Tutorial Letter 101/3/2017

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

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Please note

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

Semester 1: Submit Assignment 01 by 08 March 2017.

Semester 2: Submit Assignment 01 by 23 August 2017.

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

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

1 INTRODUCTION AND WELCOME

Dear Student

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

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

This is a partially online module, so some learning content and all tutorial letters are available on myUnisa. However, in order to support you in your learning process, we will also send you some study material in print format. To see your study material online and read about what to do for the module, go to https://my.unisa.ac.za and log in with your student number and password. You will find COS1521-2017-S1 for the first semester and COS1521-2017-S2 for the second semester in the row of modules in the orange blocks across the top of the webpage. Remember to check in the "More" tab if you cannot find the module in the orange blocks. Click on the module you want to open.

The study material for COS1521 is available in English only.

2 PURPOSE OF AND OUTCOMES AND SYLLABUS FOR THIS MODULE

2.1 *PURPOSE*

COS1521 is one of a number of first-level Computer Science modules offered by the School of Computing at Unisa. The purpose of this module is to introduce you to the computer as a system. The module covers hardware concepts such as internal representation of numbers and characters and basic computer architecture, as well as 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) give you the opportunity to see whether you have achieved the following outcomes:

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

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

Assessment criteria
You should be able to
1.1 convert between different number systems (binary, octal, decimal and hexadecimal)
1.2 apply different arithmetic methods in the binary number system
1.3 identify computer data, including the different internal representations
1.4 explain the basic restrictions that computer architecture places on numerical computations
1.5 determine outputs of basic combinational logic circuits for given inputs
1.6 draw the combinational circuits for given Boolean functions
1.7 simplify Boolean functions by implementing appropriate rules/methods
1.8 determine a Boolean function for a given problem statement using truth tables (at most four variables)
1.9 use Boolean expressions and binary logic that describe the behaviour of logic circuits
1.10 describe 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 Describe today's computers, with a brief historical background, in terms of different architectures and ethical scenarios/issues.
2.2 Describe software engineering and operating systems, including the development of software, by providing an historical context.
2.3 Describe a basic computer, including the three basic hardware subsystems and their interconnected functioning.
2.4 Describe an operating system, including the functioning of its components.
2.5 Describe popular operating systems with reference to different popular operating platforms.
2.6 Define an algorithm, and state its relation to problem-solving.
2.7 Define the three algorithm constructs and explain how they are used in algorithms.
2.8 Describe basic algorithms, including their applications.
2.9 Describe the sorting and searching concepts of algorithms and understand their mechanisms.
2.10 Explain what subalgorithms are and state how they are related to algorithms.

2.11 Describe the development process models in software engineering, including 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 and communication technologies.

Assessment criteria
3.1 Describe physical structures of networks and include references to network criteria, physical structures and categories of networks.
3.2 Describe the internet, including the TCP/IP protocol suite with reference to the characteristics of its layers and their relationships.
3.3 Describe 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 Describe data structures and include references to the differentiation between different structures.
4.2 Describe file structures and include references to updating and access methods, and to categories of directories and files.
4.3 Define a database and some traditional database models, including the relational database design.
4.4 Define a database management system (DBMS) and include its architecture.
4.5 Describe the steps in database design.

2.3 *SYLLABUS*

The module content is covered in chapters 1 to 11, 13 and 14 of the prescribed book, referred to as F&M (details are given in section 4.1 of this tutorial letter), and in all the tutorial letters, including Tutorial Letter 102. Sections 2.3, 5.8, 8.7 and 14.6 of the prescribed book are **excluded**.

The following topics are covered in the prescribed book:

Chapter 1: Introduction

Chapter 2: Number systems

Chapter 3: Data storage (Appendix A: Unicode)

Chapter 4: Operations on data

Appendix E: Boolean algebra and logic circuits

Chapter 5: Computer organisation

Chapter 6: Computer networks and the internet

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 about the study material in the prescribed book (there are certain sections in the prescribed chapters that you do not need to study), a summary, learning outcomes, explanatory notes relating to Appendix E, additional exercises and errata relating to F&M. You will also find the solution to the self-assessment assignment in Tutorial Letter 102.

Very important: *You must read through Tutorial Letter 102* ***before*** *you complete the self-assessment assignment and Assignment 01, especially units 1 to 4 and from page 24 to the end. This material will help you to understand the content of the prescribed book better, and this in turn will help you answer the questions in Assignment 01.* ***Please read Tutorial Letter 102 as soon as you receive it.*** *It is available on myUnisa in case you have not received the printed copy.*

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

All students studying through the School of Computing must have access to the internet, but references to interactive work (working on the computer or searches on the internet) are not required.

3 LECTURERS AND CONTACT DETAILS

3.1 *LECTURERS*

The best means of contacting your lecturers is by e-mail. If you are registered for Semester 1, the e-mail address to use is **COS1521-17-S1@unisa.ac.za**, and if you are registered for Semester 2, the e-mail address is **COS1521-17-S2@unisa.ac.za.**

You will find the names and contact details of your lecturers (including e-mail addresses) and contact details for the School of Computing in Tutorial Letter COSALLF for 2017. This tutorial letter is available online on myUnisa.

You will also find the above contact information on http://osprey.unisa.ac.za.

The COS1521 discussion forum on myUnisa gives you the opportunity to share ideas and discuss problems with fellow students. This forum is for your benefit, and the lecturers do not necessarily play an active part in the discussions. You are welcome to 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 websites first to see whether the answers to your queries appear there. Since most students encounter the same problems, we offer solutions to the most common problems in the tutorial letters or on the websites.

You may phone your lecturers. However, sometimes we are not available due to other school or university duties. If you are unable to contact us, you are welcome to phone the secretary of the School of Computing and leave a message. The contact number to call is also given in Tutorial Letter COSALLF. **Note that the school has moved from the Muckleneuk campus in Pretoria to the Science campus in Roodepoort, Johannesburg.**

If you have **administrative enquiries** relating to **registrations, fees, assignment submission, and examination matters such as aegrotats and special exams,** consult the brochure entitled *my Studies @ Unisa* or the Unisa website to see whom to contact.

3.2 *DEPARTMENT*

The School of Computing can be contacted at

Telephone number: 011 670 9200

E-mail: computing@unisa.ac.za

3.3 *UNIVERSITY*

To contact the university, follow the instructions in *my Studies @ Unisa*. Always be able to supply your student number when you contact the university.

4 RESOURCES FOR THE MODULE

4.1 *PRESCRIBED BOOK*

Here are the bibliographical details of the prescribed book for this module:

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

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. It also contains **supplementary study material**. See section 2.3 of this tutorial letter for more information about Tutorial Letter 102.

The prescribed book is **not** included with your study material, so please obtain a copy of F&M as soon as possible. Prescribed books can be obtained from the university's official booksellers. You will find a list of official booksellers and their addresses in *my Studies @ Unisa*.

If you have difficulty in locating your book at one of the official booksellers, please contact the Prescribed Book section at 012 429 4152, or e-mail vospresc@unisa.ac.za.

4.2 *RECOMMENDED BOOKS*

If you would like to know more about a particular topic, you may consult any of the books listed below. 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 book 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, New York, 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, New York, 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, 2002.

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

4.3 *ELECTRONIC RESERVES (E-RESERVES)*

There are no e-reserves for this module.

4.4 *OPTIONAL CAI TUTORIAL*

There is an **optional** CAI tutorial, which we highly recommend. You should receive this tutorial on a CD. However, if you do not receive it on a CD, see appendix A of this tutorial letter for instructions on how to download it from the web, or check on the COS1521 home page for information on how to access it. The tutorial deals with the simplification of Boolean expressions by means of Karnaugh maps (diagrams), and includes background material. You need to be familiar with this subject matter for Assignment 01, and the tutorial can also help you with your examination preparation relating to this topic. Past students recommend this tutorial highly.

4.5 *TUTORIALS OFFERED BY UNISA*

Unisa now offers online tutorials (e-tutoring) to students registered for modules at NQF levels 5, 6 and 7 – in other words, qualifying first-level, second-level and third-level modules.

Once you have registered for a qualifying module, you will be allocated to a group of students with whom you will be interacting during the tuition period as well as an e-tutor who will be your tutorial facilitator. You will then receive an SMS informing you about your group, the name of your e-tutor and instructions on how to log on to myUnisa in order to receive further information on the e-tutoring process.

Online tutorials are offered free of charge and are conducted by qualified e-tutors appointed by Unisa. To participate in e-tutoring, all you need is a computer with an internet connection. If you live close to a Unisa regional centre or a telecentre contracted with Unisa, you are welcome to access the internet there. E-tutoring takes place on myUnisa, where you are expected to connect with other students in your group. The e-tutor is there to guide you through your study material during this interaction process. To get the most out of online tutoring, you need to participate in the online discussions that the e-tutor will be facilitating.

