5 Years Integrated M.C.A

DSE5 Introduction to Computer Networks
(060060409)

4th Semester

EFFECTIVE FROM JANUARY - 2017

VERSION-1.0
UKA TARSADIA UNIVERSITY

Course Code: 030010412        Course Title: DSE5 Introduction to Computer Networks
Course Credits: 4        [Lectures: 04, Tutorial: 00, Practical: 00]
Prerequisites By Topics: Basic knowledge about computer organizations.
Objectives: To provide thorough understanding of Computer Network Concepts, knowledge of Physical and Data Link Layer functionalities and LAN - WAN concepts.

1 Introduction to Data Communication, Networks and Standards [17 %]
1.1. Data Communication, Communication Systems, Applications
1.2. Network Topologies and Categories of Networks: LAN, MAN, WAN
1.3. Network Hardware: Network Interface Card, Repeater, Hub, Bridge, Router, Brouter, Switches, Gateways
1.4. Network Architecture, Open Systems and OSI Model: Layers of OSI model, Functionalities of each layers
1.5. Protocols, Standards and Standard Organizations

2 Data Transmission and Communication Media [20 %]
2.1. Analog and Digital Data Transmission: Analog and Digital signals
2.2. Modulation and Demodulation: Analog to Digital Conversion and Digital to Analog Conversion
2.3. Transmission Media: Twisted Pair, Coaxial Cable, Optical Fibre
2.4. Wireless Communication: Radio Waves, Microwaves, Infrared
2.5. Data Transmission: Parallel, Serial Transmission
2.6. Interfacing, Multiplexing: FDM, TDM and WDM
2.7. Switching: Circuit, Message and Packet

3 Error Detection and Correction [13 %]
3.1. Types of Error, Redundancy, Detection Versus Correction, Forward Error Correction Versus Retransmission
3.2. Error Detection Methods: Parity Check, Cyclic Redundancy Check, Checksum
3.3. Error Correction: Hamming Code

4 Data Link Control and Protocols [17 %]
4.1. Types of Framing: Fixed-Size Framing, Variable-Size Framing
4.2. Data Link Control Functions: Flow Control and Error Control
4.3. Flow Control Protocols: Stop- and-Wait, Sliding Window

5 Medium Access Control SubLayer [20 %]
5.1. The Channel Allocation Problem
5.2. Multiple Access Protocols: ALOHA, CSMA, CSMA/CD, CSMA/CA
5.3. Token Bus, Token Ring, FDDI, DQDB, LAN Operating System and Protocols
5.4. Ethernet: IEEE Standard and Comparison of Ethernet Technologies

6 Wide Area Network and Wireless LAN's [13 %]
6.1. WAN Transmission Methods: Time Division Multiple Access, Frequency Division Multiple Access, Code-Division Multiple Access, Statistical Multiple Access
6.2. WAN Carrier Types: Point to Point, T-carrier, SONET, ISDN, Wireless
6.3. Wireless LAN: Configuration and Technology
6.4. Wireless LAN Applications
Course Outcome: Upon completion of the course, students shall be able to

CO1: Summarize about Data Communication, Network Architecture, Protocols and Standards.
CO2: Recognize Data Transmission Techniques and Transmission Media.
CO3: Demonstrate Error Detection and Error Correction Methods.
CO4: Describe the functionality of Data Link Layer Protocols for Flow Control and Error Control.
CO5: Describe the functionalities of Network Topologies and Network Components.
CO6: Describe the functionalities of Ethernet Standards 802.3.
CO7: Summarize Wide Area Network and Wireless LAN.

Course Objective and Course Outcomes Mapping:

To provide knowledge of Computer Networks Concepts: C01
To provide Knowledge of Physical and Data Link Layer functionalities: C01, C02, C03, C04
To explore LAN-WAN Concepts: C01, C05, C06, C07

Course Units and Course Outcomes Mapping:

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<tr>
<th>Unit No.</th>
<th>Unit</th>
<th>CO1</th>
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<th>CO5</th>
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Hands-on Activity

- Hands-on sessions shall be conducted on following topics:
  1. Demonstration of LAN setup and network server configuration.
  2. Implementation of Error correction and Error Detection techniques in Java Programming language.

