Tutorial Letter 101/3/2014

Computer Systems: Fundamental Concepts
COS1521

Semesters 1 and 2

School of Computing

IMPORTANT INFORMATION:

This tutorial letter contains important information about your module.

BAR CODE

Learn without limits.

UNISA | university of south africa

CONTENTS

Page

Please note / important notes:

This is a **semester** module. To be considered for examination in this module, you must meet the following requirement:

Semester 1: Submit Assignment 01 by 12 March 2014.

Semester 2: Submit Assignment 01 by 27 August 2014.

Your semester mark and examination mark will determine your final mark.

Your semester mark will be based on the percentages you achieve for Assignments 01 and 02.

1   INTRODUCTION AND WELCOME

Dear Student

Welcome to Computer Systems: Fundamental Concepts (COS1521). This is a semester module that is presented by the School of Computing.

This module provides you with a background on computers. In modern society, computers already play such a major role in our daily lives that we accept their use as a matter of course. In COS1521 you are introduced to number systems, data storage and operations on data. Furthermore, the basics of logic gates and Boolean algebra will eventually help you to draw simple combinational logic circuits when given a problem statement. The fundamentals of sequential logic circuits are also investigated. You become better acquainted with numerous concepts and properties of the hardware and software components of computer systems. The concept of software engineering is explained. Concepts relating to data structures, databases and database management are introduced. We also look at the role that computers play in data communication in the modern world.

If you put an honest effort into trying to do the self-assessment exercises and assignments, we believe you will achieve the outcomes of this module. We hope that this module will open up a whole new world for you. We bid you a hearty welcome and wish you everything of the best for your studies this semester.

Note: As from 2010, the tutorial matter for COS1521 is only available in English.

1.1   *TUTORIAL MATTER*
The content of the module is included in the following tutorial matter:

- Tutorial Letters 101 and 102
- Tutorial Letters 201 and 202
- Textbook
- CAI tutorial available (optional): See Section 4.4, and Appendix A at the end of this document.

Some of the tutorial matter might not be available when you register. Tutorial matter that is not available when you register may be posted to you but is also available on myUnisa. Note that Unisa highly encourages the use of technology in teaching and learning. You are therefore encouraged to make regular use of myUnisa to get access to study materials. It is possible that this may be the only tutorial letter posted to you. In that case you will have to find the rest on myUnisa under *Official Study Material, Additional Resources* or *Learning Units.* You must be registered on myUnisa to be able to submit assignments, to have access to the Library functions, to download study material and to participate in online discussion forums with lecturers or fellow students.

2 PURPOSE OF, OUTCOMES FOR AND SYLLABUS OF THIS MODULE

2.1 *PURPOSE*

COS1521 is one of a number of first-year Computer Science modules offered by the School of Computing at Unisa. The purpose of this module is to introduce students to the computer as a system. The module covers hardware concepts such as internal representation of numbers and characters and basic computer architecture, and software concepts such as systems software and applications software. It also includes a brief introduction to databases, and to systems analysis and design.

2.2 *OUTCOMES*
A range of tasks (in study guides, tutorial letters, assignments and examinations) will show that students have achieved the following outcomes, namely to:

Specific outcome 1
Demonstrate how data are represented, manipulated and stored in a computer using number systems, Boolean algebra, Karnaugh maps, truth tables and basic logic circuits drawings, in the context of given problem statements.

Range:
Basic knowledge of internal data, logic gates, and memory elements will be demonstrated only in the context of the design of basic combinational and sequential logic circuits.

Assessment criteria:
1.1 Conversions between different number systems (binary, octal, decimal and hexadecimal);
1.2 The application of different arithmetic methods in the binary number system;
1.3 The identification of computer data includes the different internal representations;
1.4 Explanations include the basic restrictions placed by computer architecture upon numerical computations;
1.5 The determination of outputs of basic combinational logic circuits for given inputs;
1.6 Graphical representations of the combinational circuits for given Boolean functions;
1.7 The simplifications of Boolean functions by implementing appropriate rules/methods;
1.8 The determination of a Boolean function for a given problem statement using truth tables (at most 4 variables);
1.9 Boolean expressions and binary logic that describe the behaviour of logic circuits;
1.10 The descriptions of the functioning of different types of combinational and sequential logic circuits.

Specific outcome 2
Demonstrate an understanding of the basic functions of computers, the software development process and units of hardware and software components.

Range:
The context is basic computer hardware and systems software with its relevant algorithms.

Assessment criteria:
2.1 Today's computers are described in context of some short historical background, different architectures and ethical scenarios/issues;
2.2 Descriptions of software engineering and operating systems include the development of software in a historical context;
2.3 The description of a basic computer includes the three basic hardware subsystems and their interconnecting functioning;
2.4 The description of an operating system includes the functioning of its components;
2.5 The descriptions of popular operating systems with references to different popular operating platforms;
2.6 The definition of an algorithm includes its relation to problem solving;
2.7 Definitions of the three algorithm constructs include descriptions of their use in algorithms;
2.8 Descriptions of basic algorithms include their applications;
2.9 Descriptions of the sorting and searching concepts of algorithms include an understanding of their mechanisms;
2.10 Descriptions of sub-algorithms include their relations to algorithms;
2.11 Descriptions of the development process models in software engineering include the concepts of the software life-cycle phases and documentation.

Specific outcome 3
Demonstrate an understanding of the basics of data communications and networks.

Range:
The context is the basics of Information Communication Technologies.

Assessment criteria:
3.1 Descriptions of physical structures of networks include references to network criteria, physical structures and categories of networks;
3.2 The description of the internet includes the TCP/IP protocol suite with reference to the characteristics of its layers and their relationships;
3.3 Descriptions of internet applications in the context of client-server communications.

Specific outcome 4
Describe data structures and how different databases function.

Range:
The contexts are typical of the demands of first-year undergraduate study.

Assessment criteria:
4.1 Descriptions of data structures include references to the differentiation between different structures;
4.2 Descriptions of file structures include references to updating and access methods, and categories of directories and of files;
4.3 Definitions of a database and some traditional database models include the relational database design;
4.4 The definition of a database management system (DBMS) includes its architecture;
4.5 Descriptions include the steps in database design.

2.3 *SYLLABUS*

The module content is covered by Chapters 1 to 11, 13 & 14 of the prescribed text book, referred to as F&M, provided in Section 4.1 and all the tutorial letters, including Tutorial Letter 102. The excluded sections of the prescribed book are: 2.3, 5.6, 5.7, 8.7, 9.4 and 14.7.

The following topics are covered in the prescribed book:

Chapter 1:   Introduction

Chapter 2:   Number systems

Chapter 3:   Data storage; (Appendix A: ASCII and Unicode)

Chapter 4:   Operations on data;

Appendix E: Boolean algebra and logic circuits.

Chapter 5:   Computer organization

Chapter 6:   Computer networks

Chapter 7:   Operating systems

Chapter 8:   Algorithms

Chapter 9:   Programming languages

Chapter 10: Software engineering

Chapter 11: Data structures

Chapter 13: File structures

Chapter 14: Databases

Tutorial Letter 102 contains information on the study material in the prescribed book (certain sections are excluded from the prescribed chapters), a summary, learning

outcomes and explanatory notes for Appendix E, additional exercises, and errata for F&M. In addition it contains the solution to the self-assessment assignment.

Very Important: *You must make use of Tutorial Letter 102* **before** *you complete the Self-assessment assignment and Assignment 01; especially Units 1 to 4 and pages 24 to the end. The information in these pages will help you to understand the textbook content better in order for you to answer the questions in Assignment 01.* ***Please read Tutorial Letter 102*** *from day 1. It is available on myUnisa in case you have not received the printed copy.*

A **summary** and list of **key terms** are provided at the end of each chapter of the textbook. These are very useful for identifying the most important concepts covered in the relevant chapter.

In the School of Computing all students must have access to the internet, but no references to interactive work (working on the computer or searches on the internet) are obligatory.

3 LECTURERS AND CONTACT DETAILS

3.1 *LECTURERS*

The best means to contact your lecturers is by email. The email address to use for Semester 1 is **COS1521-14-S1@unisa.ac.za** and for Semester 2 is **COS1521-14-S2@unisa.ac.za.**

You can find the names of your lecturers, their contact details (including emails) and School of Computing contact information on myUnisa in Tutorial Letter COSALLP for 2014.

You can also obtain lecturers' and school's contact information on http://osprey.unisa.ac.za.

The COS1521 discussion forum on myUnisa gives you the opportunity to discuss ideas and problems with fellow students. This forum is for the benefit of the students and the lecturers do not necessarily play an active part in the discussions. You can post queries regarding this module on the COS1521 discussion forum.

You are more than welcome to phone us, but please consult your tutorial letters or the relevant web sites first to see whether we have not already addressed your queries. Since most students encounter the same problems, we address the most common problems in the tutorial letters or web sites.

Remember, you may phone the lecturers directly. However, sometimes we are not available due to other School or University duties. The names and telephone numbers of the lecturers will be given in COSALLP tutorial letter that you will receive early in the semester. Should you have difficulty in contacting the lecturers, you are welcome to phone the pilot number of the School of Computing to leave a message. The number to call is also given in the COSALLP. **Note that the school has moved from the Mucklenuek campus at Pretoria to Florida in Roodepoort Johannesburg.**

Note that in respect of **all administrative enquiries such as registrations, fees, assignment submission, examination matters such as aegrotat and special exams,** the contact details are provided in the *my Studies @ Unisa brochure* or on the Unisa website.

3.2 *DEPARTMENT*
See the information in Section 3.1

3.3 *UNIVERSITY*
You will find general Unisa contact details in the *my Studies @ Unisa* brochure or on the Unisa website. Please remember to use your student number when contacting the University. See more information in Section 3.1.

If you need to contact the university about administrative matters, you should send your queries via e-mail to the specific department whose contact details are provided in the brochure *my Studies @ Unisa* that you received in your study package. This brochure also contains other important information about Unisa.

4   MODULE RELATED RESOURCES

4.1 *PRESCRIBED BOOK*
The prescribed book for this module is:

Authors: Forouzan, Behrouz & Mosharraf, Firouz
Title: *Foundations of Computer Science*
Edition: 3rd
Year: 2014
ISBN-10: 1-408-04411-0
ISBN-13: 978-1-408-04411-7
As stated before, we refer to the prescribed book as F&M throughout this tutorial letter.

Tutorial Letter 102 contains notes on the study material in the prescribed book and also contains **supplementary study material**. **Please read Tutorial Letter 102** from day 1. See section 2.3 for more information about 102.

The prescribed book is **not** included with your study material. You should buy it. To obtain a copy of the prescribed book, please refer to the list of official booksellers and their addresses in the *my Studies @ Unisa* brochure.

Prescribed books can be obtained from the University's official booksellers. If you have difficulty in locating your book at one of these booksellers, please contact the Prescribed Book Section at Tel: 012 429-4152 or e-mail vospresc@unisa.ac.za.

NB: In January 2014 there will be a notice about the availability of this book on the modules' home page on myUnisa. For those of you who may wish to buy this book then, check for this notice before you contact the Prescribed Book sections above.

4.2 *RECOMMENDED BOOKS*

Should you wish to know more about a particular topic, you may consult any of the following books: (Please note that these books are not necessarily included in the Study Collection in the Unisa library. The library cannot guarantee that they will be available, nor draw up waiting lists for them.) Exams and assignments will be based on the prescribed textbook and the content of Tutorial Letter 102.

CLEMENTS A. *The principles of computer hardware*, 3rd edition. Oxford University Press, Oxford, 2000.

O'BRIEN J.A. *Introduction to information systems*, 8th edition. Irwin Homewood, Burr Ridge Illinois, 1996.

HUTCHINSON S.E. and SAWYER S.C. *Computers, Communications & Information. A user's Introduction*, 7th edition. Irwin McGraw-Hill, Boston, 2000.

MARCOVITZ A.B. *Introduction to logic design*. McGraw-Hill Higher Education, Avenue of the Americas, New York, NY10020, 2002.

WILLIAMS B. K. and SAWYER S.C. Using Information Technology.A practical introduction to computers & communications, 5th edition. Irwin McGraw-Hill, Boston, 2003.