There is a high failure rate for some modules. Face-to-face tutors and tutorials have been arranged for these modules and will take place at the Unisa regional centres. Also, these tutorials are offered free of charge. To secure a place in the classes, please register at your nearest Unisa regional centre.

5 FREE COMPUTER AND INTERNET ACCESS

Unisa has entered into partnerships with establishments (referred to as telecentres) in various locations across South Africa to give you (as a Unisa student) free access to computers and the internet. This access enables you to conduct the following academic activities: registration; online submission of assignments; engaging in e-tutoring activities

and signature courses etc. Please note that any other activities outside of these are for your own cost, e.g. printing and photocopying. For more information on the telecentre nearest to you, please visit www.unisa.ac.za/telecentres.

6 STUDENT SUPPORT SERVICES AND THE SCIENCE FOUNDATION PROVISION PROGRAMME

Important information about the full range of student support services available at Unisa appears in *my Studies @ Unisa*. For example, the tutorial services information is found in this brochure, which you must please refer to constantly. The module is part of the Science Foundation Programme (SFP). For students who are not part of the 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 whom he/she can contact in case of any difficulties or queries related to the content of the module**. Please refer all such difficulties or queries to the tutor. The details of the tutors, including 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:

6.1 *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; and
- arranging peer-collaborative learning opportunities with fellow students at regional level.

6.2 *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.

6.3 *WHO CAN PARTICIPATE IN THE SFP?*

All new Unisa science students adhering to specific SFP admission criteria are allowed into the SFP. Selection criteria that will identify "at risk" students are determined on the basis of the student's M-count total, and 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.

6.4 *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.

6.5 *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 invest additional time and effort on attending the tutoring classes and academic literacy sessions and making use of peer-collaborative learning opportunities.

7 STUDY PLAN

Consult *my Studies @ Unisa* for suggestions about general time management and planning.

Here is a study programme for the first and second semesters for this module. We hope that you find it helpful.

FIRST-SEMESTER STUDY PROGRAMME

Week	Starting on	Activities	Study material
1	23 January		F&M chapters 1 and 2 Tutorial Letter 102, units 1 and 2, and Part II
2	30 January	Start Assignment 01	F&M chapters 3 and 4; Appendix A Tutorial Letter 102, units 3 and 4, and Part II
3	6 February	Do Self-assessment (Section A) by 10/02/17. **(Do not submit.)**	F&M chapters 1–4; Appendix A Tutorial Letter 102, units 1–4, and Part II
4	13 February		F&M chapter 4; Appendix E Tutorial Letter 102, unit 4, and Part II
5	20 February	Do Self-assessment (Section B) by 24/02/17. **(Do not submit.)**	F&M chapter 4; Appendix E Tutorial Letter 102, unit 4, and Part II
6	27 February		F&M Appendices A and E Tutorial Letter 102, units 1–4, & Parts II & III
7	6 March	**Complete Assignment 01 (Due date: 10 March)**	F&M Appendices A and E Tutorial Letter 102, units 1–4, & Parts II & III
8	13 March	Start Assignment 02	F&M chapters 5 and 6 Tutorial Letter 102, units 5 & 6
9	20 March		F&M chapters 7, 8 and 9 Tutorial Letter 102, units 7, 8 and 9
10	27 March		F&M chapters 10 and 11 Tutorial Letter 102, units 10 and 11
11	3 April		F&M chapters 13 and 14 Tutorial Letter 102, units 13 and 14
12	10 April	**Complete Assignment 02 (Due date: 12 April)**	F&M chapters 5–14 Tutorial Letter 102, units 5–14
13–15	17 April until examination date	Revision	
		Examinations	

SECOND-SEMESTER STUDY PROGRAMME

Week	Starting on	Activities	Tutorial matter
1	10 July		F&M chapters 1 and 2 Tutorial Letter 102, units 1 and 2, and Part II
2	17 July	Start Assignment 01	F&M chapters 3 and 4; Appendix A Tutorial Letter 102, units 3 and 4, and Part II
3	24 July	Do Self-assessment (Section A) by 28/07/17. **(Do not submit.)**	F&M chapters 1–4; Appendix A Tutorial Letter 102, units 1–4, and Part II
4	31 July		F&M chapter 4; Appendix E Tutorial Letter 102, unit 4, and Part II
5	07 August	Do Self-assessment (Section B) by 11/08/17. **(Do not submit.)**	F&M chapter 4; Appendix E Tutorial Letter 102, unit 4, and Part II
6	14 August		F&M Appendices A & E Tutorial Letter 102, units 1–4, and Parts II and III
7	21 August	**Complete Assignment 01 (Due date: 23 August)**	F&M Appendices A and E Tutorial Letter 102, units 1–4, and Parts II and III
8	28 August	Start Assignment 02	F&M chapters 5 and 6 Tutorial Letter 102, units 5 and 6
9	4 September		F&M chapters 7, 8 and 9 Tutorial Letter 102, units 7, 8 and 9
10	11 September		F&M chapters 10 and 11 Tutorial Letter 102, units 10 and 11
11	18 September		F&M chapters 13 and 14 Tutorial Letter 102, units 13 and 14
12	25 September	**Complete Assignment 02 (Due date: 27 September)**	F&M chapters 5–14 Tutorial Letter 102, units 5–14
13–15	2 October until the examination date	Revision	
		Examinations	

8 PRACTICAL WORK AND WORK-INTEGRATED LEARNING

There are no practicals or work-integrated learning components for this module.

9 ASSESSMENT

We realise that it might be difficult to keep to given schedules, but once assignment dates are set, they are captured on 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 to ask for extensions with regard to assignment due dates.

9.1 *ASSESSMENT PLAN*

NO ASSIGNMENTS WILL BE ACCEPTED AFTER THE SUBMISSION DATES.

There are three assignments. You will find all of them in section 14 of this tutorial letter.

Self-assessment assignment
First- and second-semester students complete the same self-assessment assignment. **Do not submit it.** You will receive a suggested solution to this assignment in Tutorial Letter 102 early in the semester. The self-assessment assignment does not contribute to either the semester mark or the final mark.

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: Student Assessment and Administration (DSAA). There is a specific date by which the DSAA feeds all the submitted mark-reading sheets into the computer (this is called batch processing). As a result, **no multiple-choice assignment received after the due date will be accepted**. We recommend that you submit your assignments via myUnisa.

You will be awarded 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.

The mark you obtain for Assignment 01 contributes 40% towards the semester mark, and the mark you obtain for Assignment 02 contributes 60% towards the semester mark. We will show you what we mean by means of an example.

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 assigned to Assignments 01 and 02 respectively.

Now 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 up to 71%.

A semester mark does not contribute to the final result in the case of a student who writes a supplementary examination, but it does contribute in the case of a student who writes an aegrotat examination.

Please make sure that your assignments reach the university **before or on** the due dates. Also make sure that your marks for Assignments 01 and 02 have been taken into account in the calculation of your semester mark before you write the examination. **The fastest and most secure way to submit your MCQ assignments is through myUnisa.** We recommend that you submit both assignments this way.

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 up again. Please do not contact lecturers if a problem of this kind occurs, since system problems will be taken into consideration. If you have queries with regard to the submission of assignments, please contact the Assignments section of the DSAA.

9.2 *UNIQUE ASSIGNMENT NUMBERS*

Semester 1	
Assignment	**Unique assignment number**
01	**816556**
02	**669715**
Semester 2	
Assignment	**Unique assignment number**
01	**715537**
02	**756424**

9.3 *DUE DATES FOR ASSIGNMENTS*

Self-assessment assignment for first and second semesters		
Semester	Finish by	Contribution towards semester mark
01	Part A: 10 Feb Part B: 24 Feb	- -
02	Part A: 28 July Part B: 11 Aug	- -
First semester		
Assignment	Due date	Contribution towards semester mark
01	08 March	40%
02	11 April	60%
Second semester		
Assignment	Due date	Contribution towards semester mark
01	23 August	40%
02	27 September	60%

9.4 SUBMISSION OF ASSIGNMENTS

We **recommend** that you submit both Assignments 01 and 02 **via myUnisa**.

For detailed information about assignments, please refer to *my Studies @ Unisa*.

To submit an assignment via myUnisa:

- Go to myUnisa.
- 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 number of the assignment you wish to submit.
- Follow the instructions.

You may not submit your assignments by fax or e-mail.

If you have administrative enquiries about assignments, please send an e-mail to the address supplied in *my Studies @ Unisa*.

9.5 NUMBER OF ASSIGNMENTS TO BE DONE

There are **three** assignments.

Complete the **self-assessment assignment**, but **do not** submit it for marking.