Modes of Transaction(Delivery):

- Lecture method shall be used for all units. For all units lecture delivery shall be supplemented with audio-visual aids.
- Self-Study of following part of the syllabus shall be done by the students: 5.4-IEEE Standard.

Activities/Practicum:
The following activities shall be carried out by the students.
- Identify Topologies and Network Architectures including all types of hardware in campus.
- Under the guidance of teacher students may form a small wired network once demonstrated by teacher
- Make a simple pair of nodes and make communication between two nodes on NS2.

The following activities shall be carried out by the teacher.
- Demonstration of various networking devices, Crimping of wires, installing NIC drivers and show some of the networks device. May be a teacher can take students to visit the computer labs.
- Demonstration of the OSI Layer Architecture by audio/video aids.
- Demonstration of how a small Wireless Adhoc network can be established on NS2.

Text Book:

References:

Concept Map:
It is a hierarchical / tree based representation of all topics covered under the course. This gives direct / indirect relationship / association among topics as well as subtopics.

Unit 1: Introduction to Data Communication, Networks and Standards
Unit 2: Data transmission and Communication media

Communication media & data transmission

- Analog and Digital transmission
- Modulation-Demodulation
- Multiplexing
  - FDM
  - TDM
  - WDM

- Wireless Communication
  - Radio Waves
  - Microwaves

- Interfacing

Transmission Media
- Twisted Pair
- Coaxial Cable
  - BrodBand
  - BaseBand

- Serial Transmission

Unit 3: Error Detection and Correction

Error Detection & Correction

- Types of Error
- Error detection methods
  - Parity Check
  - Longitudinal redundancy Check
  - Cyclic redundancy
  - Checksum
- Error correction
Unit 4: Data Link Control & Protocol Concepts

Data Link Control & Protocol Concepts
  
  Flow Control
  - Includes
  - Covers
  - Stop & wait Flow Control
  - Sliding window flow control

Error Control
  
  - Includes
  - Covers
  - Stop & Wait ARQ
  - Selective Repeat ARQ

Includes

Unit 5: Medium Access Control Sublayer

Medium Access Control Sublayer
  
  Channel allocation problem
  
  Multiple Access Protocols
  - Covers
  - ALOHA
  - CSMA/CD
  - CSMA/CA

Ethernet
  
  - Covers
  - Token bus, Token ring, FDDI, DQDB, LAN operating systems and Protocols

Comparison of Ethernet Technologies
  
  - Includes
  - IEEE standard
Unit 6: Wide Area Network & Wireless LAN's

Assessment:

- The weightage of Continuous Internal Evaluation (CIE) and University examination shall be as per the University regulations.
- At the institute level the structure of CIE for a course shall comprise of assessment parameters like Open Book test, Quizzes, Unit Tests, Assignments, Internal and Self-Creation.
- The frequency and weightage of each of above assessment parameter may vary from time to time to satisfy courses objectives and outcomes so as to achieve programme educational objectives and its outcomes.
- The courses teacher is free to decide the number of assessment parameters and their frequency for a course subject to prior approval of the programme co-ordinator/Director.
- The assessment policy document should be uploaded on the web before the commencement of the semester.
- Syllabus for each CIE parameter shall be covered by the date of the corresponding test.
- No make-up work shall be conducted unless approval from Programme Co-ordinator/Director.

Question Bank:

- Question Bank must be prepared which consists of several types of questions namely Matching type questions, Multiple Choice Questions, Fill in the blanks, Short type questions, long type questions etc.

UFM :

- Any ascertained fact of breaking institute policy shall be associated with one or all of the following: (i) zero marks for the work; (ii) report to the programme coordinator; (iii) report to the Director.
Attendance:

- Attendance means being present for the entire class session. Those arriving significantly late or leaving significantly early without prior permission shall be counted as ABSENT for the entire class session.
- Concern teacher must clearly state his/her attendance policies at the first class meeting.