



TECHNICAL UNIVERSITY OF MOMBASA

SCHOOL OF HEALTH & APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR:

THE DEGREE OF BACHELOR OF TECHNOLOGY IN APPLIED PHYSICS

EEE 4407 EMBEDDED SYSTEMS

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2024

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions.

Attempt any other **THREE** questions.

Do not write on the question paper.

QUESTION ONE

- a) With aid of a block diagram of control unit architecture of a typical processor explain the function of its registers
7 marks
- b) Explain the importance of using UML as an *object-oriented* modeling language to capture the design tasks of an embedded system. .
3 marks

- c) Describe any THREE embedded systems categories giving an example for each based on their functional performance requirements 6 marks
- d) Explain any FOUR factors that characterize a dependable embedded system 4 marks

QUESTION TWO

- a) Explain any FOUR factors to consider when developing a software for embedded system 4marks
- b) Describe the SEVEN steps involved in designing Fuzzy Logic Comptroller 7 marks
- c) With aid of a block diagram a 5 layers model explain the function of each layer as applied to a networked embedded system. 7 marks
- d) Explain any TWO Factors to take into account when testing the software of an embedded system on the host system 2 marks

QUESTION THREE

- a) Explain any TWO significance for providing communication interfaces on an embedded system 4 marks
- b) With aid of a block diagram of a closed loop basic structure of embedded system explain the function of its main blocks, for each block give s typical example. 6 mark
- c) Outline the function of any TWO sensors and transducer applicable to an embedded system 4 marks
- d) The requirement engineering stage in a waterfall model is subdivided in to THREE phases explain the activities involved in each phase as applicable to an embedded system. 6 marks

QUESTION FOUR

- a) Outline any FOUR factors that you will consider when choosing a processor for your embedded system project 4 marks
- b) Explain the FOUR factors that characterize the recent trend in embedded system design 8 marks
- c) With aid of the block diagram of DMA bus protocols that uses a classic four-cycle handshake, describe the events that characterize the communication of two high speed embedded system devices 8 marks

QUESTION FIVE

- a) Co-design involves portioning the design into hardware and software and then you decide whether functionality has to be implemented in either hardware or software. Explain any FOUR factors that needs to be considered when deciding to implement a functionality in ether hardware or software 8 marks
- b) Describe the significance of any TWO tests that is carried out on an embedded system 4 marks
- c) Outline any TWO factors that contribute to the energy consumption during program execution in an embedded system 2 marks
- d) Data provide an excellent opportunity for minimizing a program size because the data are most highly independent on programming style; explain ant THREE ways to achieve embedded system program size minimization with respect to data. 6 marks