You must submit Assignments 01 and 02. You will find all the assignments in section 14 of this tutorial letter.

10 OTHER ASSESSMENT METHODS

There are no other forms of assessment for this module.

11 EXAMINATIONS

FIRST SEMESTER: **In order to be admitted to** the first-semester **COS1521** examination, you must submit Assignment 01 by 10 March 2017.

SECOND SEMESTER: **In order to be admitted to** the second-semester **COS1521** examination, you must submit Assignment 01 by 23 August 2017.

There will be a two-hour examination at the end of the semester. We will send information about the format and scope of the examination during the semester. Supplementary examinations will be written at the end of the semester following the semester in which you sat for the original examination. This is also the case with aegrotat examinations. Please do not contact your lecturer regarding supplementary or aegrotat examinations; rather refer to *my Studies @ Unisa* for guidelines. Read *my Studies @ Unisa* for general examination guidelines and examination preparation guidelines.

The assignments and the examination letter that you will receive contain enough examples of the type of questions that you can expect in the examination. Please do not contact the lecturers for this module to ask for past examination papers if there are none on myUnisa. The lecturers do not provide solutions to past examination papers on myUnisa.

As discussed in section 9.1, your examination mark contributes 80% towards your final mark and your semester mark contributes the other 20%. If you obtain less than 40% for the examination, your semester mark will **not** be taken into account in the calculation of your final mark.

If you write a supplementary examination, please download all relevant study material, such as the examination tutorial letter, from myUnisa before the end of the semester in which you are registered, since this material will not be available after the end of the semester.

If you have enquiries about the examination, please send an e-mail to the address given in *my Studies @ Unisa*.

12 FREQUENTLY ASKED QUESTIONS

The *my Studies @ Unisa* brochures contains an A–Z guide of the most relevant study information. Please refer to it.

13 IN CLOSING

Do not hesitate to contact any of your lecturers (**COS1521-17-S1@unisa.ac.za for Semester 1 or COS1521-17-S2@unisa.ac.za for Semester 2)** or tutors by e-mail if you are experiencing problems with the **content** of this tutorial letter or any aspect of the module.

We wish you every success in your studies.

COS1521 lecturers

14 ASSIGNMENTS FOR COS1521

14.1 SELF-ASSESSMENT ASSIGNMENT FOR THE FIRST AND SECOND SEMESTERS

(Complete this assignment before you begin Assignment 01)

This assignment consists of sections A and B

Please complete sections A **and** B of this assignment before you begin Assignment 01.

Completion dates: Section A: 10/02/17; Section B: 24/02/17 (first semester)
Section A: 26/07/17; Section B: 11/08/17 (second semester)

Contribution to semester mark: None

We give the solution to this assignment in Tutorial Letter 102. Compare your answers with those we supply. If you have not received a printed copy of Tutorial Letter 102, download it from https://my.unisa.ac.za.

DO NOT SUBMIT THIS SELF-ASSESSMENT ASSIGNMENT FOR MARKING.

14.1.1 SECTION A – SELF-ASSESSMENT

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

(2) Tutorial Letter 102: Part I: units 1–4 and Part II

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 the main functions of an operating system.
(i) Compare the memory content of early computers with the memory content 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 devices? Explain.

Question 2

Convert the following numbers into decimals:

(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 into binaries, octals and hexadecimals:

(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 2s complement arithmetic to determine -15 + 12.

14.1.2 SECTION B – SELF-ASSESSMENT

Study material: (1) F&M: chapter 4; Appendix E

(2) Tutorial Letter 102: Parts 1 and II Unit 4

Do the relevant exercises in F&M and Tutorial Letter 102 before attempting this section.

DO NOT SUBMIT

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]'⊕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]**

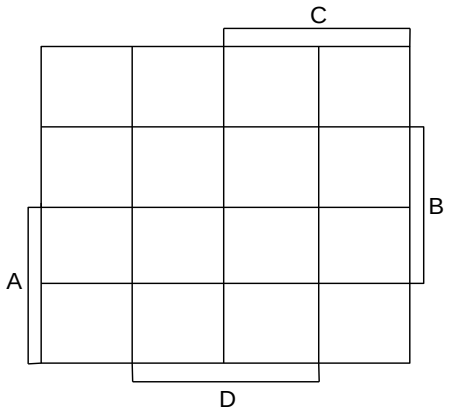
Use only Boolean algebra to simplify the Boolean expression F. (First determine F_1 and F_2, then simplify $F_1 + F_2$, showing all the steps. You need not provide the names of the Boolean rules that you apply.)

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

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. Show the groupings clearly.
Use exactly the same order for the variables as given in the following diagram:



Question 5 **[9]**

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

Package A contains three different types of chemicals.
Package B contains six different types of chemicals.
Package C contains five different types of chemicals.
Package D contains two 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 containing 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 given in the table below) to determine the Boolean function F(A, B, C, D), which 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 if we want 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.

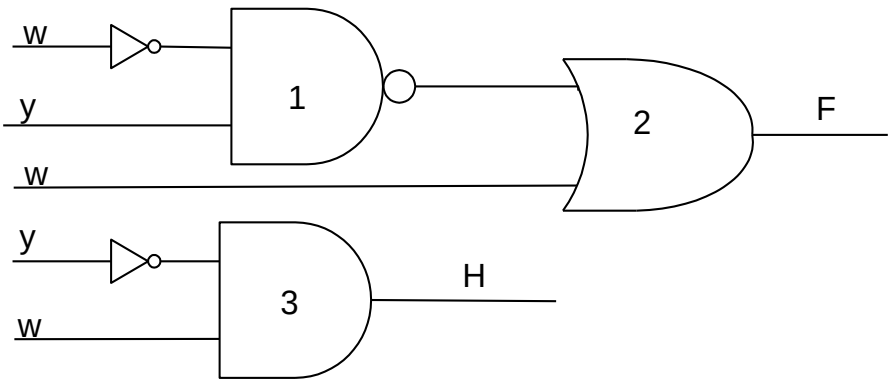
Question 10

Which one of the following options 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'·y)' + w and H = y'·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?

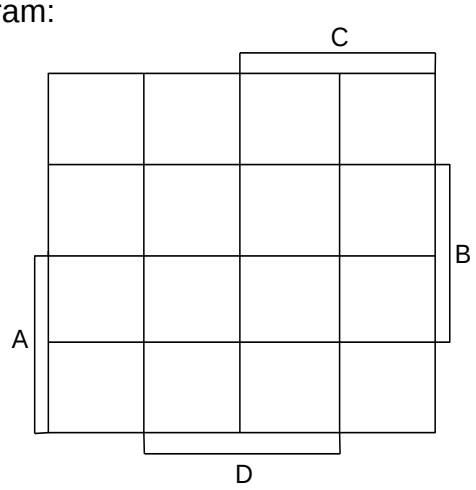
A. Gate 1 must change to a NOR gate.
B. Gate 1 must change to an OR gate.
C. Gate 3 must change to a NAND gate.
D. Gate 3 must change to an OR gate.

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:

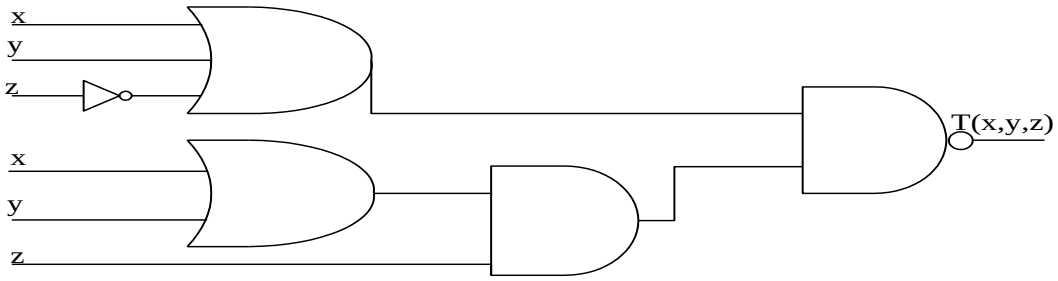


What is the simplified expression of F, derived directly from the Karnaugh map?

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

14.2 FIRST SEMESTER: ASSIGNMENT 01

Due date: **10 March 2017**

Study material: **(1) F&M: chapters 1–4; Appendices A and E (prescribed book)**

(2) Tutorial Letter 102:

Part I: units 1–4

Part II: ALL (pages 24–74)

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 Tutorial Letter 102 in section 2.3 of this tutorial letter.

Submission procedure: Via myUnisa (see section 9.4)

Contribution to semester mark: 40%

Unique assignment number: **816556**

This assignment is compulsory. To be admitted to the **examination** for this module, you must submit this assignment by 08 March 2017.

