

MATRICULATION AND SECONDARY EDUCATION CERTIFICATE EXAMINATIONS BOARD
UNIVERSITY OF MALTA, MSIDA

MATRICULATION CERTIFICATE EXAMINATION
INTERMEDIATE LEVEL
SEPTEMBER 2012

SUBJECT:	COMPUTING
DATE:	10th September 2012
TIME:	4.00 p.m. to 7.00 p.m.

Directions to Candidates

- Answer **ALL** questions in Section A and **ONE** question from Section B.
 - Good **English** and orderly **presentation** are important.
 - All answers are to be written on the **booklet** provided.
 - The use of **flowchart templates** is permitted but calculators may **NOT** be used.
-

Section A

(Answer **ALL** questions in this section)

- A1 (a) (i) What is a *flowchart*?
(ii) Using flowcharts draw ONE of the looping structures found in *Java*. [3]
- (b) WebCT and Moodle are web based systems frequently used for educational purposes.
(i) What are these web based systems called?
(ii) Mention TWO types of content typically found in such systems. [3]
- A2 (a) The evolution of computers over a number of decades has led to categorising computer systems into THREE main classes. Name and briefly describe the main characteristics of each class. [3]
- (b) *Sequential access* and *direct access* are two modes of retrieving data from a medium.
(i) Briefly explain the main difference between the TWO modes of access.
(ii) For each mode of access, mention ONE suitable application. [3]

IM 07.12s

- A3 (a) What is a *Full Adder*? [1]
(b) Design from first principles a simplified logic circuit of a *full adder*. [3]
(c) Circle and label the part of the logic circuit of question (b) above that forms a *half adder*. [2]
- A4 (a) What does the acronym *ROM* stand for? [1]
(b) Name and explain the difference between any THREE types of ROM. [3]
(c) Mention TWO practical applications of any two ROMs identified in part (b). [2]
- A5 (a) One main function of an operating system is the control of processes that are currently running in the system. This process control depends on the state of each process. Name and explain the THREE states that a process may be in. [3]
(b) Besides process control, identify and explain briefly THREE other major functions of an operating system. [3]
- A6 (a) What is *Deadlock*? [2]
(b) Describe a real scenario where deadlock might occur. [2]
(c) Give a simple solution to the scenario given in part (b). [2]
- A7 (a) Mention TWO characteristics of a text file. [2]
(b) What makes a random file different from a text file? [1]
(c) File attributes are associated with the *protection of files*.
(i) What are *file attributes*?
(ii) Name and briefly describe TWO attributes used to protect files. [3]
- A8 This question is about networking and communications. Give the term that is used for each of the statements below:
(a) A computer system which together with the appropriate software acts as an intermediary for requests from clients who are seeking resources from other servers. [1]
(b) A device in a computer network that identifies the destination of a data packet and forwards the packet via an appropriate transmission medium. [1]
(c) A set of communication standards for the simultaneous digital transmission of voice, video, data, and other network services over the traditional circuits of the public switched telephone network. [1]

- (d) A device for connecting multiple Ethernet devices together and making them act as a single network segment. [1]
 - (e) A data communications technology that enables faster data transmission over copper telephone lines than a conventional voice-band modem can provide. [1]
 - (f) A computer-based information retrieval technology that is widely used in websites. The technology enables a user to gain (or provide) access to text, audio and video recordings, photographs and computer graphics related to a particular subject. [1]
- A9 Name and briefly outline SIX major stages of the Software Development Life Cycle. [6]
- A10 (a) (i) What does DBMS stand for?
(ii) Name THREE important components found in the *data dictionary* of a DBMS. [4]
- (b) Name and differentiate between the TWO main types of *database models*. [2]
-

Section B

(Answer ONE question from this section)

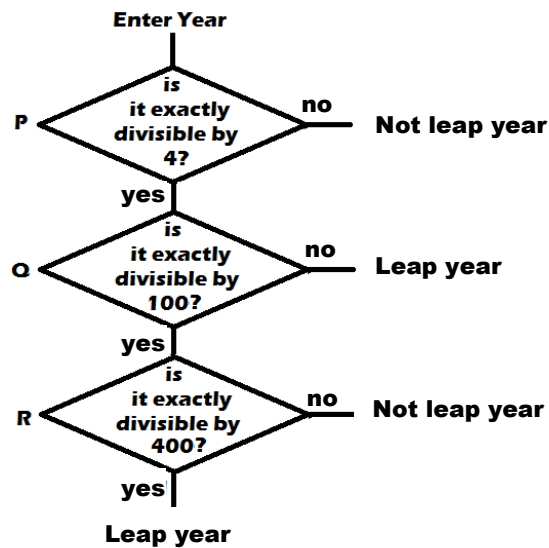
- B1 (a) Bandwidth and baud rate are two terms used in *networking*.
- (i) Differentiate between the TWO terms.
 - (ii) What unit of measurement is used for each term? [4]
- (b) The type of transmission medium used in network systems depends on various factors.
- (i) Name TWO commonly used *transmission media*.
 - (ii) For each medium mentioned in part (b) i, provide a typical application of the medium and justify your choice of application. [5]
- (c) This part of the question is about communications protocols with special reference to the IP (internet protocol) model.
- (i) What is a communications protocol?
 - (ii) What is the *IP model*?
 - (iii) List the layers of the *IP model* in the correct order.
 - (iv) What is the purpose of having such a model?

- (v) Mention one real-life application of the *IP model*.
- (vi) Which layer of the model solves the problem of sending packets across one or more networks?
- (vii) Which layer is responsible for error control, segmentation, flow control, congestion control and application addressing (port numbers)?
- (viii) Which layer is responsible for interfacing with host programs?
- (ix) Name the layer which is usually attributed to physical addressing in a network.

[11]

B2 According to the Gregorian calendar a leap year contains an extra day from the ordinary 365-day year. The following description together with the flowchart on the right define the conditions for a leap year.

A particular year is a leap year if it is exactly divisible by 4 and not exactly divisible by 100, or, if it is exactly divisible by 4, exactly divisible by 100 and exactly divisible by 400.



Let the Boolean variables P, Q and R represent respectively the conditions ‘exactly divisible by 4’, ‘exactly divisible by 100’ and ‘exactly divisible by 400’, as shown in the flowchart above.

- (a) Write a *Boolean expression* to represent the conditions for a particular year to be a leap year. [6]
- (b) Draw a *logic circuit* to represent the expression of part (a). [4]
- (c) Use a *Karnaugh map*, or otherwise, to reduce the expression of part (a). [3]
- (d) Draw the *logic circuit* for the reduced Boolean expression. [3]
- (e) Construct a truth table using T (true) and F (false) instead of logic 1 and logic 0 respectively, to prove that the reduced Boolean logic circuit of part (d) satisfies the conditions for a particular year to be a leap year. The column headings of the truth table may be as follows:

P (exactly divisible by 4)	Q (exactly divisible by 100)	R (exactly divisible by 400)	Leap year
-------------------------------	---------------------------------	---------------------------------	-------	-----------

[4]