BCS Higher Education Qualifications

Diploma in IT

Computer Networks Syllabus

Version 3.0

December 2016

Contents

1. Change History

Any changes made to the syllabus shall be clearly documented with a change history log. This shall include the latest version number, date of the amendment and the changes made. The purpose is to identify quickly what changes have been made.

Version Number	Date	Changes Made
Version 1.0		Released
Version 2.0	March 2015	Re-formatted with syllabus numbering – no change to content
Version 3.0	Dec 2016	Regulated statement added.

2. Rationale

Virtually every computer is connected, or has the potential to be connected, to other computers. When connected locally, they provide vital services such as print servers, file servers, CPU servers and when connected externally, offer access to the Internet, world-wide-web and electronic mail. Millions of people worldwide have been exposed to the World Wide Web of computers and the information they provide.

The explosion in the use of such technologies and the long-established use of local area networks has made the study of computer networks and the underlying communication technology as important as the more traditional foundations of computer science such as computer architecture, operating systems and programming.

3. Aims

- To develop an understanding of the modern network technologies in common use today
- To appreciate how computer networks can format and transfer data at high speed and over both the local and wide area
- To identify potential and actual limitations with existing networks and identify advances in technology that may solve them

4. Objectives

Upon successful completion of this module, candidates will be able to:
- demonstrate an understanding of the physical properties and performance characteristics of communication media; specifically, copper cable, fibre optics and wireless networks;
- demonstrate an understanding of the importance of communication standards, including an appreciation of protocol layer models and enhancements to those standards;
- demonstrate an appreciation of the theory and practice of common local area networks including virtual and wireless LANs;
- demonstrate an appreciation of the theory and practice of wide area networks and their interconnection;
- demonstrate an appreciation of the significance of network and inter-network protocols; specifically, IPv4, IPv6, TCP and UDP;
- describe the importance of reliability and quality of service, including examples of error recovery strategies, traffic differentiation and prioritisation.

5. Prior Knowledge Expected

Candidates are expected to be familiar with the material covered in the Certificate syllabuses and are expected to be familiar with computer architectures, particularly regarding the representation of information within a computer system. Some practical exposure to local and wide area networks would be useful for context.

6. Format and Duration of the Examination

The examination is a two-hour closed book examination (no materials can be taken into the examination room) based on the syllabus in this document.

Examinations are held twice a year and are undertaken in normal examination conditions with one or more duly appointed invigilators.

The pass mark is 40%.

7. Syllabus Detail

Category	Content
1 Introduction	Historical perspective, theoretical and practical models of network architecture particularly the ISO OSI seven-layer model and the TCP/IP protocol stack. Example networks and services including prototype new technologies. These would include Frame Relay, ISDN, ATM, Wi-Fi, xDSL, WiMAX, 2G and 3G.
2 Digital Communication	Physical properties of copper media, fibre optics, radio communication, and data communication standards. Maximum data rates (theoretical and practical) for different media including some simple analysis of signals. Data encoding of digital signals. The distinction between, and analysis of, physical media and wireless media properties. The difference between narrow band and broad band technologies with reference to ISDN and xDSL.
3 Local Area Networks	Types of LAN covering standards, topology and performance. Example architectures such as Ethernet and fast Ethernet, ATM, and Wi-Fi. The operation of LAN switches and the configuration of virtual LANs.
4 Wide Area Networks	Circuit versus packet switching and associated routing and flow control. Detailed examples of existing architectures such as Frame Relay, ISDN, ATM, Multi-protocol Label Switching (MPLS) and Virtual Private Networks (VPN).
5 Inter Networks	Principles of inter-networking, architectures, addressing and protocols. Reference to IPv4, IPv6, TCP and UDP.
6. Errors	The main causes of errors and their effects on transmission. Single bit and burst errors. Various error detection and correction strategies including parity, block sum, Hamming Codes, Cyclic Redundancy Checks and Forward versus Backward error control. Statistical analysis of the effectiveness of error detection and correction code.
7 Quality of Service	A definition of quality of service and the main parameters that define network performance. Router functionality including frame prioritisation, classification and queue management techniques. The provision of quality of service management in practical networks such as Frame Relay, ATM and the Internet.

8. Recommended Reading List

	ISBN 10	ISBN 13
Primary Texts		
Stallings, W. *Data and Computer Communications. 10th Edition.* Pearson Education. 2013.	1292014385	978-1292014388
Tanenbaum, A. *Computer Networks. 5th Edition.* Pearson Education. 2013.	1292024224	978-1292024226
Other Texts		
Stallings, W. *Wireless Communication and Networks. 2nd Edition.* Pearson Education. 2013 .	129202738X	978-1292027388

9. Contact Points

Email:
Customer Service team via www.bcs.org/contact

Phone:
UK: 01793 417424 or 0845 300 4417 (lo-call rate)
Overseas: +44 (0)1793 417424
Lines are open Monday to Friday, 08.15 a.m. to 5.45 p.m. UK time.

Website:
www.bcs.org/heq

Post:
BCS, The Chartered Institute for IT
First Floor, Block D, North Star House, North Star Avenue,
Swindon SN2 1FA, United Kingdom