- Each multiple-choice question has four possible answers. Select the option 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 due date. If this happens, we are notified about the situation and will take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is up again.
- The mark that you achieve out of a possible 40 marks will be converted into 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 there in the von Neumann model?

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

QUESTION 3

Who of the following first introduced 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 the 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 divided into two categories, namely, system areas and application areas. Which of the following belong(s) 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 $(99)_{10}$ into an octal number.

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

QUESTION 9

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

1. $(1B.4)_{16}$
2. $(FB.4)_{16}$
3. $(11.2)_{16}$
4. $(33.2)_{16}$

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

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

QUESTION 12

Convert $(77)_{10}$ into 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 2s complement representation of -36 using 8 bits?

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

QUESTION 15

Convert $(10101.11)_2$ into 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 and measuring and recording them when an audio signal is stored 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. Flipping specific bits in a bit pattern
2. Setting specific bits in a bit pattern
3. Unsetting specific bits in a bit pattern
4. Complementing 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 2s 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 next THREE questions.

QUESTION 25

What is the simplest form of the Boolean function y′ . (x + y)?

1. y′ . x
2. x + y
3. 1
4. x

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

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

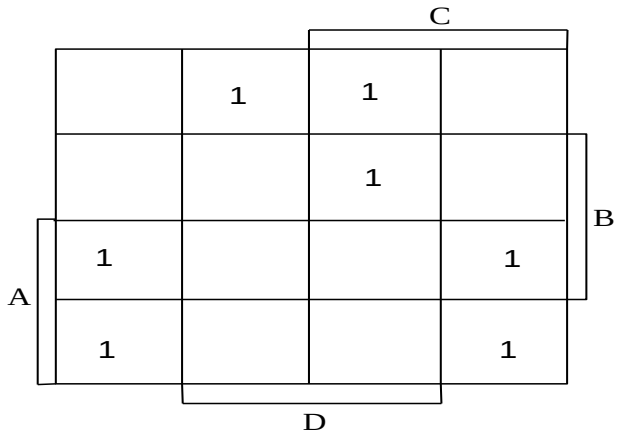
Use the following Karnaugh diagram to determine the value of F(x,y,z) using minterms.

F(x,y,z) = _____?

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. $m_1 + m_3 + m_4 + m_6$

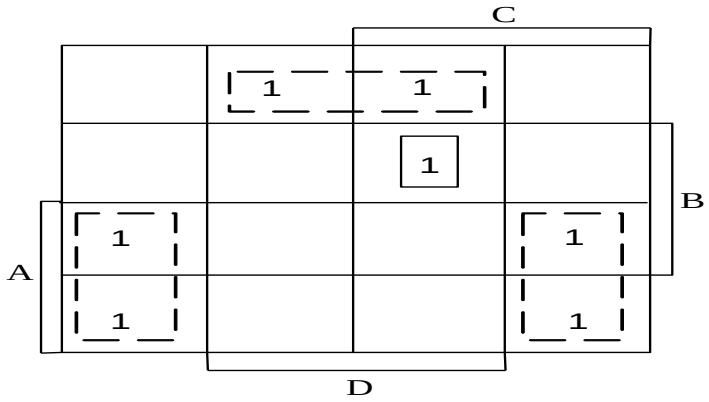
QUESTION 29

Consider the following Karnaugh map:

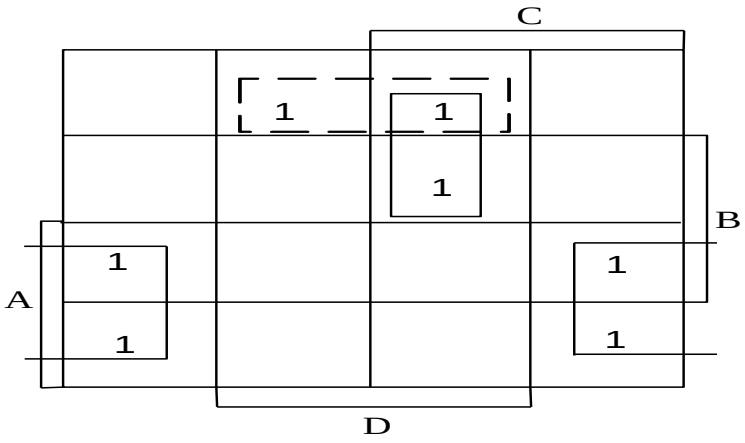


Which one of the following four Karnaugh maps reflects the correct forming of groups?

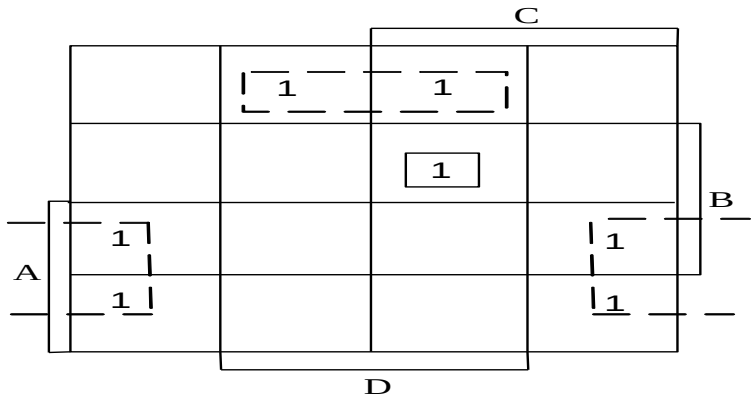
1.



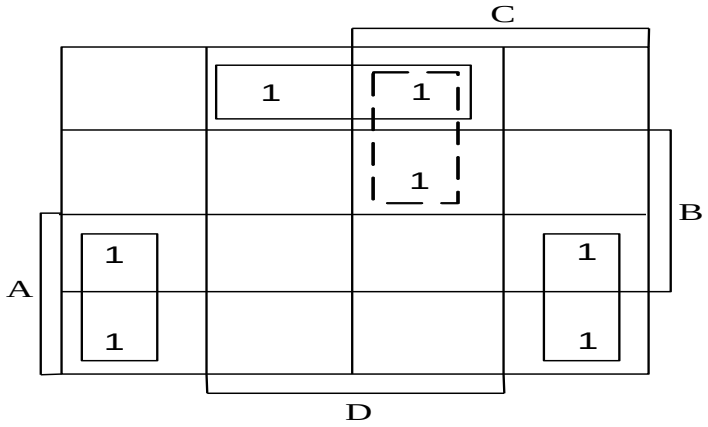
2.



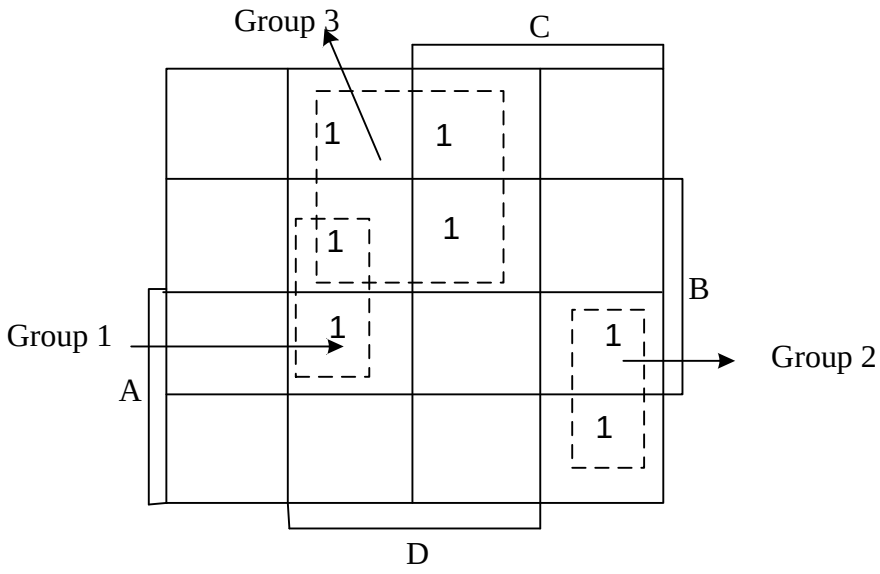
3.



4.



The next THREE questions refer to the following Karnaugh map:



QUESTION 30

Which term represents Group 1?

1. AC′
2. AB′C
3. BCD′
4. BC′D

QUESTION 31

Which term represents Group 2?