CAPRON H. L. and JOHNSON J.A. *Computers. Tools for an information age*, 7th edition. Prentice Hall, Upper Saddle River, New Jersey, 07458, 2002.

SHELLY G. and VERMAAT M.E. *Discovering computers 2010.Living in a digital world.* Course Technology, 20 Channel Center Street, Boston, MA 02210, USA, 2010.

4.3 *ELECTRONIC RESERVES (E-RESERVES)*
There are no e-Reserves for this module.

4.4 *E-LEARNING TUTORIAL*

There is an <u>optional</u> CAI-tutorial namely *Karnaugh* available that we highly recommend. You should receive this tutorial on a CD, if not see Appendix A on how to download it from the web. It deals with the simplification of Boolean expressions by means of *Karnaugh* maps (diagrams) and includes background material. This material is covered in Assignment 01 and the tutorial can also help with examination preparation on this topic. The tutorial is highly recommended by past students. If you do not receive this CD, check on the COS1521 home page on information on how to access it.

5 STUDENT SUPPORT SERVICES AND E-TUTORS FOR THE MODULE

Important information is provided in the *my Studies @ Unisa* brochure. For example, the tutorial services information is found in this brochure. Please constantly refer to this brochure. This module is part of a science foundation programme (SFP). For students who are not part of SFP, e-tutoring support will be provided. Check the *my Studies @ Unisa* brochure for more information or enquire at your nearest Unisa study centre.

Each student will be allocated a tutor who he/she can contact in case of any difficulties or queries related to the <u>content</u> of the module. Please refer all such queries to them. The details of the tutors and their contact information will be provided to you or will appear on the home page of the module's page on myUnisa.

SCIENCE FOUNDATION PROGRAMME:

5.1   *WHAT IS FOUNDATION PROVISION?*
Foundation provision is an extended additional teaching and learning intervention whose primary purpose is that of improving the success and graduation rate of identified "at-risk" students. Because Unisa is a higher education distance-learning institution, the extended additional teaching and learning intervention will include:

- the appointment of science-specific tutors to assist the "at-risk" student
- supporting "at-risk" students with academic learning gaps
- arranging peer-collaborative learning opportunities with fellow students on regional level.

5.2   *WHAT IS THE SCIENCE FOUNDATION PROGRAMME?*
The SFP runs concurrently with normal science teaching and learning activities. It creates more opportunities for students to be exposed to the learning content and activities. The extended additional teaching and learning intervention is limited to science students who register in the College of Science, Engineering and Technology and the College of Agriculture and Environmental Sciences in their first year. The foundation provision is available for students registered for COS1521.

5.3   *WHO CAN PARTICIPATE IN THE SFP?*
All new science students to Unisa adhering to specific SFP admission criteria are allowed into the SFP. Selection criteria that will identify "at-risk" students are determined taking into account the student's M-count total; marks in school Mathematics, Physical sciences (and/or Biology, Physiology, etc.) and language subjects. A post-registration diagnostic test will further inform "at-risk" student of any academic literacy gaps. More information will be sent to you at a later stage.

5.4   *HOW DOES A STUDENT GAIN ADMISSION TO THE SFP?*
Once a student has been identified as "at risk", she/he will automatically qualify for the SFP. Consult the *my studies @ Unisa* brochure for more information. An e-tutoring system might be used. These interventions will be provided at no additional cost.

5.5   *WILL PARTICIPATION IN THE SFP PROVE TO BE SUCCESSFUL?*
Given the extended and additional learning opportunities created by the SFP it is envisaged that the success rate of "at-risk" students will be increased. Much of the success will be determined by the student's willingness to spend additional time and effort to attend the tutoring classes, academic literacy sessions and peer-collaborative learning opportunities.

6   MODULE SPECIFIC STUDY PLAN

Use the *my Studies @ Unisa* brochure for general time management and planning skills.

FIRST SEMESTER STUDY PROGRAMME

For each chapter, follow the guidelines given in the corresponding units in Part I of Tutorial Letter 102.

Week	Date (Mondays)	Activities	Tutorial matter
1	27 January		F&M, Chapters 1 & 2 Tutorial Letter 102, Units 1 & 2, & Part II
2	3 February	Start Assignment 01	F&M, Chapters 3 & 4; Appendix A Tutorial Letter 102, Units 3 & 4, & Part II
3	10 February	Do Self-assessment (Section A) by 14/02/14. **(Do not submit.)**	F&M, Chapters 1 – 4; Appendix A Tutorial Letter 102, Units 1 – 4 & Part II
4	17 February		F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
5	24 February	Do Self-assessment (Section B) by 28/02/14. **(Do not submit.)**	F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
6	3 March		F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
7	10 March	**Complete Assignment 01 (Due date: 12 March)**	F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
8	17 March	Start Assignment 02	F&M, Chapters 5 & 6 Tutorial Letter 102, Units 5 & 6
9	24 March		F&M, Chapters 7, 8 & 9 Tutorial Letter 102, Units 7, 8 & 9
10	31 March		F&M, Chapters 10 & 11 Tutorial Letter 102, Units 10 & 11
11	7 April		F&M, Chapters 13 & 14 Tutorial Letter 102, Units 13 & 14
12	14 April	**Complete Assignment 02 (Due date: 14 April)**	F&M, Chapters 5 – 14 Tutorial Letter 102, Units 5 – 14
13 - 15	21 Apr. up to examination date	Revision	
		Examinations	

	SECOND SEMESTER STUDY PROGRAMME		
	For each chapter, follow the guidelines given in the corresponding units in Part I of Tutorial Letter 102.		

Week	Date (Mondays)	Activities	Tutorial matter
1	14 July		F&M, Chapters 1 & 2 Tutorial Letter 102, Units 1 & 2, & Part II
2	21 July	Start Assignment 01	F&M, Chapters 3 & 4; Appendix A Tutorial Letter 102, Units 3 & 4, & Part II
3	28 July	Do Self-assessment (Section A) by 01/08/14. **(Do not submit.)**	F&M, Chapters 1 – 4; Appendix A Tutorial Letter 102, Units 1 – 4 & Part II
4	4 August		F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
5	11 August	Do Self-assessment (Section B) by 15/08/14. **(Do not submit.)**	F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
6	18 August		F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
7	25 August	**Complete Assignment 01 (Due date: <u>27 August</u>)**	F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
8	1 September	Start Assignment 02	F&M, Chapters 5 & 6 Tutorial Letter 102, Units 5 & 6
9	8 September		F&M, Chapters 7, 8 & 9 Tutorial Letter 102, Units 7, 8 & 9
10	15 September		F&M, Chapters 10 & 11 Tutorial Letter 102, Units 10 & 11
11	22 September		F&M, Chapters 13 & 14 Tutorial Letter 102, Units 13 & 14
12	29 September	**Complete Assignment 02 (Due date: <u>29 September</u>)**	F&M, Chapters 5 – 14 Tutorial Letter 102, Units 5 – 14
13 - 15	6 Oct. up to examination date	Revision	
		Examinations	

7 MODULE PRACTICAL WORK AND WORK INTEGRATED LEARNING

None.

8 ASSESSMENT

We realise that it might be difficult to keep to given schedules, but once assignment dates are set, they are captured by the Unisa system and cannot be changed by anyone, including the lecturer. We, therefore, have to adhere to these dates. Please do not contact us for extension of assignments submissions.

In the School of Computing all students must have access to the internet. Study material can therefore be downloaded if for some reason there is a delay in the sending of tutorial matter. The following URL can be accessed if you want to download tutorial matter: https://my.unisa.ac.za

8.1 *ASSESSMENT PLAN*

NO ASSIGNMENTS WILL BE ACCEPTED AFTER THE EXTENSION DATES.

There are three assignments:

The Self-assessment assignment should **not** to be submitted.

Assignments to be submitted:
Assignment 01: A multiple-choice assignment that will be marked electronically.
Assignment 02: A multiple-choice assignment that will be marked electronically.

All multiple-choice assignments are marked electronically by the Assignments section of the directorate of student assessment and administration (DSAA). This means that there is a specific date by which they feed all the submitted mark-reading sheets to the computer (batch processing). For this procedure to be successful, **no multiple-choice assignment received after the due date will be accepted**. You are highly encouraged to submit the assignment via myUnisa.

Self-assessment assignment
The self-assessment assignment is for both the first and the second semester. **Do not submit this assignment.** You will receive a model solution for this assignment in Tutorial Letter 102 early in the semester.

You will get a *semester mark* based on the percentages you achieve for Assignments 01 and 02. The semester mark will contribute 20% towards your final mark for this module. A semester mark does not contribute to the result of a student writing a supplementary examination. It will contribute in the case of an aegrotat examination. A discussion of the way in which the semester mark is calculated, follows.

According to the assessment policy of the University, the School of Computing uses a semester mark to contribute to your final mark for COS1521. The semester mark will count 20% towards your final mark. Assignment 01 has a weight of 40% towards the

semester mark and Assignment 02 has a weight of 60%. No weight is assigned to the Self-assessment assignment. We use an example to explain.

Suppose you obtained the following marks for your assignments:
Assignment 01   70%
Assignment 02   90%

Your semester mark will be calculated as follows:

(70 × 0.4)+(90 × 0.6)% = 82%, where 0.4 (40%) and 0.6 (60%) are the weights associated with Assignment 01 and 02 respectively.

Suppose you achieve an *exam mark* of 68%. Your *final mark* will be calculated as follows:
(82 × 0.20) + (68 × 0.80)% = (16.4 + 54.4)% = 70.8% that will be rounded to 71%.

Due dates are given for Assignments 01 and 02. Please do not contact us for further extension. Please note that it is your responsibility to make sure that your assignments are received by the University. Also make sure that your marks for Assignments 01 and 02 are incorporated in your semester mark before you write the examination. **Note that the fastest and most secure way to submit your MCQ assignment is via myUnisa.** We advise that you use this method to submit both assignments.

Note that if myUnisa is down on the last submission date, the DSAA and lecturers will be notified. Try to resubmit the assignment as soon as myUnisa is running again. Please do not contact lecturers if any of these problems occur since any problem situation shall be taken into consideration. Queries with regard to submission of assignments should be directed to the Assignment section of DSAA.

8.2   *GENERAL ASSIGNMENT NUMBERS*

8.2.1   *UNIQUE ASSIGNMENT NUMBERS*

Semester 1	
Assignment	**Unique assignment number**
01	**668983**
02	**789131**
Semester 2	
Assignment	**Unique assignment number**
01	**874505**
02	**881753**

8.2.2 DUE DATES OF ASSIGNMENTS

Self-assessment assignment for first and second semester		
Semester	Finish by	Weight towards semester mark
01	Part A: 14 Feb	-
	Part B: 28 Feb	-
02	Part A: 01 Aug	-
	Part B: 15 Aug	-
First semester		
Assignment	Due date	Weight towards semester mark
01	12 March	40%
02	14 April	60%
Second semester		
Assignment	Due date	Weight towards semester mark
01	27 August	40%
02	29 September	60%

8.3   SUBMISSION OF ASSIGNMENTS

We **recommend** that you submit both assignments via myUnisa.

For detailed information on assignments, please refer to the *my Studies @ Unisa* brochure, which you received with your study package.

To submit an assignment via *my*Unisa:

- Go to *my*Unisa.
- Log in with your student number and password.
- Select the module.
- Click on assignments in the menu on the left-hand side of the screen.
- Click on the assignment number you wish to submit.
- Follow the instructions.

Assignments may not be submitted by fax or e-mail.

Note: Administrative enquiries about assignments should be addressed to an email provided in the my Studies @ Unisa brochure.

8.4   ASSIGNMENTS TO BE DONE
There are <u>three</u> assignments:

The **Self-assessment assignment** is NOT to be submitted but must be attempted.

Assignments 01 and 02 are to be submitted. See all the assignments in Section 12 of this tutorial letter.

9 EXAMINATIONS

<u>FIRST SEMESTER:</u> **In order to be considered for the** first semester examination admission **in COS1521, a student** must submit Assignment 01 by 12 March 2014.

<u>SECOND SEMESTER:</u> **In order to be considered for the** second semester examination admission **in COS1521, a student** must submit Assignment 01 by 27 August 2014.

