

National College of Ireland

B.Sc. Honours in Business Information Systems Year 2 (BSHBIS2 and BSHBIS2E2)

B.Sc. Honours in Computing Year 2 (BSHC2 and BSHCE2)

Higher Certificate in Computing Year 2 (HCC2 and HCCE2)

Semester Two Examinations – 2010/2011

Saturday, 14th May 2011

2.00pm – 3.30pm

Data Communications and Networking

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Answer **Question 1** and **One** other question

Put answers to Question 1 in your exam answer booklet (not on exam paper) – clearly state each question number and answer in words on the answer booklet.

Commence each answer on new page

Duration of exam: 90 minutes

Question 1. COMPULSORY (Answer ALL Parts) 40 Marks

Multiple Choice. Choose one of the answers in each case.

(2 marks each)

- (1) A tree topology is a variation of a _____ topology.
- (a) mesh
 - (b) star
 - (c) bus
 - (d) ring
- (2) A television broadcast is an example of _____ transmission.
- (a) simplex
 - (b) half-duplex
 - (c) full-duplex
 - (d) automatic
- (3) In _____ transmission, the channel capacity is shared by both communicating devices at all times.
- (a) simplex
 - (b) half-duplex
 - (c) full-duplex
 - (d) automatic
- (4) MacKenzie Publishing, with headquarters in London and branch offices throughout Asia, Europe and South America is probably connected by _____.
- (a) a LAN
 - (b) a MAN
 - (c) a WAN
 - (d) none of the above
- (5) The performance of a data communications network depends on _____.
- (a) the number of users
 - (b) the transmission media
 - (c) the hardware and software
 - (d) all of the above

- (6) The end-to-end delivery of an entire message is the responsibility of the _____ layer of the OSI model.
- (a) transport
 - (b) network
 - (c) data link
 - (d) application
- (7) When data is transmitted from device A to device B, the header from A's OSI layer 3 is read by B's _____ layer.
- (a) physical
 - (b) transport
 - (c) network
 - (d) application
- (8) The type of propagation used in radio communication is highly dependent on the _____ of the signal.
- (a) data rate
 - (b) power
 - (c) baud rate
 - (d) frequency
- (9) A periodic signal completes one cycle in 0.001 seconds. What is the frequency?
- (a) 1 Hz
 - (b) 100 Hz
 - (c) 1 KHz
 - (d) 1 MHz
- (10) If the bandwidth of a signal is 5 KHz and the lowest signal is 52 KHz, what is the highest frequency?
- (a) 5 KHz
 - (b) 10 KHz
 - (c) 47 KHz
 - (d) 57 KHz
- (11) As frequency increases, the period _____.
- (a) remains the same
 - (b) doubles
 - (c) decreases
 - (d) increases

- (12) In asynchronous TDM, the transmission rate of the multiplexed path is usually _____ the sum of the transmission rates of the signal sources
- (a) 1 Less than
 - (b) Greater than
 - (c) Less than
 - (d) Equal to
- (13) In _____ propagation low-frequency radio waves hug the earth.
- (a) surface
 - (b) sky
 - (c) line-of-sight
 - (d) space
- (14) Which type of switching uses the entire capacity of a dedicated channel?
- (a) Circuit switching
 - (b) Datagram packet switching
 - (c) Virtual circuit packet switching
 - (d) Message switching
- (15) In _____ circuit switching, delivery of data is delayed because data must be stored and retrieved from RAM.
- (a) space-division
 - (b) time-division
 - (c) virtual-circuit
 - (d) datagram
- (16) In _____, each packet of a multi-packet transmission need not follow the same path from sender to receiver.
- (a) circuit switching
 - (b) datagram packet switching
 - (c) virtual-circuit packet switching
 - (d) message switching
- (17) In Ethernet, the source address field of the MAC frame is _____ bits long.
- (a) 44
 - (b) 46
 - (c) 48
 - (d) 50

(18) CSMA/CD stands for Carrier Sense _____ Access with Collision Detection.

- (a) Medium
- (b) Media
- (c) Multiple
- (d) Many

(19) With 10BASE-T the maximum cabling length is approximately ____ metres.

- (a) 100
- (b) 150
- (c) 200
- (d) 500

(20) Which of the following is true about IPv4 addresses?

- (a) It's divided into exactly two classes
- (b) It contains a fixed-length hostid
- (c) It was established as a user-friendly interface
- (d) It is 32 bits long

(40 Marks)

P.T.O

Answer Questions 2 OR Question 3.

Question 2 (Answer ALL Parts) 60 Marks

- a) What are the three main types of multiplexing and briefly explain what each is mainly used for?
(12 Marks)
- b) If we want to use frequency-division multiplexing to combine 20 voice-grade signals (each of 4KHz) with a guard band of 1KHz between them how much bandwidth do we need?
(8 Marks)
- c) Briefly describe the functions and operation of each of the following devices:
Clearly state which layer(s) of the TCP/IP Internet model each device operates on and what type of addressing (if any) it uses.
- i. Hub (both active and passive)
(5 marks)
 - ii. Switch (layer 2 only)
(5 marks)
 - iii. Router
(5 marks)
 - iv. Gateway
(5 marks)
- d) Describe, with the aid of a diagram, the components of an optical fibre cable and state what each component is used for.
(12 marks)
- e) Briefly explain the main reason why the wires are twisted in twisted-pair cable.
(8 marks)

P.T.O

Question 3. (Answer ALL Parts) 60 Marks

- a) What are the main uses of twisted-pair cable?
(8 marks)
- b) Outline briefly the three different levels of addressing that are used in an internet which is using the TCP/IP protocol suite. State at which layer(s) the levels of addressing operate.
(14 marks)
- c) Briefly explain, with the aid of a diagram, how the TCP/IP Internet network model uses peer-to-peer communication.
(14 marks)
- d) Describe, with the aid of a diagram, the components of coaxial cable and state what each component is used for.
(14 marks)
- e) List two advantages and two disadvantages of using optical fibre over twisted-pair cable.
(10 marks)