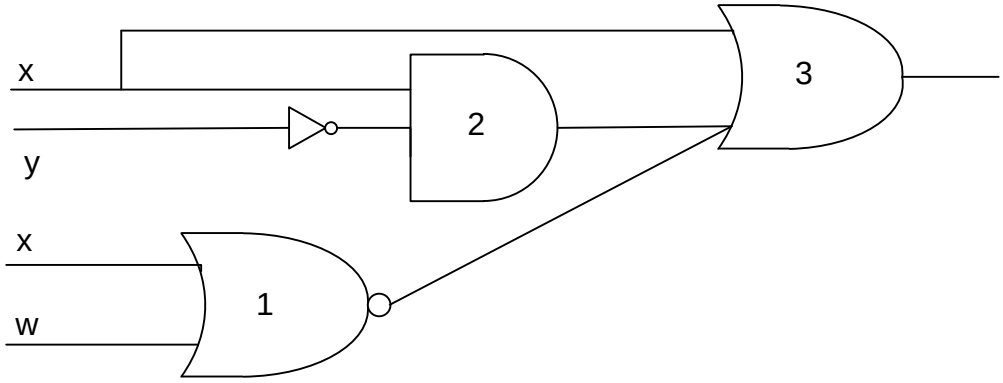
1. AD
2. ACD′
3. BC’D
4. ACD

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)′

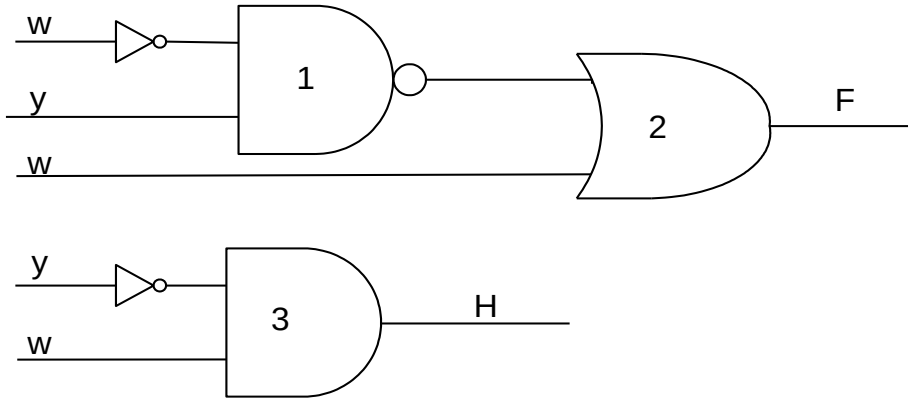
QUESTION 35

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 an end-of-year holiday at a national park.

The father's phone, **Cellphone A**, can only access Facebook and LinkedIn. The mother's phone, **Cellphone B**, can only access LinkedIn and MySpace, and the daughter's phone, **Cellphone 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 Cellphone A along for the holiday, then variable A = 1 (A = 0 if he forgets it). Likewise variable B = 1 if the mother takes her Cellphone B along, and variable C = 1 if the daughter takes her Cellphone C along. Nobody can take another's cellphone. For example, if A = 1, B = 1 and C = 0, it means that the father takes Cellphone A along (there is access to Facebook and LinkedIn), and the mother takes Cellphone 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 <u>at least</u> 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 next 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

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

14.3 FIRST SEMESTER: ASSIGNMENT 02

Due date: 12 **April 2017**

Study material: **(1) F&M: chapters 5–14, but excluding chapter 12**

(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 Tutorial Letter 102 in section 2.3 of the tutorial letter.

Submission procedure: Via myUnisa (see section 9.4)

Contribution to semester mark: 60%

Unique assignment number: **669715**

This assignment is compulsory: the mark you obtain for it contributes to your semester mark.

- Each multiple-choice question has four possible answers. Please 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 due date. If this happens, we are notified about the situation and will take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is up again.
- The mark that you achieve out of a possible 50 marks will be converted into 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 to program other designs?

1. A small set of instructions will do a minimum number of simple operations.
2. Complex instructions are simulated by means of 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 World Wide Web where information is stored in a set of documents that are connected together through 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 required to be in memory for execution.
- 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 it 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 s 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

QUESTION 22

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

1. (i) symbolic (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 statements 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 the 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 a 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 array structures?

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

QUESTION 37

Which algorithm must be done before a new node is put 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 large numbers 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 a 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

14.4 SECOND SEMESTER: ASSIGNMENT 01

Due date: **23 August 2017**

Study material: **(1) F&M: chapters 1–4; Appendices A and E (prescribed book)**

(2) Tutorial Letter 102:

Part I: units 1–4

Part II: ALL (pages 24–74)

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 Tutorial Letter 102 in section 2.3 of the tutorial letter.

Submission procedure: Via myUnisa (see section 9.4)

Contribution to semester mark: 40%

Unique assignment number: **715537**

This assignment is compulsory. To be admitted to the **examination** for this module, you must submit this assignment by 23 August 2017.

- Each multiple-choice question has four possible answers. Select the option 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 due date. If this happens, we are notified about the situation and will take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is up again.
- The mark that you achieve out of a possible 40 marks will be converted into a **percentage** and will contribute 40% towards your semester mark.

Second semester: Assignment 01

QUESTION 1

Which subsystem of a computer is responsible for sending signals to other subsystems?

1. Memory
2. Arithmetic logic unit
3. Control unit
4. Input/Output

QUESTION 2

Computer science has created some peripheral issues. Privacy, copyright and computer crime are categorised as _____ issues.

1. social
2. digital divide
3. security
4. ethical

QUESTION 3

Software engineering refers to …….

1. the design and writing of structured programs.
2. the organisation of data into different entities and formats.
3. computer hardware, data and computer software.
4. peripheral issues categorised as social and ethical issues.

QUESTION 4

Which of the following is NOT true about the universal machine proposed by Alan Turing?

1. It should have input data.
2. It should generate output data.
3. It is a specific-purpose computing machine.
4. It is a general-purpose computing machine.

QUESTION 5

Since 1950, historians have divided computer software and hardware into generations. Which generation witnessed the appearance of palmtop and the use of multimedia?

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

QUESTION 6

The first electronic special-purpose computer was designed specifically to …

1. solve a system of linear equations.
2. break the German Enigma code.
3. control the raising of the warp threads in the manufacture of textiles.
4. sort data stored on punched cards.

QUESTION 7

According to the von Neumann model, memory subsystem is responsible for storing ….. …

1. only data.
2. only programs.
3. programs and data.
4. programs and processes.

QUESTION 8

Convert the decimal number $(75.55)_{10}$ into a binary number.

1. $(1001011.10001)_2$
2. $(1001011.10010)_2$
3. $(1001011.10000)_2$
4. $(1001011.11000)_2$

QUESTION 9

Convert the binary number $(1101010.11\ )_2$ into a hexadecimal number.

1. $(6A.3)_{16}$
2. $(6A.C)_{16}$
3. $(D4.3)_{16}$
4. $(D4.C)_{16}$

QUESTION 10

Convert $(8F.C)_{16}$ into an octal number.

1. $(217.3)_8$
2. $(79.6)_8$
3. $(217.6)_8$
4. $(79.3)_8$

QUESTION 11

Convert hexadecimal number $(3C)_{16}$ into a decimal number.

1. $(50)_{10}$
2. $(55)_{10}$
3. $(60)_{10}$
4. $(65)_{10}$

QUESTION 12

Convert $(26)_8$ into a decimal number.

1. $(20)_{10}$
2. $(22)_{10}$
3. $(24)_{10}$
4. $(26)_{10}$

QUESTION 13

Which of the following is FALSE?

1. $(B)_{16} = (11)_{10}$
2. $(1000)_2 = (10)_8$
3. $(12)_{10} = (14)_8$
4. $(E)_{16} = (15)_8$

QUESTION 14

Which representation is the most efficient for performing arithmetic operations on the numbers?

1. sign-magnitude
2. 1s complement
3. 2s complement
4. unsign-magnitude

QUESTION 15

Which one of the following statements regarding the storing of audio is TRUE?

1. Audio is an example of digital data.
2. It is logical to record all the values of an audio signal over an interval and store them in memory.
3. Sampling rate determines the quality of an audio signal.
4. Quantisation refers to a process that encodes sample values as bit patterns.

QUESTION 16

What decimal integer is stored in memory (8 bits) as 110100010 in 2s complement representation?

1. -114
2. 114
3. -46
4. 46

QUESTION 17

Which one of the following statements regarding the storing of images is TRUE?

1. Raster graphics are used when we need to store a digital image.
2. The scanning rate in image processing is called resolutions.
3. A vector graphic image stores bit patterns for each pixel.
4. Raster graphics decompose an image into a combination of geometrical shapes.

QUESTION 18

Convert $(1.10001)_2$ into normalised form:

1. $(1.10001)_2 \times (2^1)_{10}$
2. $(0.110001)_2 \times (2^0)_{10}$
3. $(0.110001)_2 \times (2^{-1})_{10}$
4. $(1.10001)_2 \times (2^0)_{10}$

QUESTION 19

A mask is used to unset bits of the bit pattern 10100110 (input). What is the output if the mask 00100100 is applied?

