NEW ZEALAND INSTITUTES OF TECHNOLOGY AND POLYTECHNIC QUALIFICATIONS IN INFORMATION & COMMUNICATIONS TECHNOLOGY

PRESCRIPTION: DC500 DATA COMMUNICATIONS

AIM OF MODULE:	Students will gain an understanding of the facilities and techniques available for the interconnection of computers and peripherals.
CREDITS:	7
STUDENT LEARNING HOURS:	70
CONTENT REVISED:	2008
PRESCRIPTION EXPIRY DATE:	Nov 2011

Level and Assessment Schedule

TOPICS	Highest Skill Level R	C	A	P	Suggested Assessment Percentage
1. Data Communications Developments and Concepts		*			15
2. Communications Media and Transmission Concepts		*			35
3. Data Link layer methods and protocols		*			30
4. Data Communications Interfaces		*			20
					100

LEARNING OUTCOMES

The student will:

C 1 Describe the developments in data communications and explain the major communications components and types of network

C 2 Describe commonly used communications media and explain data transmission concepts

C 3 Describe methods for media access and error control and describe the commonly used data link protocols

C 4 Describe and explain the operation of the physical interfaces between the Data Terminal Equipment (DTE) and the Data Communications Equipment (DCE)

Demonstrations of data communications techniques and facilities should be used whenever practicable.

CONTENT

1 DATA COMMUNICATIONS DEVELOPMENTS

- Describe the past, present and future trends in data communications, with emphasis on the integration of voice, data and video and the impact of the Internet
- The basic components of a communications system will be described in terms of source, medium and receiver
- The differences between DTE and DCE will be explained
- The different network configurations will be described (PAN, LAN, Backbone Network and WAN)
- The requirements for standards and the development of standards organisations; ie. ITU, ISO, EIA, and IEEE, will be examined
- The relationships between the OSI and TCP/IP architectures are described

2 COMMUNICATIONS MEDIA AND DATA TRANSMISSION CONCEPTS

- The examination of communications media will include; twisted pair, coaxial and optical fibre cables and wireless; e.g. Microwave and infrared, and their properties.
- Transmission concepts will include the following:
  - Circuit configuration (Point-to-Point and multidrop)
  - Data Flow (simplex, half-duplex and full-duplex)
  - Transmission modes (serial & parallel)
  - Digital data transmission
  - Analogue transmission of digital data (Modems)

- Digital transmission of analogue data (Codecs)
- Multiplexing; e.g. FDM, TDM, STDM, WDM, or other current technologies

3 DATA LINK LAYER METHODS AND PROTOCOLS

- Media access methodologies are described.
  - Controlled access (X-ON/X-OFF), Polling
  - Contention (random access protocols; CSMA/CD, CSMA/CA)
- Error control and detection methodologies are described;
  - Sources of errors
  - Error prevention
  - Error detection (parity, Longitudinal Redundancy, Polynomial, CRC will be covered in more detail)
  - Error correction (Stop-and-Wait ARQ, Continuous ARQ)
- Describe Data Link Protocols;
  - Asynchronous transmission (Xmodem, Zmodem, Kermit)
  - Synchronous transmission (SDLC, HDLC, Ethernet)

4 PHYSICAL INTERFACES

- Compare the different interfaces for DTE/DCE devices;
  - These may include serial, parallel, USB, Bluetooth, Ethernet, etc.

- The mechanical, electrical, functional and procedural requirements of the ITU-T, V, X, and I series recommendations, or other current standards, will be described

- A specific example of an implementation of a serial interface, such as the EIA 232-D, or USB will be examined. The explanation may also include a comparison between two serial interfaces; e.g. USB and Ethernet, to promote understanding of preferred options when connecting to, for example, a Broadband (DSL) modem

LEARNING RESOURCES

Suggested Textbooks:

- Data & Computer Communications (8th Edition) by William Stallings. ISBN-13: 978-0132433105 (Published by Prentice Hall, August 12, 2006)
- Data Communications and Networking (4th Edition) by Behrouz A Forouzan. ISBN: 0072967757 (Published by McGraw-Hill Science/Engineering/Math, February 9, 2006)