There will be a two hour examination at the end of the semester. The format of the exam and its scope will be sent to you during the semester. Supplementary exams will be done at the end the semester following the semester in which you sat for the exam. This is also the case with aegrotat examination. Please do not contact the lecturer for supplementary or aegrotat exams, rather refer to the *my Studies @ Unisa* brochure for guidelines. Read the *my Studies @ Unisa* brochure for general examination guidelines and examination preparation guidelines.

The assignments and the examination letter that will be provided to you contain enough examples of the type of questions that you can expect in the examination. We therefore request you not to contact the lecturers of this module for past paper examination papers, if there are none on myUnisa. The lecturers do not provide solutions to the past exam papers on myUnisa.

Note that the examination mark contributes 80% towards your final mark and the semester mark contributes the other 20%. See Section 8.1 for a calculation of the final mark. If you fail the examination with less than 40%, the year mark will **not** count for you to pass.

Note to supplementary students: Please ensure that you download all relevant study material, such as the exam tutorial letter, from myUnisa before the end of the semester in which you are registered since they will not be available after the end of the semester.

Note: Examination related enquiries should be addressed to an email provided in the *my Studies @ Unisa* brochure.

10 OTHER ASSESSMENT METHODS

There are no other assessment methods for this module.

11 FREQUENTLY ASKED QUESTIONS
The *my Studies @ Unisa* brochure contains an A-Z guide of the most relevant study information. Please refer to this brochure.

12   ASSIGNMENTS

12.1   SELF-ASSESSMENT ASSIGNMENT FOR FIRST AND SECOND SEMESTER

(Attempt this assignment before Assignment 01)

This assignment consists of Sections A and B

It is strongly advised that you attempt **both** sections A and B of this assignment before you do Assignment 01.

Completion dates: Section A: 14/02/14; Section B: 28/02/14 (First semester)
Section A: 01/08/14; Section B: 15/08/14 (Second semester)

Semester-mark weight: None

The solution to this assignment is provided in Tutorial letter 102. Compare your answers to those in the letter. If you have not received a printed copy of this letter, download it from https://my.unisa.ac.za

DO NOT SUBMIT

12.1.1 SECTION A – SELF ASSESSMENT

Study material: (1) F&M: Chapters 1 – 4; Appendix A

(2) Tutorial Letter 102: Part I: Units 1 – 4

DO NOT SUBMIT

Question 1

Provide a detailed answer to each of the following questions:

(a)   List the four subsystems comprising a machine based on the von Neumann model.

(b)   What does the concept 'a stored program' mean?

(c)   What are the two important aspects of programming that must be understood when we consider the von Neumann model?

(d)   Why does it make sense that data and program instructions have the same format?

(e)   What is a computer program?

(f)   Describe in your own words what an algorithm is.

(g)   What is meant by the term 'software engineering' as defined in the context of the textbook?

(h) List some of the main functions of an operating system.

(i) Compare and contrast the memory contents of early computers with the memory contents of a computer based on the von Neumann model.

(j) According to the von Neumann model, can the hard disks of today be used as input or output device? Explain.

Question 2

Convert the following numbers to decimal:

(a) $(10101.1)_2$

(b) $(1010011.01)_2$

(c) $(517)_8$

(d) $(710.01)_8$

(e) $(A9F)_{16}$

(f) $(B08.4)_{16}$

Question 3

Convert the following decimal numbers to binary, octal and hexadecimal:

(a) 613.625   (b) 120.25

Question 4

Why is 845,3 not an octal number?

Question 5

Do the following binary arithmetic:

(a) 10111 + 1111   (b) 110100 - 10011

Question 6

What are the disadvantages of the sign-and-magnitude representation?

Question 7

Write down the following numbers in binary, normalised floating-point representation:

(a) 78.43   (b) 1.39×10^2

Question 8

What is the result if a logical right-shift operation is applied to the bit pattern 11001111?

Question 9

Using an 8-bit allocation, use two's complement arithmetic to determine -15 + 12.

WRITTEN QUESTIONS

Question 1   **[4]**

(a) Use the XOR operator on the bit patterns 100110101 and 101010011.
     (Determine 100110101 XOR 101010011.)

(b) Determine 1101101 + 1000110 in binary.

(c) A 6-bit digital counter can be made up of _____ T flip-flops. At the start the counter
     represents _____.

Question 2   **[4]**
Draw the logic circuit for the following Boolean expression (do not simplify the expression):

$$F(x, y, w) = [(x' + y + w) + xy]' \oplus w'$$

(The circuit should include one OR gate, one AND gate, one NOR gate, one XOR gate and two inverters. Draw all the gates clearly.)

Question 3   **[8]**
Use only Boolean algebra to simplify the Boolean expression F. (First determine F_1 and F_2, then simplify $F_1 + F_2$, showing all the steps. You need not provide the names of the Boolean rules that you apply.)

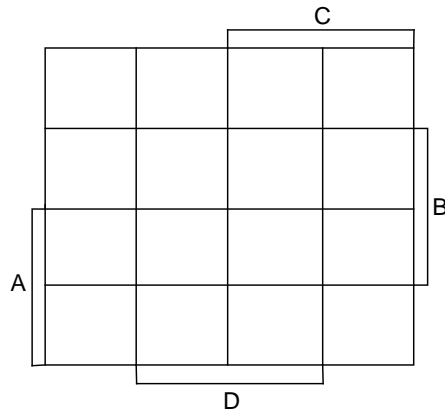$F_1 = x'(wy')' + x'wy'$
$F_2 = (xw + w')'$
$F(w, x, y) = F_1 + F_2.$

Question 4 **[5]**

Use a *Karnaugh* map to find the simplest form of

$H(A, B, C, D)) = m_0 + m_1 + m_2 + m_3 + m_5 + m_6 + m_8 + m_9 + m_{13}.$

Derive the terms of H directly from the *Karnaugh* map without making use of algebraic manipulations or truth tables. Clearly show the groupings.

Use exactly the same order for the variables as given in the following diagram:

Question 5 **[9]**

Four types of package (A, B, C and D) with chemicals are supplied to research laboratories. Each package contains unique types of chemicals.

Package A contains 3 different types of chemicals,

Package B contains 6 different types of chemicals,

Package C contains 5 different types of chemicals and

Package D contains 2 different types of chemicals.

Suppose the input variables A, B, C and D in a truth table take on the value 1 whenever a laboratory receives a package with chemicals. For example, if A = 0, B = 1, C = 0 and D = 1, it means that a laboratory receives packages B and D.

Construct a truth table (use the same order for the variables as in the table given on the next page) to determine the Boolean function F(A, B, C, D) that gives a 1 whenever a laboratory receives more than 11 different types of chemicals.

Give F as a sum-of-minterms in m-notation.

A	B	C	D	F	minterms
0	0	0	0		
0	0	0	1		
0	0	1	0		
0	0	1	1		
0	1	0	0		
0	1	0	1		
0	1	1	0		
0	1	1	1		
1	0	0	0		
1	0	0	1		
1	0	1	0		
1	0	1	1		
1	1	0	0		
1	1	0	1		
1	1	1	0		
1	1	1	1		

MULTIPLE CHOICE QUESTIONS

Question 6

Which logic gate has an output of 1 only if it has two inputs that are not equal?

A. OR
B. XNOR
C. NAND
D. XOR

Question 7

How many adjacent minterms must be grouped together in a four variable *Karnaugh* map to derive a simplified term consisting of three variables?

A. 8
B. 4
C. 2
D. 1

Question 8

In which category of logic circuits does a flip-flop fall?

A. combinational circuits
B. sequential circuits
C. adders
D. multiplexers

Question 9

A three-bit digital counter counts from 0 to _____.

A. 16
B. 15
C. 8
D. 7

Question 10

Which one of the following statements best describes a multiplexer?

A. A combinational circuit that has *n* inputs and *n* outputs.
B. A combinational circuit that has *n* inputs and only 1 output.
C. A sequential circuit that has *n* inputs and *n* outputs.
D. A sequential circuit that has *n* inputs and *n* − 1 outputs.

Question 11

Consider the following two logic circuits:
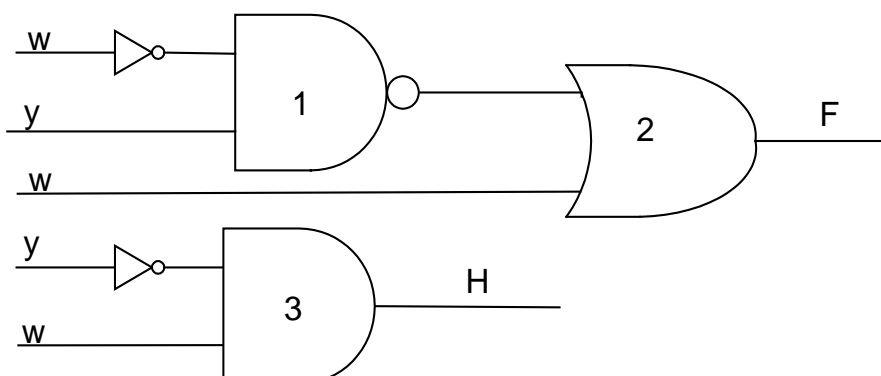
These two logic circuits are not equivalent. The outputs are $F = (w' \cdot y)' + w$ and $H = y' \cdot w$. One of the four gates must be changed in order for the circuits to become equivalent. Which gate must be changed and what kind of gate must it become?

A. Gate 1 must change to a NOR gate.
B. Gate 1 must change to an OR gate.
C. Gate 3 must change to a NAND gate.
D. Gate 3 must change to an OR gate.

Question 12

Use a *Karnaugh* map to find the simplest form of the following sum-of-minterm expression:

$$F(A, B, C, D) = m_1 + m_6 + m_7 + m_9 + m_{10} + m_{14} + m_{15}$$

Derive the terms of F directly from the *Karnaugh* map without making use of algebraic manipulations or truth tables. Use exactly the same order for the variables as given in the following diagram:
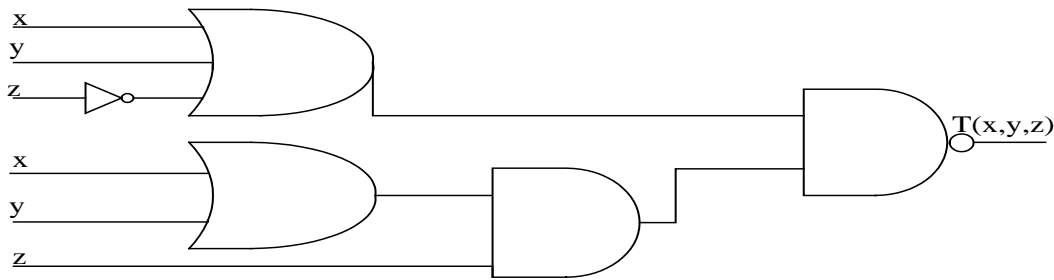
C

B

A

D
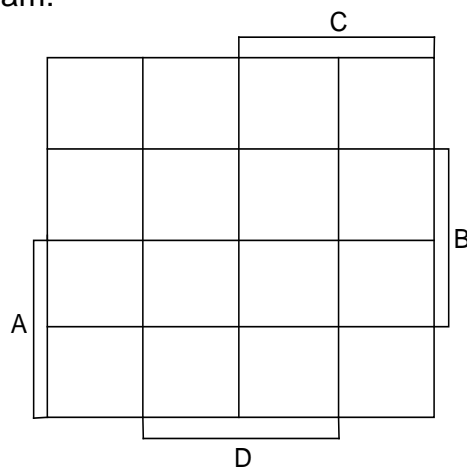
What is the simplified expression of F, derived directly from the *Karnaugh* map?
A. $F = AB'CD' + B'C'D + BC$
B. $F = B'C'D + ACD' + BC$
C. $F = B'C'D + BCD + CD'$
D. $F = AB'C'D' + A'B'C'D' + ACD' + BC$

Question 13

Consider the following logic circuit:

What is the final output T(x, y, z) of the given logic circuit?

A.   T = (x + y + z')' + ((x + y)· z)'
B.   T = [(x· y· z') **+** ((x· y) **+** z)]'
C.   T = (x + y + z')' · ((x + y)· z)'
D.   T = [(x + y + z') · ((x + y)· z)]'

Question 14

Consider the expression F = (xy')' ·**[x'z]** + (x'' + y').
If x = 1, y = 0 and z = 1, what are the values of (xy')'; **[x'z]**; (x'' + y') and F?

