** |

**(Signature of HOD)**

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| **Date:** | **28-07-2023** |

**Faculty members teaching the course (IF MULTIPLE sections EXIST):**

|  |  |  |  |
| --- | --- | --- | --- |
| **FACULTY** | **Section** | **FACULTY** | **Section** |
| Vinayak M Mantoor | A | Nirmal Kumar Nigam | B |
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