BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 5 Diploma in IT

COMPUTER NETWORKS

Friday 29th September 2017 – Morning
Answer **any** FOUR questions out of SIX. All questions carry equal marks
Time: TWO hours

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

The marks given in brackets are **indicative** of the weight given to each part of the question.

Only **non-programmable** calculators are allowed in this examination.

Section A
Answer Section A questions in Answer Book A

A1. Explain briefly the following terms:

a) Integrated Services Digital Network (ISDN) **(5 marks)**

b) Session Initiation Protocol (SIP) **(5 marks)**

c) Asymmetric Digital Subscriber Line (ADSL) **(5 marks)**

d) Asynchronous Transfer Mode (ATM) **(5 marks)**

e) ITU-T (formerly CCITT) **(5 marks)**

A2. This question is about IPv6.

a) Explain the terms **global unicast address** and **link local address** and the difference between them. **(6 marks)**

b) Explain the compressed format for writing IPv6 addresses and write the following IPv6 addresses in their shortest compressed form:

2001:0DB8:0000:1470:0000:0000:0000:0200 **(4 marks)**

F380:0000:0000:0000:0123:4567:89AB:CDEF **(3 marks)**

c) Global unicast IPv6 addresses can be assigned dynamically in two different ways: stateless address autoconfiguration (SLAAC) and dynamic host configuration protocol v6 (DHCPv6). Describe the differences between the two methods. **(12 marks)**

A3. This question is concerned with local area networks using Ethernet technology.

a) Explain the difference between a switch and a bridge. **(6 marks)**

b) Briefly explain the difference between cut-through, fragment-free and store-and-forward switches. **(9 marks)**

c) Why are switches generally preferred to bridges except for the smallest networks? **(6 marks)**

d) How do routers operate differently from switches? **(4 marks)**

Section B

Answer Section B questions in Answer Book B

B4. This question is about the network layer and its functionality.

a) Briefly describe the concepts of: i) routing information, ii) routing algorithm and, iii) autonomous system, and indicate their involvement in the routing process. **(8 marks)**

b) There are three approaches to gathering and using routing information:
   i. distance-vector routing,
   ii. link-state routing,
   iii. path-vector routing.

   Briefly compare the three approaches by describing the routing information used and the way the routing algorithm works. **(9 marks)**

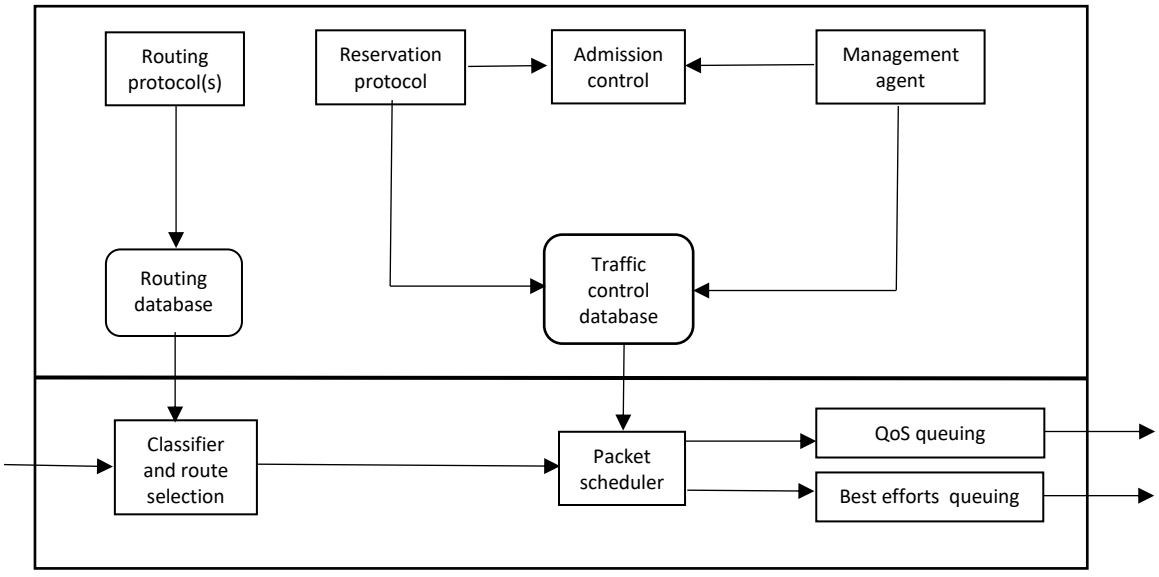
c) Describe the three main differences between RIPv1 and OSPF. **(6 marks)**

d) Summarise the difference between multicast and broadcast communication. **(2 marks)**

