



THE CATHOLIC UNIVERSITY OF EASTERN AFRICA

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MAIN EXAMINATION

JANUARY – APRIL 2015 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

REGULAR PROGRAMME

CMT 107: COMPUTER NETWORKS

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|-------------------------|--------------------------|
| Date: APRIL 2015 | Duration: 2 Hours |
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| Instructions: Answer Question ONE and any other TWO Questions. |
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- Q1. a) Define the following terms:
- i) Computer network (1 mark)
 - ii) Communication protocol (1 mark)
 - iii) Layering (1 mark)
 - iv) Topology (1 mark)
- b) Briefly describe four advantages and two problems of computer networks. (6 marks)
- c) Describe the role of the following layers:
- i) Application layer (2 marks)
 - ii) Transport layer (2 marks)
 - iii) Network layer (2 marks)
 - iv) Data link layer (2 marks)
- d) What is the primary role of a Domain Name System (DNS)? (2 marks)
- e) List two transport layer protocols. (2 marks)
- f) List four criteria for choosing networking media. (4 marks)
- g) Briefly describe two ways of handling error correction. (4 marks)
- Q2. a) Draw the simplified communication model and indicate the different components. (5 marks)

- b) List the three main types of computer networks based on coverage. **(3 marks)**
- c) State the two types of network architectures. **(2 marks)**
- d) Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use user Datagram Protocol (UDP) or Transmission Control Protocol (TCP)? **(2 marks)**
- e) Briefly describe four characteristic differences between TCP and UDP. **(4 marks)**
- f) i) What is the primary role of the TCP sliding window system? **(2 marks)**
 ii) Which data structure is used to implement the studying window mechanism? **(2 marks)**
- Q3. a) An application layer protocol defines how an application's processes, running in different end systems, pass messages to each other. In particular, an application layer protocol defines four things. What are these four things? **(4 marks)**
- b) Name three types of application layer architectures. **(3 marks)**
- c) Briefly describe the following two Domain Name System name resolution techniques:
 i) Iterative **(2 marks)**
 ii) Recursive **(2 marks)**
- d) State an advantage of each of the following topologies.
 i) Bus **(1 mark)**
 ii) Star **(1 mark)**
 iii) Ring **(1 mark)**
- e) State the role of the following devices that are used to set up a network.
 i) Hub **(1 mark)**
 ii) Switch **(1 mark)**
 iii) Bridge **(1 mark)**
 iv) Repeater **(1 mark)**
 v) Router **(1 mark)**
 vi) Network interface cards **(1 mark)**
- Q4. a) Identify and describe any five properties of routing algorithms. **(6 marks)**
- b) Distinguish the following terms:
 i) Static and dynamic routing **(2 marks)**
 ii) Distance vector and link state routing **(2 marks)**

- c) Describe the optimality principle. **(2 marks)**
- d) List five basic hardware items required to set up a Wireless Local Area Network (WLAN) **(5 marks)**
- e) Briefly describe four benefits of WLAN. **(4 marks)**
- Q5. a) Distinguish between single bit error and burst error. **(2 marks)**
- b) Briefly describe the redundancy technique as used in error detection. **(2 marks)**
- c) List the three types of redundancy checks. **(3 marks)**
- d) What is the role of Hamming codes? **(2 marks)**
- e) Distinguish the following terms:
- i) Linear and non-linear Multimedia. **(2 marks)**
- ii) Lossy and lossless multimedia file compression algorithms. **(2 marks)**
- f) List five categories of components (hardware and software) that are required for a multimedia system. **(5 marks)**
- g) State two applications of multimedia. **(2 marks)**

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