A.   (xy')' = 0; **[x'z] = [0]**; (x'' + y') = (1) and F = 1
B.   (xy')' = 0; **[x'z] = [1]**; (x'' + y') = (0) and F = 0
C.   (xy')' = 1; **[x'z] = [0]**; (x'' + y') = (1) and F = 1
D.   (xy')' = 1; **[x'z] = [1]**; (x'' + y') = (0) and F = 0

Question 15

Use only Boolean algebra to simplify the following Boolean expression: F(v, w, x) = vxw'
+ (vxw')'
What is the simplest form of F?

A.   vxw' + v' + x' + w'
B.   w'(vx + (vx)')
C.   0
D.   1

II---oooOooo---II

FIRST SEMESTER ASSIGNMENTS

12.2 FIRST SEMESTER: ASSIGNMENT 01

Due date: **12 March 2014**

Study material: **(1) F&M: Chapters 1 - 4; Appendix A & Appendix E (Text book)**

                        (2) Tutorial Letter 102:

                                    Part I: Units 1 – 4;

                                    Part II: ALL (pages 24 – 74); and

                                    Part III: Solution to Self-assessment assignment.

Do the relevant exercises in F&M, Tutorial Letter 102, and the Self-assessment assignment before attempting this assignment. See more information about 102 in Section 2.3.

Submission procedure: Via myUnisa (see Section 8.3)

Year-mark weight: 40%

Unique assignment number: **668983**

Compulsory: To be considered for **examination** in this module, you must submit this assignment by 12 March 2014.

- Each multiple-choice question has four possible answers. You should select the alternative you consider to be the most appropriate.
- Submit your assignment via *myUnisa* by the due date. Do not be concerned if *myUnisa* is down on the last submission date. We are notified and shall take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is running again.
- The mark that you achieve from a possible 40 marks will be converted to a **percentage** and will contribute 40% towards your semester mark.

QUESTION 1

Which one of the following is a social issue that covers both dependency and social injustice?

1. Computer security
2. The digital divide
3. Privacy
4. Copyright

QUESTION 2

How many computer subsystems are in the Von Neumann model?

1. 2
2. 3
3. 4
4. 5

QUESTION 3

Who of the following first brought the idea that described the universal computational device?

1. Alan Turing
2. Von Neumann
3. John Atanasoff
4. Konrad Zuse

QUESTION 4

According to F & M, what is the main feature/concept of Turing or von Neumann Models?

1. Data
2. Program
3. Algorithm
4. Memory

QUESTION 5

Which of the following defines a situation where a person might think that life cannot be lived without a computer?

1. Social justice
2. Digital divide
3. Computer dependency
4. Computer ethics

QUESTION 6

Computer science can be dived into two categories, namely, system areas and application areas. Which of the following belongs to application areas?

1. Computer databases
2. Computer networking
3. Computer architecture
4. Computer security

QUESTION 7

There are many antivirus software packages sold in computer shops. One of the main uses of antivirus programs is to minimise _____.

1. Computer privacy
2. Computer crime
3. Electronic copyright
4. Computer security

QUESTION 8

Convert $(99)_{10}$ to an octal number.

1. $(321)_8$
2. $(123)_8$
3. $(431)_8$
4. $(143)_8$

QUESTION 9

Convert $(11011.01)_2$ to a hexadecimal number.

1. $(1B.4)16$
2. $(FB.4)16$
3. $(11.2)16$
4. $(33.2)1_6$

QUESTION 10

Which one of the following number representations is NOT correct?

1. $(11.2)2$
2. $(11.1)8$
3. $(A1B)16$
4. $(58)10$

QUESTION 11

Convert $(11)_{16}$ to a binary number.

1. $(10001)_2$
2. $(1.1)_2$
3. $(11)_2$
4. $(10111)_2$

QUESTION 12

Convert $(77)_{10}$ to an octal number.

1. $(111)_8$
2. $(115)_8$
3. $(155)_8$
4. $(77)_8$

QUESTION 13

Which one of the following is False?

1. $(1)_{10} = (1)_2$
2. $(17)_8$ is greater than $(15)_{10}$
3. $(10)_2$ is an even number
4. $(B)_{16}$ is equal to $(11)_{10}$

QUESTION 14

What is the 2's complement representation of -36 using 8 bits?

1. $(00101001)_2$
2. $(11010001)_2$
3. $(00100100)_2$
4. $(11011100)_2$

QUESTION 15

Convert $(10101.11)_2$ to normalised form.

1. $(0.1010111)_2 \times (2^{-5})_{10}$
2. $(0.1010111)_2 \times (2^{5})_{10}$
3. $(1.010111)_2 \times (2^{4})_{10}$
4. $(1.010111)_2 \times (2^{-4})_{10}$

QUESTION 16

Which one of the following statements is NOT TRUE?

1. Real numbers with very large integral parts should not be stored in fixed-point representation.
2. Real numbers with very small fractional parts should not be stored in fixed-point representation.
3. Real numbers with very large integral parts should be stored in fixed-point representation.
4. Real numbers with very large integral parts should be stored in floating-point representation.

QUESTION 17

Which one of the following refers to the process of selecting a finite number of points on an analog signal, measuring and recording them, when storing an audio signal over an interval?

1. Compression
2. Quantisation
3. Sampling
4. Encoding

QUESTION 18

How many bits are there in 8 bytes?

1. 1
2. 8
3. 16
4. 64

QUESTION 19

Which one of the following is an application of the OR operator?

1. To flip specific bits in a bit pattern.
2. To set specific bits in a bit pattern.
3. To unset specific bits in a bit pattern.
4. To complement all the bits in a bit pattern.

QUESTION 20

Calculate: $(101.11)_2 + (111011.1)_2$.

1. $(1000001.01)2$
2. $(1000011.01)2$
3. $(1000111.01)2$
4. $(1000011.11)_2$

QUESTION 21

Calculate: $(1011.01)_2 + (111)_2$.

1. $(1101.00)_2$
2. $(10010.01)_2$
3. $(1101.01)_2$
4. $(10010.00)_2$

QUESTION 22

Calculate: $(1011)_2$ XOR $(1101)_2$.

1. $(0011)_2$
2. $(0110)_2$
3. $(0111)_2$
4. $(111)_2$

QUESTION 23

Use an arithmetic right shift operation on the bit pattern 10001101. The pattern is an integer in two's complement format.

1. $(10001101)_2$
2. $(01110010)_2$
3. $(11000110)_2$
4. $(11000111)_2$

QUESTION 24

Which logical operation on two input patterns has the following property?

"If a bit in one input is 1, there is no need to check the corresponding bit in the other input. The result is always 1."

1. OR
2. AND
3. XOR
4. NOT

Apply Boolean algebra rules in the following THREE questions.

QUESTION 25

What is the simplest form of the Boolean function $y' \cdot (x + y)$?

1. $y' \cdot x$
2. $x + y$
3. 1
4. x

QUESTION 26

What is the simplest form of the Boolean function $(x' + y)(y' + z)(x + z')'$?

1. 1
2. $x'z$
3. $x'y' + yz$
4. $x' + y + z'$

QUESTION 27

What is the simplest form of the Boolean function $(x + xy) + xz$?

1. 0
2. x
3. xy
4. xy + z

QUESTION 28

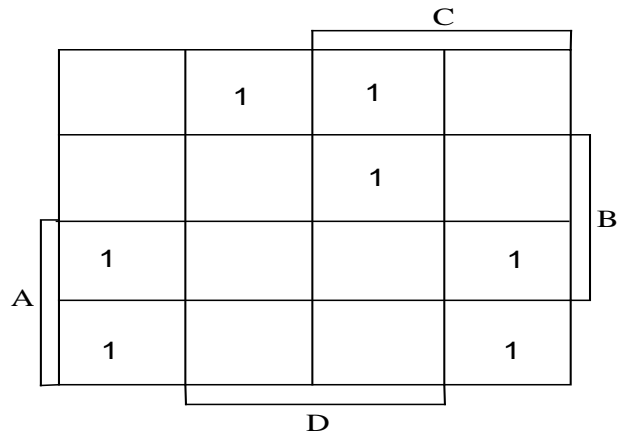Use the following Karnaugh diagram to determine the value of F(x,y,z) using minterms.

F(x,y,z) = _____?

	y'z'	y'z	yz	yz'
x'		1		1
x	1			1

1. $m_1 + m_2 + m_4 + m_6$

2. $m_1 + m_2 + m_5 + m_7$

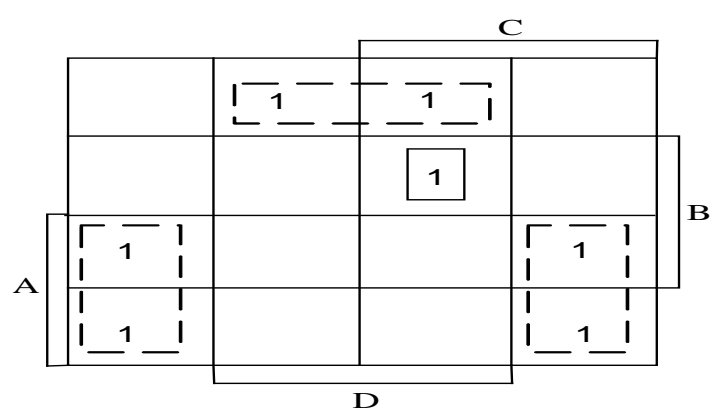3. $m_2 + m_3 + m_4 + m_7$

4. $m_1 + m_3 + m_4 + m_6$

QUESTION 29

Consider the following Karnaugh map:

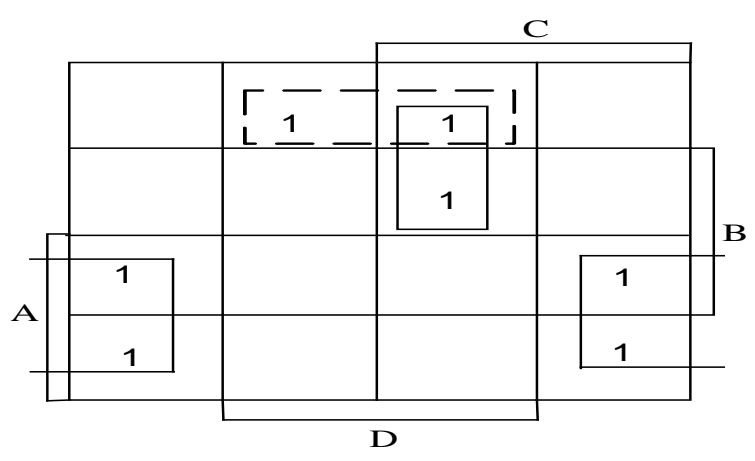**Which one of the following four Karnaugh maps reflects the correct forming of groups?**
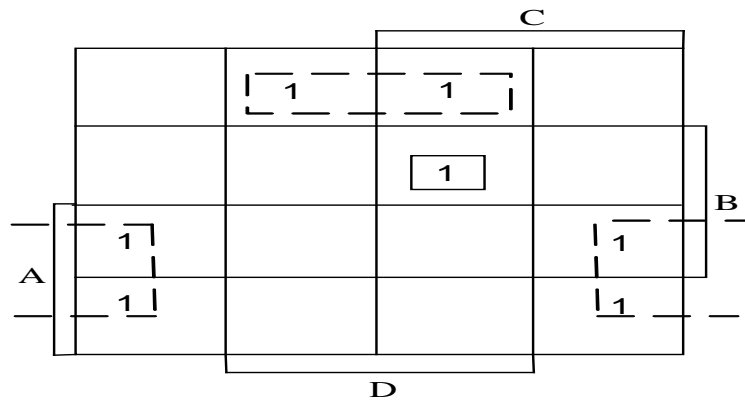
1.

2.

3.

