

UNIVERSITY OF BOLTON

SCHOOL OF ENGINEERING

MSc ELECTRICAL & ELECTRONIC ENGINEERING

SEMESTER TWO EXAMINATIONS 2021/22

PERVASIVE EMBEDDED SYSTEMS DESIGN

MODULE NO: EEE7007

Date: Thursday 19th May 2022

Time: 10:00 – 12:30

INSTRUCTIONS TO CANDIDATES:

There are SIX questions.

Answer ANY FOUR questions.

All questions carry equal marks.

Marks for parts of questions are shown in brackets.

This assessment paper carries a total of 100 marks.

Electronic calculators may be used if data and program storage memory is cleared prior to the examination.

All working must be shown. A numerical solution to a question obtained by programming an electronic calculator will not be accepted.

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MSc Electrical and Electronic Engineering
Semester Two Examination 2021-2022
Pervasive Embedded System Design.
Module No. EEE7007

Question 1

A. With the aid of suitable diagrams, compare the Von-Neumann and Harvard architecture.

[15 marks]

B.

(i) State three of the key processes to be considered for the design of embedded systems.

[6 marks]

(ii) Further elaborate in details two of your answered key processes.

[4 marks]

Total 25 Marks

Question 2

A. Message Queuing Telemetry Transfer (MQTT) provides a means of accelerating your IoT application development without the burden of managing the infrastructure. List the advantages and disadvantages of MQTT.

[16 marks]

B. Describe how a device can be remotely control over the Internet using MQTT.

[9 marks]

Total 25 Marks

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Question 3

A. Choosing a processor is a complex task that defies simple optimisation. State three considerations that you would make when choosing the right processor for a project.

[6 marks]

B. Explain the following terms:

(i) Concurrency

[5 marks]

(ii) Parallelism

[5 marks]

(iii) Explain the key differences between Model and languages

[9 marks]

Total 25 Marks

Question 4

A. A kernel debugger is present in some operating system kernels to ease debugging and kernel development. State 3 advantages and disadvantages of the debug kernel.

[12 marks]

B. Mention four system elements in the ROM emulator

[8 marks]

C. Discuss the limitations of the ROM emulator

[5 marks]

Total 25 Marks

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Question 5

A. Show a schematic of the registers in ARM programmer's model.

[15 marks]

B. Describe the program status register, stating the three specialised views.

[10 marks]

Total 25 Marks

Question 6

Number Systems and Computer Data Representation is integral to computer programming.

A.

(i) Convert $(1100100)_2$ to decimal.

[2 marks]

(ii) Convert $(10110)_2$ to hexadecimal

[2 marks]

B. With the aid of a flowchart, describe how you would design a system for an adaptive intelligent spider robot, incorporating sensors, such that the four-legged spider robot is able to monitor the environment wirelessly.

[21 marks]

Total 25 Marks

END OF QUESTIONS