1. 01011001
2. 00100100
3. 10110101
4. 10100110

QUESTION 20

If the input is 00001111, and the mask is 10101010, what is the resulting output?

1. 00001010
2. 11110101
3. 01010101
4. 11101000

QUESTION 21
Calculate: $(11101.01)_2$ - $(1011)_2$.

1. $(11010.00)_2$
2. $(10010.01)_2$
3. $(10101.01)_2$
4. $(10010.10)_2$

QUESTION 22
Calculate: $(1011.01)_2$ + $(111)_2$.

1. $(1101.00)_2$
2. $(10010.01)_2$
3. $(11010.01)_2$
4. $(10010.10)_2$

QUESTION 23
Calculate: $(1011)_2$ XOR $(1101)_2$.

1. $(0011)_2$
2. $(0110)_2$
3. $(1101)_2$
4. $(1001)_2$

QUESTION 24
Calculate: $(10011001)_2$ XOR $(00101110)_2$

1. $(11001000)_2$
2. $(01001100)_2$
3. $(00110011)_2$
4. $(10110111)_2$

QUESTION 25

Calculate the simplest form of the Boolean function AB'C + (AB'C)'D.

1. AB'C + D
2. A + B + C + D
3. D'
4. AB'C

QUESTION 26
Which one of the examples below expresses the associative rule of Boolean algebra?

1. (x + y) + z = x + (y + z)
2. x(y + z) = xy + xz

3. x + (y + z) = xy + xz
4. x(yz) = (xy)z

QUESTION 27

Which Boolean rule represents the Boolean function x(x' + y) = xy?

1. Commutative rule
2. Distributive rule
3. Absorption rule
4. Identity rule

QUESTION 28

After applying DeMorgan's theorem to the expression [(A + B + C).D]', the result is

1. A'B'C'D'
2. (ABC)'.D
3. ABC.D'
4. A'B'C' + D'

QUESTION 29

The following question refers to the incomplete truth table below for the expression

$$G = A'C + AB'$$

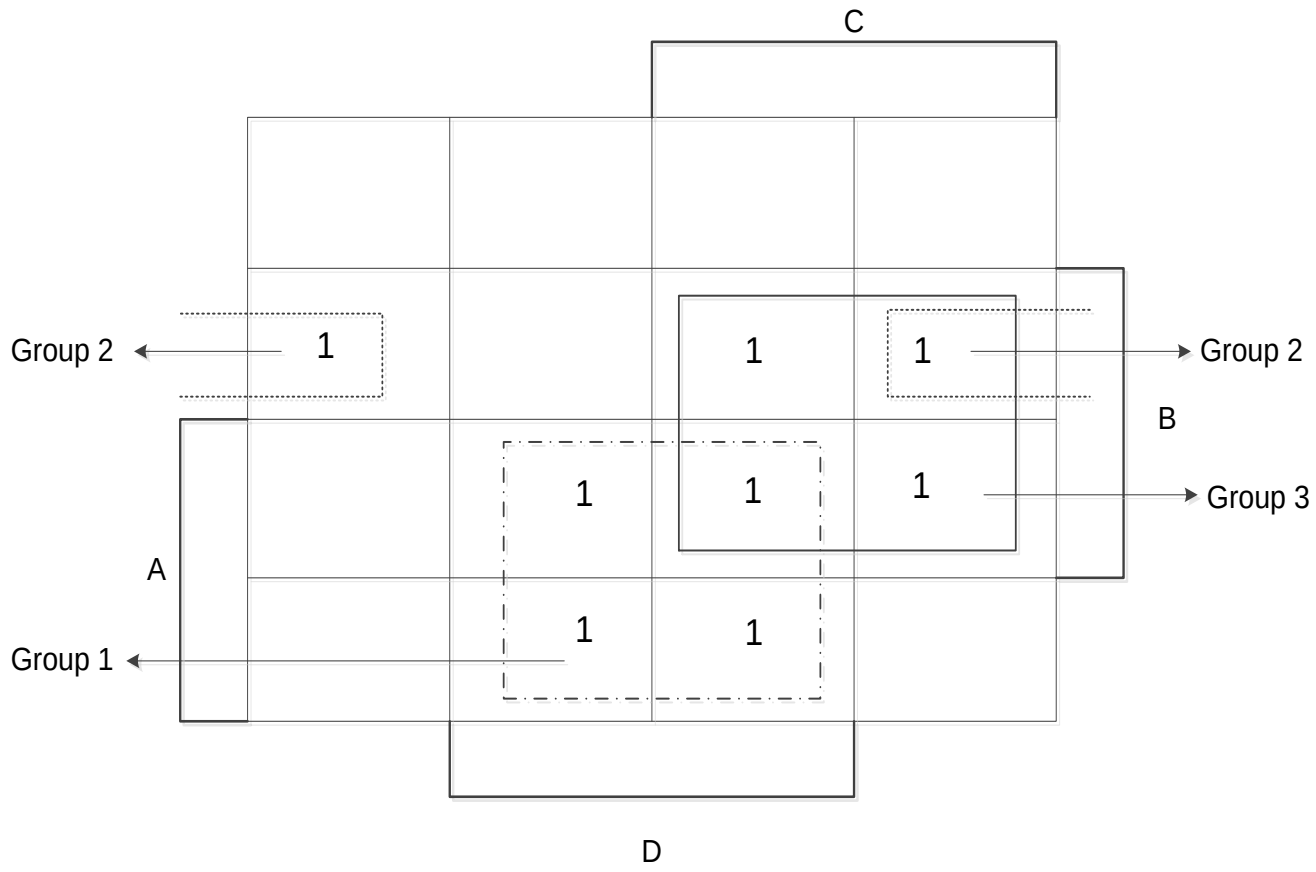
B'C + AB'

What is the expression G in sum of minterms form?

A	B	C	G	minterms	m-notation
0	0	0	0	A'B'C'	m_0
0	0	1	1	A'B'C	m_1
0	1	0	0	A'BC'	m_2
0	1	1	0	A'BC	m_3
1	0	0	1	AB'C'	m_4
1	0	1	1	AB'C	m_5
1	1	0	0	ABC'	m_6
1	1	1	0	ABC	m_7

1. $m_1 + m_2 + m_2$
2. $m_1 + m_4 + m_5$
3. $m_0 + m_2 + m_3$
4. $m_0 + m_4 + m_5$

The next TWO questions refer to the following Karnaugh diagram:



QUESTION 30

Which term represents Group 2?

1. B
2. A'BD'
3. A'BC
4. BD’

QUESTION 31

Which term represents Group 3?

1. A'B
2. D'B
3. BC
4. CBD

QUESTION 32

Which one of the Karnaugh diagrams below represents the expression $X = AC + BC + B$?

1.

	B'C'	B'C	BC	BC'
A'	1	1	1	1
A	0	0	0	0

2.

	B'C'	B'C	BC	BC'
A'	0	0	0	0
A	1	1	1	1

3.

	B'C'	B'C	BC	BC'
A'	0	0	1	1
A	0	1	1	1

4.