4.
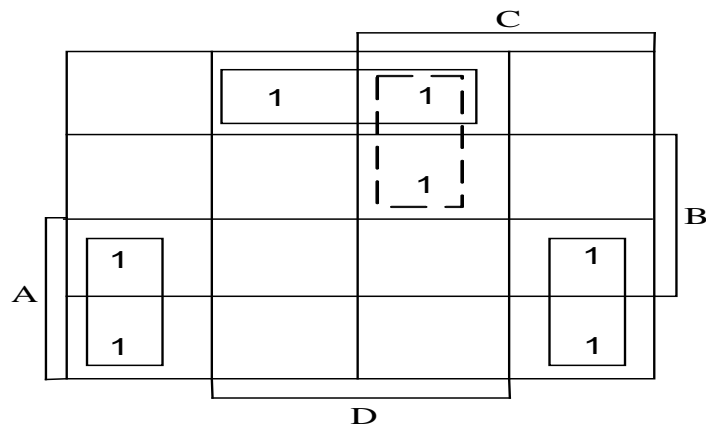
The next THREE questions refer to the Karnaugh map below:
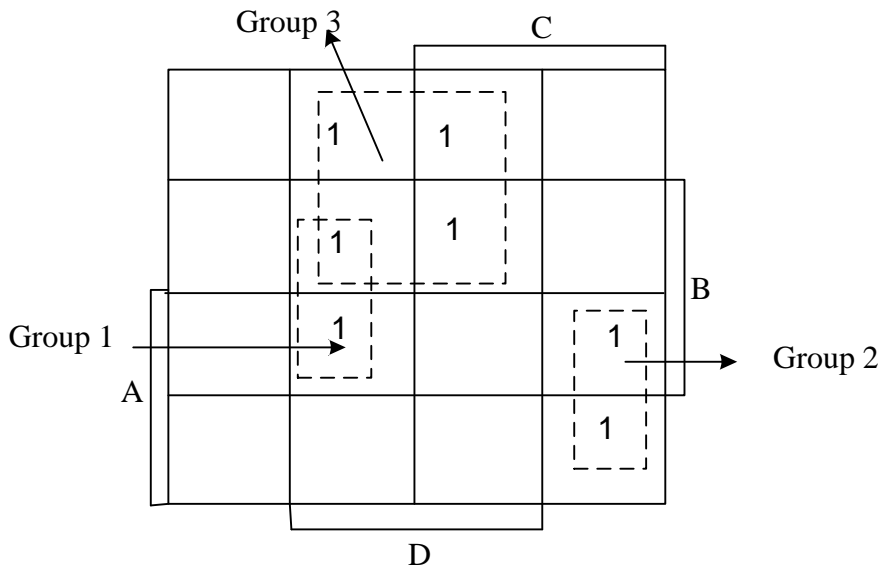
QUESTION 30

Which term represents Group 1?

1. AC′
2. AB′C
3. BCD′
4. BC′D

QUESTION 31

Which term represents Group 2?

1. AD
2. ACD′
3. BC'D
4. ACD

QUESTION 32

Which term represents Group 3?

1. D
2. A′D
3. ACD′
4. B'C

The next THREE questions refer to the following combinational logic circuit:
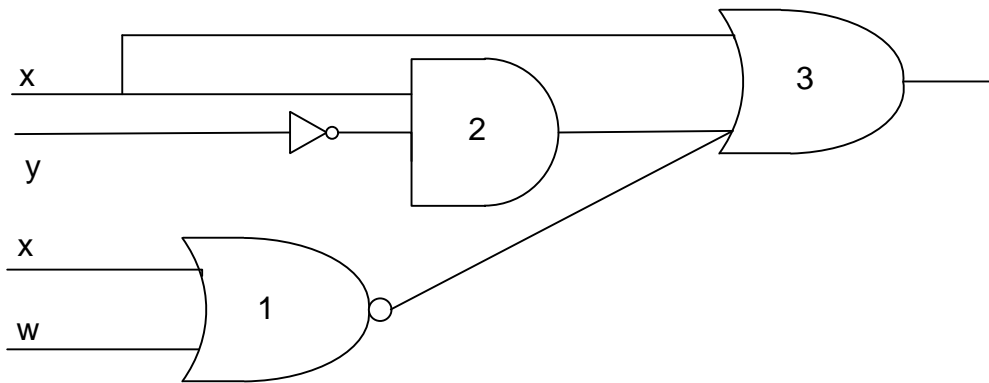
QUESTION 33

What is the output of Gate 1?

1. x . w
2. x + w
3. (x + w)′
4. x′ + w′

QUESTION 34

What is the output of Gate 2?

1. x + y
2. x . y′
3. (x + y)′
4. (x . y)′

QUESTION 35

What is the output of Gate 3?

1. x + x.y′ + (x+w)′
2. x . w + x.y ′ + x
3. x ′+ w′ + x + y ′
4. x + y′ + z

QUESTION 36

Consider the following two logic circuits:
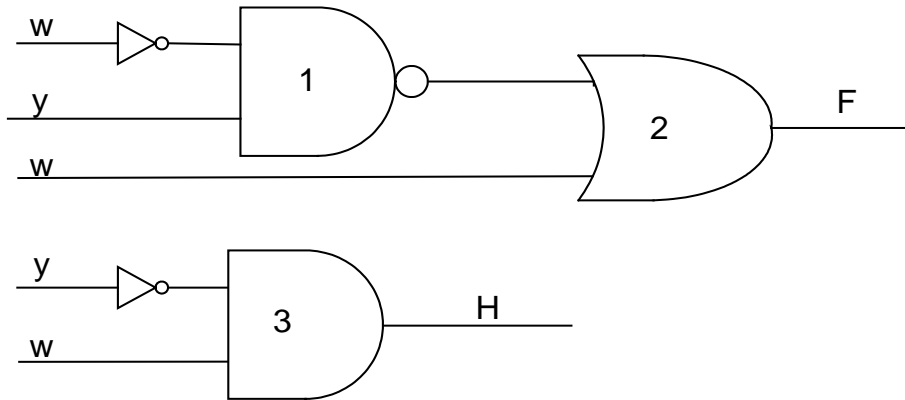
These two logic circuits are not equivalent. $F = (w'y)' + w$ and $H = y'w$. One of the three gates can be changed so that the circuits can become equivalent. Which gate can be changed and what kind of gate must it become?

1. Gate 3 must change to an OR gate.
2. Gate 1 must change to an OR gate.
3. Gate 2 must change to a NAND gate.
4. Gate 3 must change to a NOR gate.

Consider the following scenario:

Three family members, father, mother and daughter, go for the end-of-year holiday at a national park.

The father's phone, **Cell Phone A**, can only access Facebook and LinkedIn. The mother's phone, **Cell Phone B**, can only access LinkedIn and MySpace, and the daughter's phone, **Cell Phone C**, can only access Facebook and Twitter. This means that each phone can access only two social networking sites.

If the father does not forget and takes his Cell Phone A along for the holiday, then variable $A = 1$ ($A = 0$ if he forgets it). Likewise variable $B = 1$ if the mother takes her Cell Phone B along, and variable $C = 1$ if the daughter takes her Cell Phone C along. Nobody can take another's cell phone. For example, if $A = 1$, $B = 1$ and $C = 0$, it means that the father takes Cell Phone A along (there is access to Facebook and LinkedIn), and the mother takes Cell Phone B along (there is access to LinkedIn and MySpace). In this case the family will have access to only Facebook, LinkedIn and MySpace.

A Boolean function F(A,B,C) is defined as follows: **F(A,B,C) = 1 when the family (Father, Mother and daughter together) have access to   at least Facebook, Twitter and LinkedIn** when on holiday**, otherwise F(A,B,C) = 0.

Different combination inputs for A, B and C are given in the tables in the following FOUR questions. The question that should be answered in each case is: Which alternative shows the correct outputs for F?

QUESTION 37

			Alternative 1	Alternative 2	Alternative 3	Alternative 4
A	**B**	**C**	**F**	**F**	**F**	**F**
0	0	0	0	1	0	1
0	0	1	0	1	1	0

QUESTION 38

			Alternative 1	Alternative 2	Alternative 3	Alternative 4
A	**B**	**C**	**F**	**F**	**F**	**F**
0	1	0	0	1	0	1
0	1	1	1	1	0	0

QUESTION 39

			Alternative 1	Alternative 2	Alternative 3	Alternative 4
A	**B**	**C**	**F**	**F**	**F**	**F**
1	0	0	0	1	1	0
1	0	1	0	1	0	1

QUESTION 40

A	B	C	Alternative 1 F	Alternative 2 F	Alternative 3 F	Alternative 4 F
1	1	0	0	0	1	1
1	1	1	0	1	1	0

12.3 FIRST SEMESTER: ASSIGNMENT 02

Due date: 14 April 2014

Study material: **(1) F&M: Chapters 5 – 14. Chapter 12 is not included.**

(2) Tutorial Letter 102: Part I: Units 5 – 14

Please read the relevant study material in F&M and Tutorial Letter 102before attempting this assignment. See more information about 102 in Section 2.3 of this tutorial letter.

Submission procedure: Via myUnisa (see Section 8.3)

Year-mark weight: 60%

Unique assignment number: **789131**

Compulsory: It contributes towards the year mark.

- Each multiple-choice question has four possible answers. You should select the alternative you consider to be the most appropriate.
- Submit your assignment via *myUnisa* by the due date. Do not be concerned if *myUnisa* is down on the last submission date. We are notified and shall take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is running again.
- The mark that you achieve from a possible 50 marks will be converted to a **percentage** and will contribute 60% towards your semester mark.

FIRST SEMESTER ASSIGNMENT 02

QUESTION 1

Which of the following statements regarding storage devices is NOT TRUE?

1. They can be referred to as auxiliary storage devices.
2. They are cheaper than main memory.
3. Their contents are volatile.
4. They are classified as I/O devices.

QUESTION 2

In the decode phase of the machine cycle, an instruction in an instruction register is decoded by the _____.

1. memory
2. control unit
3. ALU
4. programmed I/O

QUESTION 3

Why is it easier to program CISC-based computers than other designs?

1. A small set of instructions do a minimum number of simple operations.
2. Complex instructions are simulated by using a subset of simple instructions.
3. There is a single instruction for both simple and complex tasks.
4. Programming is done on one level.

QUESTION 4

Network performance can be measured by _____.

1. accuracy of delivery
2. the frequency of failure
3. response time
4. the network's robustness in a catastrophe

QUESTION 5

There are four basic network topologies. Which network topology has the following advantage and disadvantage?

Advantage: If one link becomes faulty, it does not put the entire network out of action.
Disadvantage: The large amount of cabling and number of input/output ports required.

1. Star
2. Mesh
3. Bus
4. Ring

QUESTION 6

There are several layers in the Internet TCP/IP protocol suite. What is the network layer responsible for?

1. Node-to-node delivery of frames.
2. Logical delivery of a message between client and server processes.
3. Delivery of individual packets from the source host to the destination host.
4. Providing services to the user.

QUESTION 7

Error and flow control can be applied by some data-link layer protocols in the data-link layer of the Internet TCP/IP protocol suite. However, error checking at this layer does not cover errors that might happen inside routers. At which other layer will error control detect router errors?

1. Application
2. Network
3. Transport
4. Physical

QUESTION 8

In the basic model for FTP (file transfer protocol), the client does NOT have a _____ component.

1. decoding process
2. user interface
3. control process
4. data transfer process

QUESTION 9

Hypertext is a concept used by the WWW whereby information is stored in a set of documents that are connected together by using the concept of _____.

1. multiplexing
2. port addresses
3. links
4. IP addresses

QUESTION 10

An operating system (OS) is an interface between the hardware of a computer and the user. The word 'user' in this definition refers to _____.

1. humans only
2. programs only
3. programs or humans
4. software applications only

QUESTION 11

What name is given to the situation where computer programs are in memory at the same time and are executed concurrently?

1. Multiprocessing
2. Multiprogramming
3. Synchronised processing
4. Batch processing

QUESTION 12

Which form of memory management is best described by the following?

- The entire program does not need to be in memory.
- A program is divided into pages, loaded into memory one by one, executed and replaced by another page.

1. Segmentation
2. Demand segmentation
3. Paging
4. Demand paging

QUESTION 13

Modern operating systems use three different terms that refer to a set of instructions: program, job and process. Which one of the following statements is NOT true about these terms?

1. A program is a non-active set of instructions stored on a storage medium such as a disk.
2. A program might or might not become a job.
3. A process is a program that is waiting to be executed.
4. A program becomes a job when is selected for execution.

QUESTION 14

A deadlock can occur when an operating system (OS) does not put resource restrictions on processes. There are four necessary conditions for a deadlock to occur. Which one of the following is the correct description for the 'NO PREEMPTION' condition?

