



D U R B A N

UNIVERSITY *of*
TECHNOLOGY

**DEPARTMENT OF
ELECTRONIC ENGINEERING**

Computer Systems

MICROPROCESSORS 111

STUDY GUIDE

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Lectures: 3 periods per week

Practicals: 2 periods per week

Lecture venue: S8 220

Practical Venue: S8 220

Duration of Course: 16 weeks

Assessment Type: Continuous Assessment

Welcome: Welcome to Microprocessors 111!!
The purpose of this learner guide is to make you aware of the contents of this course as well as the assessment criteria.

Purpose of this subject: This subject concentrates on giving you a solid knowledge of microprocessor principles which will be of use in other subjects in the instructional program, and also of use in many areas of electronic engineering.

Code: MPRO3

Pre-requisite subjects: Digital Systems 111

Learning Outcomes: After completing this subject, you should be able to:

- i. interpret and understand the architecture of a microprocessor system
- ii. program a microprocessor system to perform small yet useful functions
- iii. apply microprocessor software design tools and techniques

Assessment Criteria: Successful completion of the practical and passing of both tests with a minimum of 50% in each one.

Assessment Method:

1st written test	30%
2nd written test	30%
Practical	40%

There will be two written tests during the course of the semester, each of which is equally weighted. Failure of attaining an aggregate of at least 50% for all the assessments will result in the student having to re-register for the Microprocessors 111 subject. The dates of these tests will be announced during the course of the semester. The tests together will carry 60% of the course mark.

The practicals sessions are intended to strengthen the students understanding of the subject as well as to add a practical and

hands-on dimension to the course. Attendance to these practicals is compulsory and the practical carry 40% towards the course mark. Failure to pass the practical component of the course will result in an overall failure of the course.

Prescribed Text Book:

Microprocessor Architecture, Programming and Applications with the 8085/8080A

Author: R Gaonkar 5th ed. Publisher: Prentice Hall

ISBN: 0-675-20675-8

Practical:

A basic micro-computer system will be constructed on bread-board during the practical sessions. The topology and components required by the system will be determined by the specific technical specifications. This system will comprise of the microprocessor, read-only-memory, random-access-memory, logic gates, decoders, buffers and latches.

The mark allocation for the practical is as follows:

1. Correctness of circuit diagram – 15%
2. Circuit functionality – 20%
3. Software functionality – 7%
4. Understanding of hardware – 20%
5. Understanding of software – 8%
6. Demonstrated trouble-shooting skills – 25%
7. Neatness of construction – 5%

Verbs describing tasks in this guide have the following extended meanings:

Compute x : calculate, or select or recognise x

Define: define, recognise, complete or correct a definition of

Describe: describe, recognise, complete or correct a definition of

Discuss: describe, recognise, complete or correct a definition of

Draw: draw, recognise, complete or correct a drawing of

Explain: explain, recognise, complete or correct a definition of

Illustrate: sketch, draw, recognise or complete an illustration of

Produce: draw, recognise, complete or correct a drawing of

Learners will have to master each of the following:

Specific Outcomes	Detailed Outcomes	Assessment	Reference in the prescribed text
Be able to explain the basic operation and architecture of a microprocessor	<ul style="list-style-type: none"> • State the advantages and disadvantages of microprocessors • Explain a basic microprocessor system and provide an overview of its operation • Explain the architecture and functions of the central processing unit (CPU) • Discuss bus organisation and system timing • Explain system architecture and memory address decoding 	This will be assessed in the written test and practical	Chapters 1,2 & 3
Be able to explain the different types of memory types used by a microprocessor	<ul style="list-style-type: none"> • State what an EPROM is • State what an EEPROM is • Define flash memory • Explain the difference between static and dynamic RAM • Explain what non-volatile RAM is 	This will be assessed in the written test	Chapter 4 & 5
Be able to explain the different microprocessor software principles	<ul style="list-style-type: none"> • Discuss the 8085 instruction set • Compare the different instruction types (alu, data transfer, branch group, machine control) • Describe the operand addressing modes • Discuss assembly language programming and assembler directives • Discuss subroutines, their advantages and disadvantages as well as the call/ret instructions • Describe stack usage and stack operation with specific reference to the push/pop instructions • Explain masking, with use of the instructions to set, clear and invert bits • Describe decision making using standard structures • Draw loops in software subroutines 	This will be assessed in the written test and practical	Chapters 6, 7 & 8
To be able to draw flowcharts and write basic programs for the 8085 microprocessor	<ul style="list-style-type: none"> • Write programs using arrays for clearing, searching and copying a block of memory • Illustrate basic arithmetic routines for multibyte addition, multiplication and division • Illustrate delay routines and programmable timer control • Use tables to perform code conversion and basic logic and arithmetic functions • Describe the operation of the 8251 serial interface controller • Write A/D and D/A control programs • Discuss routines to test RAMs and ROMs 	This will be assessed in the written test and practical	Chapters 7, 8, 9 & 13

<p>Be able to explain the different methods of troubleshooting</p>	<ul style="list-style-type: none"> • Demonstrate the use of an oscilloscope in a microprocessor system • Describe the use of a logic probe in a microprocessor system • Describe logic state analysers in terms of their basic use and application, using simple block diagrams • Discuss the microprocessor development system in terms of the simulators and emulators 	<p>This will be assessed in the practical</p>	<p>Chapter 11</p>
<p>Be able to compare and contrast serial and parallel data transfer</p>	<ul style="list-style-type: none"> • Describe the input ports and the 74HC244 buffer • Describe the output ports and the 74HC373 latch • Discuss the parallel ports on the 8155 PIA • Explain the handshake mode on the 8155 PIA • Discuss the principles of asynchronous serial working • Explain the function of a USART • Discuss the basic architecture of a system containing an 8251 USART • Explain the application of the USART to MODEM operation • Discuss the function and draw a block diagram of an FSK modem • Describe the RS232 interface standard 	<p>This will be assessed in the written test</p>	<p>Chapter 16</p>
<p>Be able to explain how interrupts work in the 8085 microprocessor</p>	<ul style="list-style-type: none"> • Discuss polling I/o, using a keyboard example and compare and contrast the polling and interrupt methods • Explain DMA methods, applications and the operation of the 8257 DMA controller • List the advantages and disadvantages of interrupts • Discuss vectored and non-vectored interrupts • Discuss maskable and non-maskable interrupts • Discuss interrupt priorities and interrupt structures • Explain how interrupts are triggered • Demonstrate the use of breakpoints and dynamic debugging 	<p>This will be assessed in the written test</p>	<p>Chapters 12 & 15</p>
<p>Be able to explain the operation of programmable timers</p>	<ul style="list-style-type: none"> • Provide a detailed operation of the programmable timer on the 8155 PIA • Provide an overview of the 8253 programmable interval timer 	<p>This will be assessed in the written test</p>	<p>Chapter 14</p>