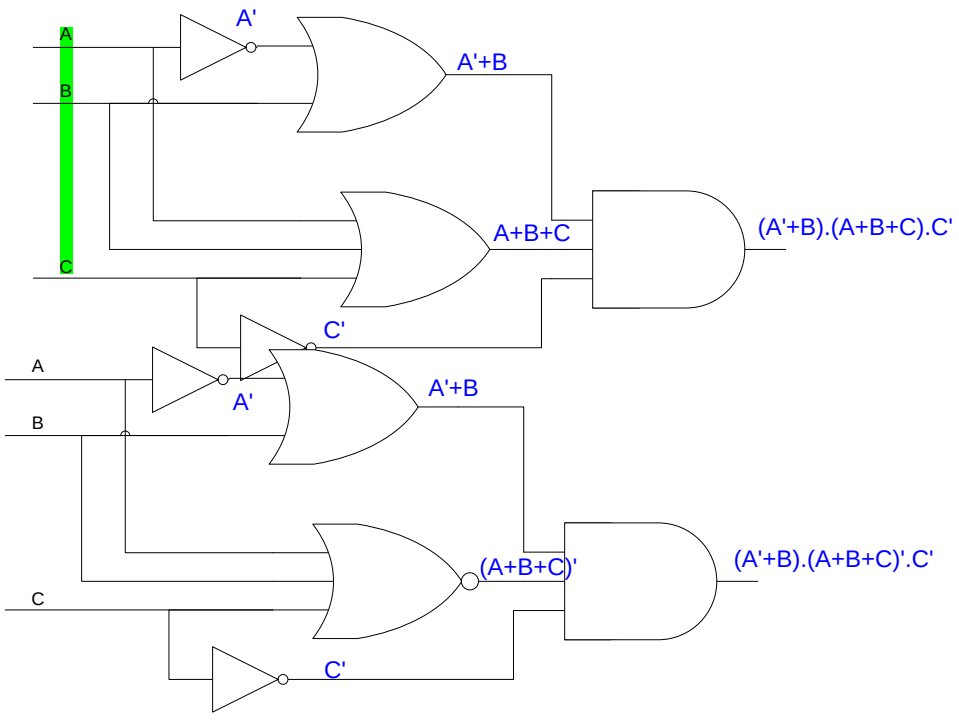
	B'C'	B'C	BC	BC'
A'	1	1	1	0
A	1	1	1	0

QUESTION 33

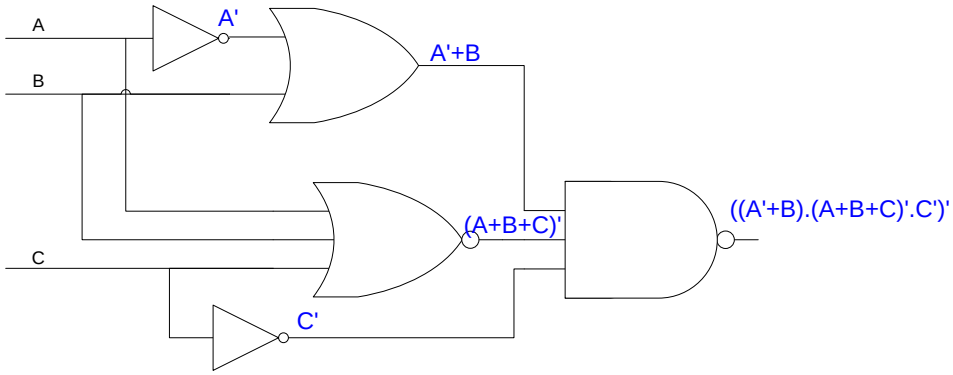
Which logic diagram represents the logic expression BC'?

1.

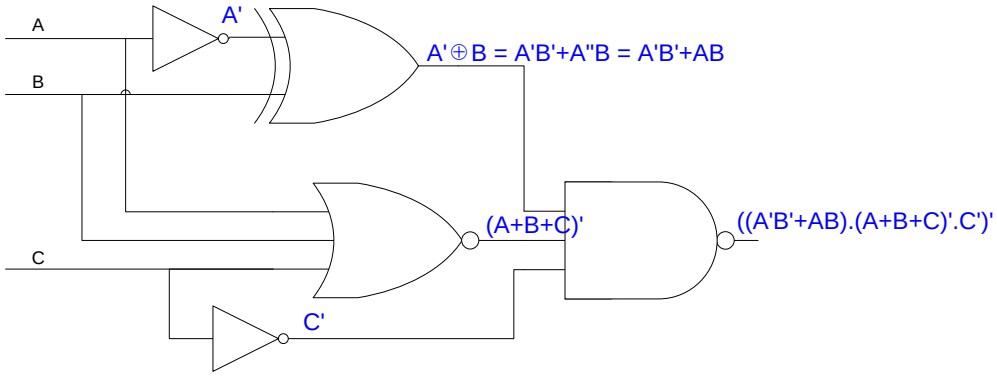
2.



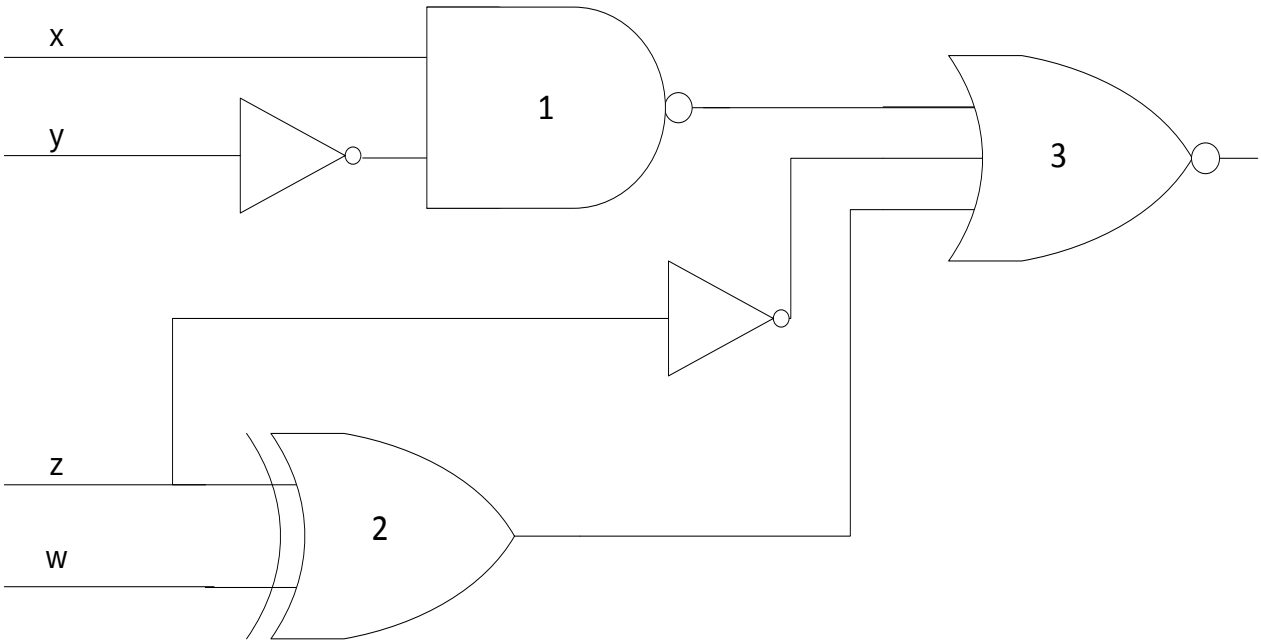
3.



4.



Questions 34, 35 and 36 refer to the following combinational logic circuit:



QUESTION 34
Gate 2 is an example of a _____ gate.

1. AND
2. NAND
3. NOR
4. XOR

QUESTION 35
What is the output of Gate 2?

1. z' ⊕ w
2. z ⊕ w
3. z + w
4. zw' + z'w

QUESTION 36
What is the output of Gate 3?

1. [(x' + y) + z'(z + w)]'
2. (x + y') · (z' + zw' + 'wz)'
3. [(xy')' + z' + (z ⊕ w)]'
4. [(xy')' + z'(z' ⊕ w)]'

The next FOUR questions refer to the following scenario:

Three sensors are attached to a printing device, with two alarms attached to the sensors.

- The first sensor, "A," detects if the printer needs ink.
- The second sensor, "B," detects if the printer needs repair.
- The third sensor, "C," detects if the printer will jam.

If the printer jams or needs repair, alarm 1 sounds. If the printer jams or is short on ink, alarm 2 sounds.

Suppose the input variables A, B and C in a truth table take on the value 1 whenever a problem is detected. For example, if A = 0, B = 1 and C = 1, it means that the printer needs repair (B) or the printer will jam (C) and alarm 1 will sound.

A Boolean function F(A,B,C) is defined as follows: F(A,B,C) = 1 when two or more problems occur at once and a zero otherwise.

Different input combinations for A, B and C are given in the tables provided in the next FOUR questions. Which option shows the correct outputs for F in EACH question?

QUESTION 37

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

QUESTION 38

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

QUESTION 39

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

QUESTION 40

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

14.5 SECOND SEMESTER: ASSIGNMENT 02

Due date: **27 September 2017**

Study material: **(1) F&M: Chapters 5–14, but excluding Chapter 12**

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

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

Submission procedure: Through myUnisa (see section 9.4)

Contribution to semester mark: 60%

Unique assignment number: **756424**

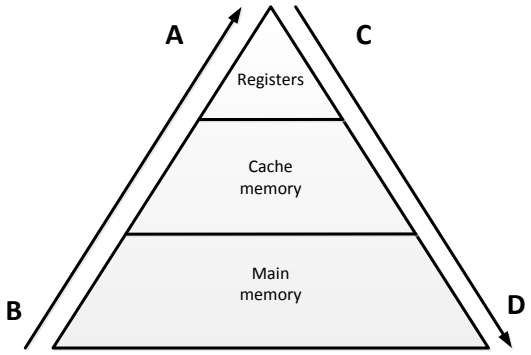
This assignment is compulsory. The mark you obtain for it contributes to your semester mark.

- Each multiple-choice question has four possible answers. Please select the answer you consider to be the most appropriate.
- Submit your assignment through myUnisa by the due date. Do not be concerned if myUnisa is down on the due date. If this happens, we are notified about the situation and we will take this type of delay into consideration. Try to resubmit the assignment as soon as myUnisa is up again.
- The mark that you achieve out of a possible 50 marks will be converted into a **percentage** and will contribute 60% towards your semester mark.