1. The OS cannot temporarily relocate a resource.
2. Two or more processes can hold a resource.
3. A process holds a resource even though it cannot use it until other resources are available.
4. All processes and resources involved form a loop.

QUESTION 15

An OS can be programmed in such way that *the code is independent of the machine language of a computer on which it runs.* This property refers to the _____ of the OS.

1. extensibility
2. reliability
3. compatibility
4. portability

QUESTION 16

A list contains the following elements:

    6 10 17 19 36 40 48 69 76 83 85 100 123

At the beginning, *first* = 1, *mid* = 7 and *last* = 13. What are the values of *first*, *mid* and *last* respectively after two iterations of the binary search algorithm if the goal is 36?

1. 4, 5, 6
2. 4, 5, 7
3. 1, 4, 7
4. 1, 3, 6

QUESTION 17

Suppose a list contains the following elements:

   26 30 40 17 59 11 107

What is the order of the elements in the list after three passes when selection sort is used?

1. 11 17 40 30 59 26 107
2. 11 17 26 30 40 59 107
3. 107 59 40 30 26 17 11
4. 11 17 26 30 59 40 107

QUESTION 18

Which one of the following is not considered to be a basic algorithm in computer programs?

1. Summation
2. Loop
3. Product
4. Search

QUESTION 19

Which one of the following alternatives is NOT a sorting algorithm?

1. Bubble
2. Selection
3. Division
4. Insertion

QUESTION 20

In computer science, what name is given to a step-by-step solution that expresses a logical solution to a particular problem?

1. Computer program
2. Process
3. Program structure
4. Algorithm

QUESTION 21

A graphic representation of an algorithm that hides the details of the algorithm and shows how the algorithm flows from beginning to end is called a _____.

1. pseudocode
2. UML
3. subroutine
4. Gantt chart

46

QUESTION 22

An assembler is used to translate code from (i) _____ language into (ii) _____ language.

1. (i) symbolical   (ii) assembly
2. (i) machine   (ii) assembly
3. (i) the English   (ii) machine
4. (i) assembly   (ii) machine

QUESTION 23

Compilation _____.

1. is used in the *first approach* to interpretation
2. translates and executes the source code one line at a time
3. translates the whole source program into the object module before it is executed
4. is a slow process in comparison to interpretation

QUESTION 24

The two methods that are used for translating a program to machine language both follow the same translation process. What is the SECOND step in the process?

1. Semantic analysis
2. Lexical analysis
3. Syntax analysis
4. Code generation

QUESTION 25

Which one of the following statement regarding functional programming languages is NOT TRUE?

1. A program is considered a mathematical function.
2. Summation is an example of functional programming with n inputs and one output.
3. A functional language allows a programmer to combine basic functions to create other functions.
4. Java is an example of a functional language.

QUESTION 26

Which computer programming language is known for using INHERITANCE?

1. Declarative
2. Object-oriented
3. Functional
4. Procedural

QUESTION 27

In the Scheme version of LISP, if S = (5 8 13 20 33 57 99), then (car (cdr (cdr (cdr S)))) would give a result of:

1. 20
2. 13
3. 8
4. 5

QUESTION 28

Which stage of waterfall model for software development results in the creation of a specification document?

1. Design
2. Analysis
3. Testing
4. Implementation

QUESTION 29

Which diagram CANNOT be used as modelling tool during the analysis phase of the software development lifecycle (SDLC)?

1. Data flow diagram
2. Program code diagram
3. Entity-relationship diagram
4. State diagram

QUESTION 30

In the testing phase of the SDLC errors are located. What type of testing is used if the internal structure of the software is not known?

1. Black-box
2. White-box
3. Basis
4. Control

QUESTION 31

Which of the following best describes *a measure of how closely the modules in a software system are related*?

1. Modularity
2. Adhesion
3. Cohesion
4. Coupling

QUESTION 32

Which of the following testing methods is used in glass-box testing?

1. Basis path
2. Exhaustive
3. Random
4. Boundary-value

QUESTION 33

Documentation in the software lifecycle is an ongoing process. Which one of the following statements regarding documentation is NOT TRUE?

1. User documentation shows step by step how to use the software.
2. System documentation defines software.
3. System documentation describes the servicing of a software system.
4. Technical documentation describes the installation of a software system.

QUESTION 34

In an array named SCORE, SCORE [2] refers to the second _____ of the array.

1. name
2. index
3. element
4. field

QUESTION 35

Which one of the following statements is TRUE?

1. An array is a collection of fields that are all related to one object.
2. An array can only be two-dimensional.
3. A data structure uses a collection of related variables that can only be accessed individually.
4. A data structure represents a set of data items that share a specific relationship.

QUESTION 36

Which of the following operations CANNOT be defined on arrays structures?

1. Addition
2. Deletion
3. Retrieval
4. Transversal

QUESTION 37

Which algorithm must first be done before putting a new node in a linked list?

1. Addition
2. Searching
3. Deletion
4. Retrieving

QUESTION 38

The first step in traversing a linked list is to _____.

1. check for the last node in the list
2. allocate a node
3. create a walking pointer to the first node in the list
4. set up a loop

QUESTION 39

Which one of the following statements regarding linked lists is NOT TRUE?

1. A linked list is a suitable structure if a large number of insertions and deletions are needed.
2. A linked list can grow infinitely and shrink to an empty list.
3. The name of a linked list is the name of the head pointer that points to the first node of the list.
4. Each node in a linked list has a unique name.

QUESTION 40

In which type of file are records only accessed one-after-another from beginning to the end?

1. Random
2. Indexed
3. Sequential
4. Hashed

QUESTION 41

Which one of the following is NOT a collision resolution method for hashed files?

1. Prime area hashing
2. Open addressing
3. Linked list resolution
4. Bucket hashing

QUESTION 42

What name is given to the address produced by a hashing algorithm when a collision occurs?

1. Index
2. Prime
3. Synonym
4. Home

QUESTION 43

Which collision resolution method for hashed files uses a node that can accommodate more than one record?

1. Bucket hashing
2. Open addressing
3. Prime area hashing
4. Linked list resolution

QUESTION 44

Which one of the following statements regarding directories is NOT TRUE?

1. In most operating systems directories are organised like a tree abstract data type in which each directory has a parent directory.
2. Directories are provided by most operating systems for organising files.
3. A directory performs the same function as a folder in a filing cabinet.
4. In most operating systems a directory is represented as a special type of file that holds information about other files.

QUESTION 45

What view of data does the conceptual level of a database define?

1. Logical
2. User
3. Internal
4. External

QUESTION 46

Which of the following database models are obsolete?

1. Hierarchical and distributed
2. Network and relational
3. Network and distributed
4. Network and hierarchical

QUESTION 47

Which one of the following is NOT TRUE about XML?

1. It stands for 'Extensible Markup Language'.
2. It is the language normally used for object-oriented databases.
3. It has replaced all database query languages.
4. It can represent data with nested structure.

QUESTION 48

Which three terms best describe the functions of a database management system (DBMS) in relation to a database?

1. Define, create and delete
2. Define, create and maintain
3. Create, read and write
4. Read, write and update

QUESTION 49

In a fragmented distributed database for the internet, _____.

1. data are localised
2. each site holds an exact replica of another site
3. objects and their relations are defined
4. any modification to data stored in one site is repeated exactly at every site

QUESTION 50

Which one of the following statements regarding an object-oriented database is NOT TRUE?

1. It keeps the advantages of the relational model.
2. It allows applications to access structured data.
3. Each object has attributes that are expressed as classes
4. Objects and their relations are defined.

II---oooOooo---II

SECOND SEMESTER ASSIGNMENTS

12.4   SECOND SEMESTER: ASSIGNMENT 01

Due date: **27 August 2014**

Study material: **(1) F&M: Chapters 1 - 4; Appendix A & Appendix E (Text book)**

                       (2) Tutorial Letter 102:

                            Part I: Units 1 – 4;

                            Part II: ALL (pages 24 – 74); and

                            Part III: Solution to Self-assessment assignment.

Do the relevant exercises in F&M, Tutorial Letter 102, and the Self-assessment assignment before attempting this assignment. See more information about 102 in Section 2.3.

Submission procedure: Via myUnisa (see Section 8.3) or by post

Year-mark weight: 40%

Unique assignment number: **874505**

Compulsory: To be considered for **examination** in this module, you must submit this assignment by 27 August 2014.

- Each multiple-choice question has four possible answers. You should select the alternative you consider to be the most appropriate.
- Submit your assignment via *myUnisa* or by post by the due date. Do not be concerned if *myUnisa* is down on the last submission date. We are notified and shall take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is running again.
- The mark that you achieve from a possible 40 marks will be converted to a **percentage** and will contribute 40% towards your semester mark.

QUESTION 1

According to the von Neumann model, which subsystem of a computer serves as a manager of other subsystems?

1. ALU
2. Input/output
3. Control unit
4. Memory

QUESTION 2

Historians divide computer software and hardware into generations. In which generation are we currently in?

1. Sixth
2. Third
3. Fifth
4. Fourth

QUESTION 3

Which of the given options is NOT TRUE? Since the 1950's, computers have general become_____.

1. faster
2. smaller
3. cheaper
4. heavier

QUESTION 4

Before cell phones (mobile phones) emerged, some people used to communicate using emails and others used post office (Snail) mail. However, this communication gap has narrowed with the use of SMSs using cell phones. What name is given to the situation described here?

1. Dependency
2. Social justice
3. Digital divide
4. Privacy

QUESTION 5

What name is given to a set of instructions that tells the computer what to do with data?

1. A program
2. An algorithm
3. A data processor
4. An operating system

54

QUESTION 6

The first electronic special-purpose computer was called_____.

1. ABC
2. Pascaline
3. ENIAC
4. Pascal

QUESTION 7

The area of the design and writing of structured programs that follow strict rules and principles is known as _____.

1. software engineering
2. application development
3. algorithm design
4. program development

QUESTION 8

Convert $(10101)_2$ to a decimal number.

1. $(5)_{10}$
2. $(21)_{10}$
3. $(17)_{10}$
4. $(33)_{10}$

QUESTION 9

Convert $(B3.2)_{16}$ to an octal number.

1. $(83.2)_8$
2. $(263.2)_8$
3. $(563.2)_8$
4. $(263.1)_8$

QUESTION 10

Which one of the following number representations is NOT correct?

1. $(111.1)_{10}$
2. $(12.01)_2$
3. $(BAD)_{16}$
4. $(417)_8$

QUESTION 11

Convert $(34)_{10}$ to a hexadecimal number.

1. $(34)_{16}$
2. $(22)_{16}$
3. $(24)_{16}$
4. $(42)_{16}$

QUESTION 12

Convert $(22)_{16}$ to a binary number.

1. $(1111)_2$
2. $(1010)_2$
3. $(100010)_2$
4. $(111100)_2$

QUESTION 13

Which of the following is False?

1. $(0)_{10} = (0)_2$
2. $(10)_8$ is less than $(10)_{10}$
3. $(10)_{16}$ is an even number
4. $(F)_{16}$ is equal to $(14)_{10}$

QUESTION 14

What is the 2's complement representation of −14 using 5 bits?

1. $(11110)_2$
2. $(10100)_2$
3. $(11001)_2$
4. $(10010)_2$

QUESTION 15

Which one of the following statements regarding sign-and-magnitude representation is NOT TRUE?

1. There are two 0s in sign-and-magnitude representation: positive zero and negative zero.
2. Sign-and-magnitude representation is often used to quantise an analog signal.
3. Sign-and-magnitude numbers are subjected to positive and negative overflow.
4. Sign-and-magnitude representation is commonly used to store integers.

QUESTION 16

Samples are taken if all the values of an audio signal cannot be recorded. The number of samples needed to retrieve a replica of the original image depends on _____.

1. quantisization
2. encoding
3. the bit depth
4. the maximum number of changes in the analog signal

QUESTION 17

Which one of the following statements regarding the storing of audio or images is NOT TRUE?

1. Vector graphics is suitable for storing the fine details of photographic images.
2. Audio storing can involve sampling, quantization and encoding.
3. Currently, in 2014, the dominant standard for storing audio is MP3.
4. Raster graphics is used when an analog image such as a photograph must be stored.