B5. This question is about the management of Quality of Service (QoS) in a network.

a) Briefly indicate two reasons why QoS management is required within an IP network. **(4 marks)**

b) The diagram below depicts the Integrated Services Architecture implemented in a router. Briefly indicate the function of at least two components (either from the foreground or background). **(6 marks)**



c) Describe FOUR key characteristics of the differentiated services mechanism for classifying and managing network traffic that contribute to its efficiency and ease of deployment. **(8 marks)**

d) Describe THREE IP metrics, defined by the IETF, that relate to the quality, performance and reliability of Internet data delivery. Which one is used to measure jitter? **(7 marks)**

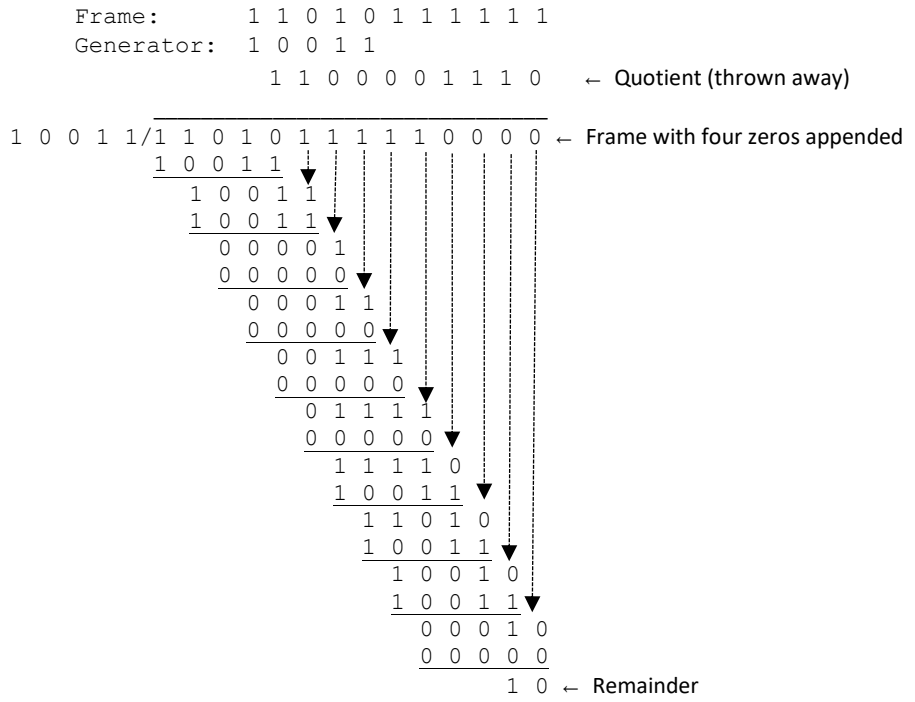
B6. This question is about error detection and correction in data communication.

a) Consider the following example, transmitter A is transmitting character G (1110001) and using odd parity for error detection. Briefly explain what the transmitter will transmit and what the receiver will do to detect any error. **(4 marks)**

b) One of the most common error-detecting codes is Cyclic Redundancy Check (CRC).

i. Briefly describes how CRC performs error-detecting. **(4 marks)**

ii. Given the frame (message), generator and remainder shown below, what would be the transmitted frame? **(3 marks)**



c) A 1024-bit message is sent that contains 992 data bits and 32 CRC bits. CRC is computed using the IEEE 802, standardized, 32-degree CRC polynomial. For each of the following, explain whether the errors during message transmission will be detected by the receiver:

i. There was a single-bit error. **(2 marks)**
ii. There were two isolated bit errors. **(2 marks)**
iii. There were 18 isolated bit errors. **(2 marks)**
iv. There was a 24-bit long burst error. **(2 marks)**
v. There was a 35-bit long burst error. **(2 marks)**

d) Describe how Hamming Codes are used to perform error correction. **(4 marks)**