Second semester: Assignment 02

QUESTION 1

In the following figure the hierarchical levels of memory are provided. The costliness (A and B) and speed (C and D) with regard to the memory hierarchy are indicated by the arrowed lines in the figure. Choose the option that gives the correct information for A, B, C and D.



1.	A less costly,	B more costly,	C slowest,	D fastest
2.	A more costly,	B less costly,	C fastest,	D slowest
3.	A less costly,	B more costly,	C fastest,	D slowest
4.	A more costly,	B less costly,	C slowest,	D fastest

QUESTION 2

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

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

QUESTION 3

A computer has 1 024 MB of memory. Each word in this computer has 64 bytes. How many bits are needed to address any single word in memory?

1. 25
2. 26
3. 23
4. 24

QUESTION 4

Pipelining can be defined as:

1. The simulation of complex instructions by means of simple instructions.
2. Programming to be done in two levels: *microoperations* and *microprogramming*.
3. Processing of an instruction that starts before another instruction is finished.
4. A single computer having multiple control units, multiple logic units and multiple memory units.

QUESTION 5

A host communicates with another host using the TCP/IP protocol. What is the unit of data sent or received by the application layer?

1. message
2. datagram
3. frame
4. bytes

QUESTION 6

There are several layers in the internet TCP/IP suite. What is the transport layer responsible for?

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

QUESTION 7

Which of the following is NOT a component of email architecture?

1. MTA server
2. MAA client
3. FTP protocol
4. UA program

QUESTION 8

A computer that translates _____ of another computer into a(n) _____ and vice versa on request is known as a DNS server.

1. the domain name and IP address
2. the host address and domain name
3. the domain name and server address
4. the server name and IP address

QUESTION 9

What are the identifiers needed for defining a webpage?

1. protocol, client, port, path
2. protocol, host, browser, path
3. protocol, host port, path
4. protocol, client, server, path

QUESTION 10

In _____ only one program can reside in memory for execution.

1. monoprogramming
2. multiprogramming
3. partitioning
4. paging

QUESTION 11

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

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

QUESTION 12

Which two of the following techniques belong to the *swapping* category?

A. Paging
B. Segmentation
C. Demand paging
D. Demand segmentation
E. Partitioning

1. A and B
2. B and C
3. C and D
4. D and E.

QUESTION 13

A process in the ready state goes to the running state when _____.

1. it enters memory.
2. it requests.
3. it gets access to the CPU.
4. it has finished running.

QUESTION 14

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 15
Which ONE of the following managers is responsible for archiving and backup?

1. memory
2. process
3. device
4. file

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. 2, 5, 8
3. 4, 5, 6
4. 7, 10, 13

QUESTION 17
Suppose a list contains the following elements:

55 71 16 33 65 48 83 24

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

1. 16 24 33 55 65 48 83 71
2. 16 71 55 33 65 48 83 24
3. 16 24 55 33 65 48 83 71
4. 16 24 33 55 48 65 71 83

QUESTION 18
In which sorting algorithms is the list to be sorted divided into two sublists – sorted and unsorted – and separated by an imaginary wall?

1. Selection sort
2. Bubble sort
3. Insertion sort
4. Deletion sort

QUESTION 19
Which construct is represented by the pseudocode below?

get our number
set our initial count to 0
***while** our number is greater than 1*
divide the number 2
increase our count by 1
end

1. Sequence
2. Decision
3. Repetition
4. Generalisation

QUESTION 20
The way a card game player arranges his cards as he picks them up one by one, is an example of?

1. Bubble sort
2. Selection sort
3. Insertion sort
4. Merge sort

QUESTION 21
Which one of the following is a logical part of the "summation" algorithm?

1. Swap the selection algorithm.
2. Initialisation of the product at the beginning.
3. The loop, which in each iteration multiplies a new integer with the product.
4. Return of the result after exiting from the loop.

QUESTION 22
Which language was understood by the computer hardware, where the language was made of electronic switches with two states?

1. Computer language
2. High-level language
3. Assembly language
4. Machine language

QUESTION 23
(i) _____and (ii) _____ are both classified as object-oriented languages.

1. (i) BASIC (ii) C#
2. (i) Java (ii) C

3. (i) C (ii) Visual Basic
4. (i) C++ (ii) C#

QUESTION 24

During the source code translation process, the source file goes through a series of subprocesses to its final output. In which subprocess does a set of tokens constitute parses to find instructions?

1. syntax analysis
2. lexical analysis
3. code generation
4. semantic analysis

QUESTION 25

What is the tool used by a programmer to convert a source program into the object program?

1. Compiler
2. Language translator
3. Linker
4. Preprocessor

QUESTION 26

Which computer programming language is known for using *prolog*?

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

QUESTION 27

Which one of the following is a common language in the business environment?

1. FORTRAN
2. C++
3. C
4. COBOL

QUESTION 28

State whether True or False for the Incremental Model.

A. Software is developed in a series of steps.
B. The developers do not add more functionality until the existing system works properly.

1. False, False
2. False, True
3. True, False
4. True, True

QUESTION 29

Coupling is _____.

1. the encapsulation of data and methods.
2. the division of a large program into smaller parts that can communicate with each other.
3. a measure of how tightly two modules are bound to each other.
4. a measure of how closely the modules in a system are related.

QUESTION 30

Transferability is one of the measures for software quality. Transferability includes _____.

1. portability
2. changeability
3. flexibility
4. efficiency

QUESTION 31

_____ is a black box testing method.

1. Boundary value testing
2. Basic path testing
3. Code path testing
4. Control stricture testing

QUESTION 32

The objective of the testing phase is ...

1. to debug software.
2. to uncover errors.
3. to gain modularity.
4. to analyse systems.

QUESTION 33

Documentation is needed in order for software to be used properly and maintained efficiently. Technical documentation _____.

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

QUESTION 34

All the members of a record must be _____.

1. of the same type
2. of a related type
3. of an integer type
4. of a character type

QUESTION 35

Which one of the following best describes what a linked list 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 related elements, possible of different types.
4. A collection of data in which each element contains the location of the next element.

QUESTION 36

Which one of the following operations can be defined on array structures?

A. Searching
B. Deletion
C. Retrieval
D. Insertion

Options:

1. Only A, B and C
2. Only B, C and D
3. Only A, B and D
4. A, B, C, and D.

QUESTION 37

Given a linked list called children, the pointer variable children identifies the _____ element of the linked list.

1. first
2. second
3. middle
4. last

QUESTION 38

What is an ordered collection of data in which each element contains the location of the next element?

1. An array
2. A record
3. A linked list
4. A node

QUESTION 39

State whether the two statements below are True or False with regard to the retrieval of elements.

A. Retrieving means randomly accessing an element for the purpose of inspecting or copying the data contained in the element.

B. Retrieving is a difficult operation when a data structure is an array.

1. False, False
2. False, True
3. True, False
4. True, True

QUESTION 40

When a sequential file is updated, which file contains the changes to be applied?

1. new master
2. old master
3. transaction
4. error report

QUESTION 41

What is the address produced by a hashing algorithm?

1. probe
2. synonym
3. collision
4. home

QUESTION 42

How many field(s) does the index of an indexed file have?

1. one
2. two
3. three
4. four

QUESTION 43

When digit extraction hashing is used, selected digits are extracted from the key and used as _____

1. the buckets
2. the address
3. the record
4. the report

QUESTION 44
Which one of the following steps is NOT correct when a record in the file is accessed?

1. The entire index file is loaded into main memory.
2. The index entries are searched by means of an efficient search algorithm such as a binary search for the purpose of finding the desired key.
3. The address of the record is retrieved.
4. Using the address, the data record is retrieved and passed to the mapping.

QUESTION 45
The data model and the schema of a DBMS are often defined at the _____level.

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

QUESTION 46
In the _____ model, the entities are organised in a graph, in which some entities can be accessed through several paths.

1. network
2. distributed
3. relational
4. hierarchical

QUESTION 47
What name is given to a column of relations (table)?

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

QUESTION 48
A binary operator is applied to _____ relations(s) and creates an output of_____relation(s).

1. one, one
2. one, two
3. two, one
4. two, two

QUESTION 49

In a replicated distributed database, _____.

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

QUESTION 50

Which of the following is a declarative language used on relational databases?

1. PDQ
2. SQL
3. LES
4. PBJ

II---oooOooo---II

Appendix A

STEPS FOR DOWNLOADING THE CAI TUTORIAL FROM THE WEB

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

Here is the link:

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

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

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

You can now navigate through the tutorial.

We have tested these steps without experiencing any problem. Depending on your browser and operating system, there may be a slight variation in these steps. If you need to, 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.

This CAI tutorial is optional.