QUESTION 18

How many bytes should be used for a 32-bit pattern?

1. 4
2. 5
3. 16
4. 32

QUESTION 19

If the input is 1010011, and the mask 0011111 is used to unset the input, what is the resulting output?

1. 0000000
2. 1111111
3. 0010011
4. 0000011

QUESTION 20

Calculate: $(11011)_2 + (1001)_2$.

1. $(100100)_2$
2. $(100010)_2$
3. $(111000)_2$
4. $(101100)_2$

QUESTION 21

Calculate: $(101011.1)_2$ + $(11001.01)_2$.

1. $(1110010.10)_2$
2. $(1000010.01)_2$
3. $(10010011.11)_2$
4. $(1000100.11)_2$

QUESTION 22

Calculate: $(1010)_2$ XOR $(1001)_2$.

1. $(0011)_2$
2. $(0110)_2$
3. $(0111)_2$
4. $(1111)_2$

QUESTION 23

Use the arithmetic left shift operation on the bit pattern 11001101. The pattern is an integer in two's complement format.

1. $(10011010)_2$
2. $(11001101)_2$
3. $(11000110)_2$
4. $(11100101)_2$

QUESTION 24

Which logical operation on two input patterns has the following property?

"If a bit in one input is 0, there is no need to check the corresponding bit in the other input. The result is always 0."

1. AND
2. OR
3. XOR
4. NOT

Apply Boolean algebra rules to determine the simplest forms of the given Boolean functions in the following THREE questions.

QUESTION 25

What is the simplest form of the Boolean function $(xx' + y)'$?

1. y'
2. 0
3. $(x + x')y'$
4. 1

QUESTION 26

What is the simplest form of the Boolean function $x + xy'z' + xy'z'$?

1. $y'z'$
2. $xy'z'$
3. x
4. $x + xy'z'$

QUESTION 27

What is the simplest form of the Boolean function $(x'y)' + y$?

1. $x + y$
2. $xy' + y$
3. 1
4. Y

QUESTION 28

Consider the following Boolean function:

$$F(x,y,z) = m_2 + m_4 + m_5 + m_6$$

Which one of the following four Karnaugh diagrams represents the given function?

1.

	y'z'	y'z	yz	yz'
x'				1
x	1	1		1

2.

	y'z'	y'z	yz	yz'
x'			1	
x	1	1		1

3.

	y'z'	y'z	yz	yz'
x'			1	1
x	1		1	

4.

	y'z'	y'z	yz	yz'
x'			1	
x	1	1	1	

QUESTION 29

Consider the following Karnaugh map:

Which one of the following four Karnaugh maps reflects the correct forming of groups?

1.

2.

3.

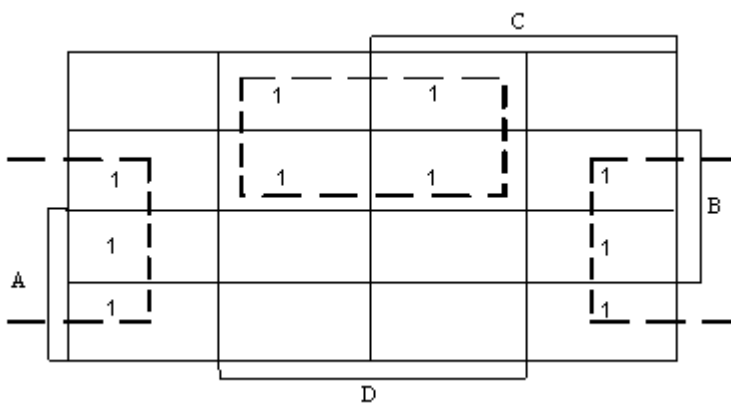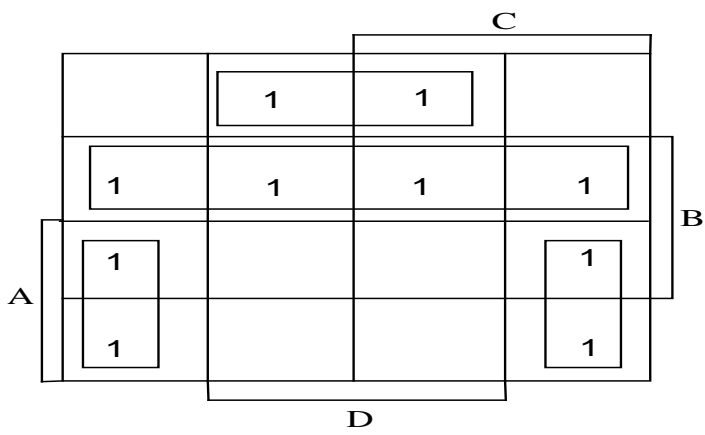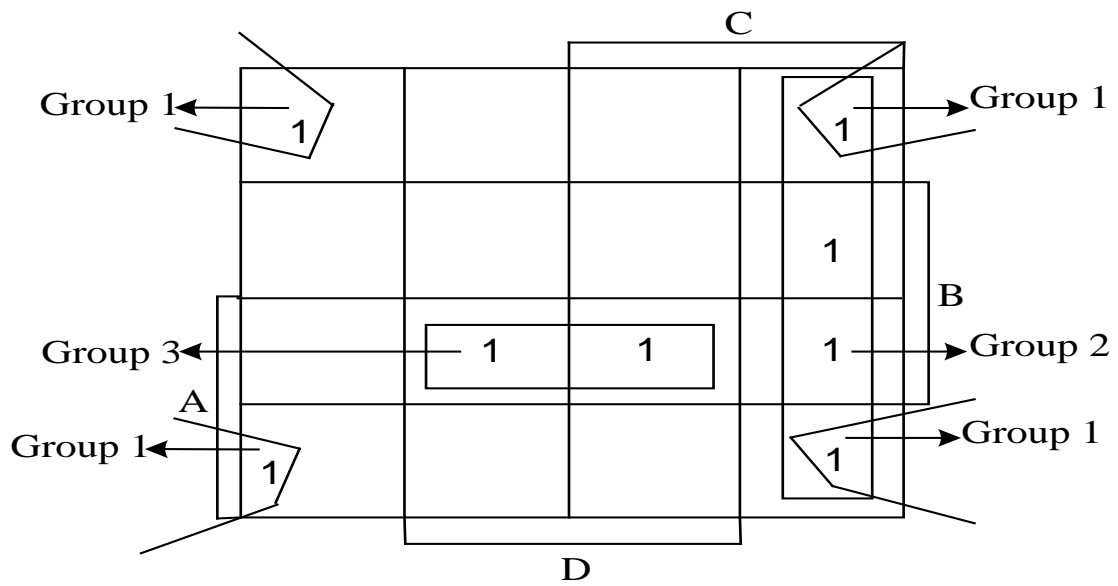4.
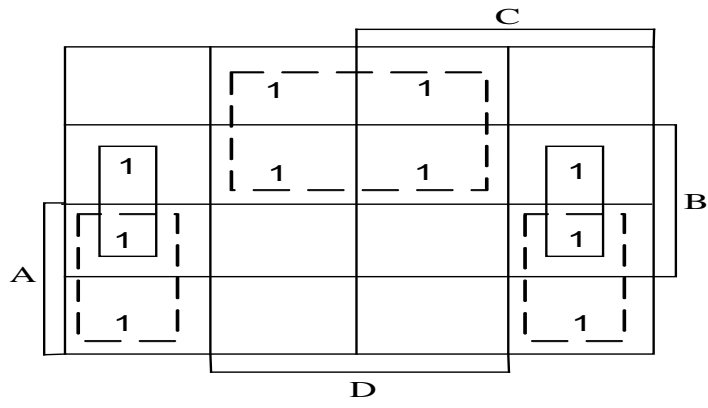
The next THREE questions refer to the Karnaugh map beneath

QUESTION 30

Which term represents Group 1?

1. A′B′CD′
2. D′
3. A′
4. B′D′
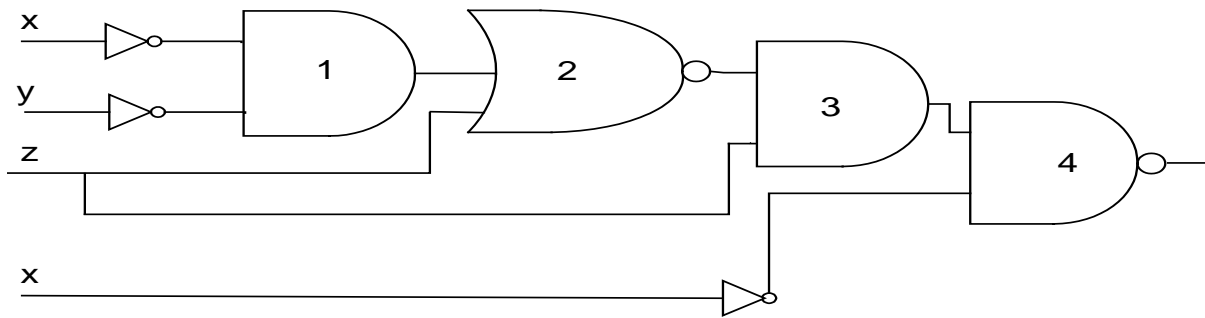
QUESTION 31

Which term represents Group 2?

1. DC′
2. C′
3. D′
4. CD′

QUESTION 32

Which term represents Group 3?

1. ABD
2. AB
3. D
4. ACD

The next FOUR questions refer to the following combinational logic circuit:

QUESTION 33

What is the output of Gate 1?

1. $(x + y)'$
2. $x'y'$
3. $x' + y'$
4. $(xy)'$

QUESTION 34

What is the output of Gate 2?

1. $[(x + y)' \cdot z]'$
2. $(xy)' + z'$
3. $(x'y' + z)'$
4. $[(x' + y') \cdot z]'$

QUESTION 35

What is the output of Gate 3?

1. $[(x' + y') \cdot z]' + z$
2. $[(xy)' + z'] \cdot z$
3. $(x'y' + z)' \cdot z$
4. $[(x + y)' \cdot z]' + z$

QUESTION 36

What is the output of Gate 4?

1. $[(x'y' + z)' \cdot z]' \cdot x'$
2. $[(x'y' + z)' \cdot z \cdot x']'$
3. $[[(x' + y') \cdot z]' + z + x']'$
4. $[(x + y)' \cdot z]' + z + x'$

Consider the following scenario:

Three people are looking for trees in the country side. They see the following trees:

Person A: willows & fever trees;   **Person B**: willows & stinkwoods; **Person C**: milkberry trees & zebrawoods

When a person sees two kinds of tree (as mentioned above), the output is 1. For example, if A = 1, B = 1 and C = 0, Person A sees willows and fever trees, and Person B sees willows and stinkwoods, so the group of three persons spots only 3 different kinds of tree.

A Boolean function F(A,B,C) outputs a 1 if a group of three persons spots more than 3 different kinds of tree.

Different combination inputs for A, B and C are given in the tables in the following FOUR questions. Which alternative shows the correct outputs for F in EACH of the following FOUR questions?

QUESTION 37

A	B	C	Alternative 1 F	Alternative 2 F	Alternative 3 F	Alternative 4 F
0	0	0	0	1	0	1
0	0	1	0	1	1	0

QUESTION 38

A	B	C	Alternative 1 F	Alternative 2 F	Alternative 3 F	Alternative 4 F
0	1	0	0	1	0	1
0	1	1	0	1	1	0

QUESTION 39

A	B	C	Alternative 1 F	Alternative 2 F	Alternative 3 F	Alternative 4 F
1	0	0	0	1	0	1
1	0	1	0	1	1	0

QUESTION 40

A	B	C	Alternative 1 F	Alternative 2 F	Alternative 3 F	Alternative 4 F
1	1	0	0	1	0	1
1	1	1	0	1	1	0

12.5   SECOND SEMESTER: ASSIGNMENT 02

Due date: 29 September 2014

Study material: **(1) F&M: Chapters 5 – 14. Chapter 12 is not included.**

                             (2) Tutorial Letter 102: Part I: Units 5 – 14

Please read the relevant study material in F&M and Tutorial Letter 102 before attempting this assignment. See more information about 102 in Section 2.3 of this tutorial letter.

Submission procedure: Via myUnisa (see Section 8.3) or by post

Year-mark weight: 60%

Unique assignment number: **881753**

Compulsory: It contributes towards the year mark.

- Each multiple-choice question has four possible answers. You should select the alternative you consider to be the most appropriate.
- Submit your assignment via *myUnisa* or by post by the due date. Do not be concerned if myUnisa is down on the last submission date. We are notified and shall take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is running again.
- The mark that you achieve from a possible 50 marks will be converted to a **percentage** and will contribute 60% towards your semester mark.

QUESTION 1

A computer uses memory-mapped I/O addressing. The address bus uses 6 lines (6 bits). If memory is made up of 80 words, how many four-register controllers can be accessed by the computer?

1. 12
2. 16
3. 48
4. 60

QUESTION 2

In the fetch stage of the machine cycle used by the CPU, _____.

1. instructions are decoded by the control unit
2. the contents of two input registers are added
3. the address of the instruction to be copied is held in the program counter register
4. the task order is sent to a component in the CPU

QUESTION 3

Which one of the following statements describes a property of RISC computer architecture?

1. A small set of instructions do a minimum number of simple operations.
2. A complex instruction is transformed into a set of simple operations and then executed by the CPU.
3. It is easier than other designs because there is a single instruction for both simple and complex tasks.
4. Micromemory holds the set of operations for each complex instruction in the instruction set.

QUESTION 4

There are four basic network topologies. Which network topology has the following advantage and disadvantage?

Advantage: Each connection can carry its own data load.
Disadvantage: A large amount of cabling and number of input/output ports required.

1. Mesh
2. Star
3. Bus
4. Ring

QUESTION 5

Which of the following is a form of a complex network operated by a service provider?

1. A backbone
2. A LAN
3. A hub
4. A workstation

QUESTION 6

According to F & M, how many layers does the TCP/IP protocol suite have?

1. 3
2. 4
3. 5
4. 6

QUESTION 7

Transport layer protocols have been designed for the TCP/IP protocol suite. Which one of the following statements regarding the user datagram protocol (UDP) is NOT TRUE?

1. It is also known as a connection protocol.
2. It is one of the three transport layer protocol.
3. It simple and fast.
4. It does not provide a logical connection between packets belonging to a single message.

QUESTION 8

There are several layers in a TCP/IP protocol suite. What is the physical layer responsible for?
1. Provision of services to the users.
2. Node-to-node delivery of frames.
3. The movements of individual bits from one node to the next.
4. The logical delivery of a message between client and server processes.

QUESTION 9

Documents on the WWW can be grouped into categories. Which type of document is created by a web server whenever a browser requests a document?

1. Static
2. Dynamic
3. Active
4. Hanging

QUESTION 10

Which one of the following statements regarding the evolution of computer operating systems and hardware is NOT TRUE?

1. Batch operating systems were designed in the 1950s to control mainframe computers.
2. In the 1950s computers used punched cards for input.
3. Multiprogramming and time-sharing required the operating system to do scheduling.
4. Parallel operating systems required one CPU on one computer when they were first used.

QUESTION 11

An operating system (OS) can be programmed in such way that its higher layers can be changed without affecting its lower layers. This property refers to the _____ of the OS.

1. extensibility
2. reliability
3. compatibility
4. portability

QUESTION 12

In multiprogramming, more than one program is in memory at the same time. Which one of the following is NOT a memory management technique during multiprogramming?

1. Demand partitioning
2. Demand segmentation
3. Partitioning
4. Demand paging

QUESTION 13

In paging, the memory is divided into equally-sized sections called _____.

1. segments
2. threads
3. frames
4. pages

QUESTION 14

Modern operating systems use three different terms that refer to a set of instructions: program, job and process.

Which of the following states are applicable to a *process*?

1. Ready, running and terminate
2. Waiting, running and terminate
3. Hold, ready and running
4. Ready, waiting and running

QUESTION 15

The operating system synchronises different processes with different resources but a deadlock can occur. There are four necessary conditions for a deadlock to occur. Which of the following is the correct description of the 'NO PREEMPTION' condition?

1. The operating system cannot temporarily relocate a resource.
2. Only one process can hold a resource.
3. A process holds a resource even though it cannot use it until other resources are available.
4. All processes and resources involved form a loop.

QUESTION 16

A list contains the following elements:

    7 10 17 19 35 40 48 69 76 81 83 98 110

At the beginning, first = 1, mid = 7 and last = 13. What are the values of first, mid and last respectively after two more iterations of the binary search algorithm if the goal is 35?

1. 1, 3, 6
2. 1, 7, 13
3. 4, 5, 6
4. 7, 10, 13

QUESTION 17

Suppose a list contains the following elements:

    30 34 44 21 63 15 89

What is the order of the elements in the list after three passes if selection sort is used?

1. 15 21 44 34 63 30 89
2. 15 30 21 34 44 63 89
3. 15 21 30 34 63 44 89
4. 15 21 30 34 44 63 89

QUESTION 18

Certain constructs are needed for a structured program. Which of the following is a construct that tests a condition?

1. Selection
2. Diversion
3. Sequence
4. Repetition

QUESTION 19

Which one of the following statements regarding search algorithms is TRUE?

1. A sequential search is usually used for big lists.
2. A sequential search is generally very slow.
3. A binary search requires the list to be unsorted.
4. A binary search starts at the beginning of the list.

QUESTION 20

An English-language-like representation of a step-by-step solution that expresses a logical solution to a particular problem of interest is best described as _____.

1. a process
2. an algorithm
3. a program code
4. a pseudocode

QUESTION 21

Which one of the following is NOT TRUE about subalgorithms?

1. They are more difficult to understand than the main algorithm.
2. They are subunits of main algorithms.
3. They are can be called many times by the main algorithm.
4. They can be broken down into other subalgorithms.

QUESTION 22

The only language understood by computer hardware is _____ language.

1. scientific
2. natural
3. machine
4. mnemonic

QUESTION 23

The two methods used in computer translation are _____.

1. decoding and interpretation
2. interpretation and encoding
3. compilation and encoding
4. compilation and interpretation

QUESTION 24

The two methods that are used for translating a program to machine language both follow the same translation process. What is the FIRST step in the process?

1. Syntax analysis
2. Semantic analysis
3. Code generation
4. Lexical analysis

QUESTION 25

In which two forms can a final program in Java be?

1. An application or an applet
2. A function or a procedure
3. A procedure or an applet
4. An application or a function

QUESTION 26

What name is given to procedures in the object-oriented paradigm?

1. Algorithms
2. Actors
3. Subroutines
4. Methods

QUESTION 27

Which programming language paradigm is based on deduction?

1. Functional
2. Procedural
3. Declarative
4. Object-oriented

QUESTION 28

The waterfall model is one of the most common models for the development process of the software lifecycle. Which of the following would you consider to be the THIRD stage of the model?

1. Design
2. Implementation
3. Analysis
4. Testing

QUESTION 29

A number of diagrams can be used during the analysis phase of object-oriented analysis process in software development. Which of the following will NOT be used during this phase?

1. State diagram
2. Class diagram
3. State chart
4. Use case diagram

QUESTION 30

What name refers to the process of breaking down a whole task into smaller tasks during the design phase of the software life cycle?

1. Modularity
2. Polymorphism
3. Subpackaging
4. Encapsulation

QUESTION 31

Which one of the following statements regarding modules in a software system is NOT TRUE?

1. Loosely coupled modules are more likely to be reused.
2. Cohesion between modules must be minimised.
3. Cohesion is a measure of how closely the modules are related.
4. Coupling is a measure of how tightly two modules are bound to each other.

QUESTION 32

Maintainability is one of the measures for software quality. Maintainability includes_____.

1. reusability, interoperability and portability
2. changeability, usability and correctability
3. changeability, flexibility and testability
4. reliability, timeliness and flexibility

QUESTION 33

Documentation is needed for proper and efficient usage and maintenance of software. System documentation_____.

1. defines the software itself
2. describes the installation and the servicing of the software
3. can be a very powerful marketing tool
4. shows how to use the software step by step

QUESTION 34

Which of the given options is described by the following two statements?

- It represents a set of data items that share a specific relationship.
- It uses a collection of related variables that can be accessed individually or as a whole.

1. Data structure
2. Method
3. Program
4. Object

QUESTION 35

Which of the following best describes what an array is?

1. A collection of fields that are all related to one object.
2. A sequenced collection of elements, normally of the same data type.
3. A collection of elements called fields.
4. A collection of elements called records.

QUESTION 36

Which of the following operations CANNOT be defined on array data structures?

1. Deletion
2. Retrieval
3. Transversal
4. Append

QUESTION 37

Given a node to insert into a linked list, if the predecessor node has a null pointer, then you are adding to _____.

1. the beginning of the list or empty list
2. body of the list or end of the list
3. an empty list or end of the list
4. the beginning of the list or end of the list

QUESTION 38

What is the first step in traversing a linked list?

1. Checking for the last node.
2. Creating a walking pointer to the first node.
3. Allocating a pointer to a node.
4. Setting up a loop.

QUESTION 39

Which one of the following statements regarding linked lists is NOT TRUE?

1. A linked list is a suitable structure if a large number of insertions and deletions are needed.
2. A linked list can grow infinitely and shrink to an empty list.
3. The name of a linked list is the name of the head pointer that points to the first node of the list.
4. A linked list is inefficient for storing data that needs a lot of insertions.

QUESTION 40

Which one of the following statements regarding sequential files is NOT TRUE?

1. To access a file sequentially, a sequential file structure can be used.
2. There are only three files associated with an update program: the old and new master files, and the transaction file.
3. All the files need to be sorted on the same key to make the updating process efficient.
4. A loop is used to read and process records one by one.

QUESTION 41

A hashed file is a random access file in which a _____ maps a key to an address.

1. function
2. transaction
3. relation
4. connection

QUESTION 42

When a collision occurs, the address produced by a hashing algorithm, is called the _____ address.

1. home
2. synonym
3. linked
4. prime

QUESTION 43

Which one of the following collision resolution mechanisms uses a node that can accommodate more than one record?

1. Open addressing
2. Division remainder hashing
3. Bucket hashing
4. Linked list resolution

QUESTION 44

Which one of the following statements regarding directories is NOT TRUE?

1. A directory performs the same function as a folder in a filing cabinet.
2. In most operating systems a directory is represented as a special type of file that holds information about other files.
3. Directories are provided by most operating systems for organising files.
4. In most operating systems directories are organised like a tree abstract data type in which each directory has a parent directory.

QUESTION 45

Which level of a database defines the logical view of the data?

1. architectural
2. internal
3. conceptual
4. external

QUESTION 46

Which one of the following is a database model that has become obsolete?

1. Object-oriented
2. Distributed
3. Relational
4. Network

QUESTION 47

What name is given to a record of relation (table)?

1. Attribute
2. Tuple
3. Field
4. Cardinality

QUESTION 48

Which query language is often used in relational databases?

1. ANSI
2. SQL
3. ISO
4. QRD

QUESTION 49

In a fragmented distributed database, _____.

1. each site holds an exact replica of another site
2. objects and their relations are defined
3. data are localised
4. any modification to data stored in one site is repeated exactly at every site

QUESTION 50

Which query language is often used in object-oriented databases?

1. HTML
2. Prolog
3. XML
4. Scheme

II---oooOooo---II

Appendix A:

APPENDIX A: DOWNLOAD FROM WEB THE CAI TUTORIAL KARNAUGH (OPTIONAL)

A web link is now available so that you can access the CAI tutorial. The tutorial deals with logic circuits, Boolean algebra and Karnaugh diagrams.

The link:

http://osprey.unisa.ac.za/TechnicalReports/cos1521/cos1521.zip

You can download the tutorial:

Go to the given web link.

Save cos1521.zip to your computer (Choose C drive *Documents* or wherever you want to save it) and then double click on the saved cos1521.zip.

Choose **extract** from top row of buttons on the opened page. Then click on **extract to the right** of the open window.

Then double click on the cos1521 folder that appears, then, double click on the karnaugh.exe icon that looks like a round ball with a red ribbon around it.

You can now navigate through the tutorial.

We have tried these steps without experiencing any problem. Depending on your browser and operating system, there may be a slight variation in these steps. Ask someone more experienced with computers to help you. Also note that you should have WINZIP installed on your computer. Find it free on the internet.

Not that the use of this CAI tutorial is optional.