Tutorial Letter 101/3/2015

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

Please note

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 11 March 2015.

Semester 2: Submit Assignment 01 by 26 August 2015.

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 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 we introduce you to number systems, data storage and operations on data. Furthermore, the basics of logic gates and Boolean algebra will ultimately help you to draw simple combinational logic circuits when given a problem statement. We also investigate the fundamentals of sequential logic circuits. You 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.

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.

This is partially an online module, and therefore some learning content and all tutorial letters are available on myUnisa. However, in order to support you in your learning process, you will also receive some study materials in printed format. You need to go online to see your study materials and read what to do for the module. Go to the website here: https://my.unisa.ac.za and login with your student number and password. You will find COS1521-2015-S1, for first semester, and COS1521-2015-S2 for the second semester in the row of modules in the orange blocks across the top of the webpage. Remember to also check in the -More- tab if you cannot find it in the orange blocks. Click on the module you want to open.

We wish you everything of the best for your studies this semester.

Note: The tutorial matter for COS1521 is only available in English.

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 you 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 you have achieved the following outcomes:

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 circuit 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
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 placed by computer architecture upon numerical computations
1.5 determine outputs of basic combinational logic circuits for given inputs
1.6 give graphical representations of 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 in the context of some short historical background, different architectures and ethical scenarios/issues.
2.2 Describe software engineering and operating systems, including the development of software in a historical context.
2.3 Describe a basic computer, including the three basic hardware subsystems and their interconnecting functioning.
2.4 Describe an operating system, including the functioning of its components.
2.5 Describe popular operating systems with references to different popular operating platforms.
2.6 Define an algorithm, including its relation to problem-solving.

2.7 Define the three algorithm constructs and include descriptions of their use 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 Describe subalgorithms and include their relations 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 categories of directories and of 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.

Syllabus

The module content is covered by chapters 1 to 11, 13 & 14 of the prescribed textbook, referred to as F&M, mentioned in 4.1 and all the tutorial letters, including Tutorial Letter 102. The excluded sections of the prescribed book are: 2.3, 5.8 8.7 and 14.6.

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 organization

Chapter 6:   Computer networks and 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 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.

<u>**Very important:**</u> *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. These pages will help you to understand the textbook content better so that you can answer the questions in Assignment 01.* <u>***Please read Tutorial Letter 102***</u> *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 e-mail. The e-mail address to use for Semester 1 is **COS1521-15-S1@unisa.ac.za** and for Semester 2 **COS1521-15-S2@unisa.ac.za.**

You can find the names of your lecturers, their contact details (including e-mail addresses) and School of Computing contact information on myUnisa in Tutorial Letter COSALLF for 2015.

You can also obtain the contact information for lecturers and the school 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 your benefit 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 websites first to see whether we have not already answered your queries. Since most students encounter the same problems, we answer the most common problems in the tutorial letters or on the websites.

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 COSALLF tutorial letter that you will receive early in the semester. Should you have difficulty in contacting the lecturers, you are welcome to phone the secretary of the School of Computing to leave a message. The contact number to call is also given in COSALL. **Note that the school has moved from the Mucklenuek campus in Pretoria to the Florida campus in Roodepoort, Johannesburg.**

For **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*

The School of Computing can be contacted as follows:

Telephone number: 011 670 9200

E-mail: computing@unisa.ac.za

3.3   *UNIVERSITY*

To contact the University, you should follow the instructions in the ***myStudies @ Unisa*** brochure. Remember to have your student number available when you contact the University.

When you contact anybody in the university, please do not forget to always include your student number. This will help that person to assist you.

If you need to contact the university about administrative matters via e-mail, you should send your queries 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

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

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 optional 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.

4.5   *INFORMATION ON TUTORIAL OFFERINGS AT UNISA*

Please be informed that, with effect from 2013, Unisa offers online tutorials (e-tutoring) to students registered for modules at NQF level 5 and 6, this means qualifying first year and second year modules.

Once you have been 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. Thereafter you will receive an sms informing you about your group, the name of your e-tutor and instructions on how to log onto MyUnisa in order to receive further information on the e-tutoring process.

Online tutorials are conducted by qualified E-Tutors who are appointed by Unisa and are offered free of charge. All you need to be able to participate in e-tutoring is a computer with internet connection. If you live close to a Unisa regional Centre or a Telecentre contracted with Unisa, please feel free to visit any of these to access the internet. E-tutoring takes place on MyUnisa where you are expected to connect with other students in your allocated group. It is the role of the e-tutor to guide you through your study material during this interaction process. For your to get the most out of online tutoring, you need to participate in the online discussions that the e-tutor will be facilitating.

There are modules which students have been found to repeatedly fail, these modules are allocated face-to-face tutors and tutorials for these modules take place at the Unisa regional centres. These tutorials are also offered free of charge, however, it is important for you to register at your nearest Unisa Regional Centre to secure attendance of these classes.

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.

<u>SCIENCE FOUNDATION PROGRAMME:</u>

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

Week	Date (Mondays)	Activities	Tutorial matter
1	26 January		F&M, Chapters 1 & 2 Tutorial Letter 102, Units 1 & 2, & Part II
2	2 February	Start Assignment 01	F&M, Chapters 3 & 4; Appendix A Tutorial Letter 102, Units 3 & 4, & Part II
3	9 February	Do Self-assessment (Section A) by 13/02/15. **(Do not submit.)**	F&M, Chapters 1 – 4; Appendix A Tutorial Letter 102, Units 1 – 4 & Part II
4	16 February		F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
5	23 February	Do Self-assessment (Section B) by 27/02/15. **(Do not submit.)**	F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
6	2 March		F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
7	9 March	**Complete Assignment 01 (Due date: <u>11 March</u>)**	F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
8	16 March	Start Assignment 02	F&M, Chapters 5 & 6 Tutorial Letter 102, Units 5 & 6
9	23 March		F&M, Chapters 7, 8 & 9 Tutorial Letter 102, Units 7, 8 & 9
10	30 March		F&M, Chapters 10 & 11 Tutorial Letter 102, Units 10 & 11
11	6 April		F&M, Chapters 13 & 14 Tutorial Letter 102, Units 13 & 14
12	13 April	**Complete Assignment 02 (Due date: <u>13 April</u>)**	F&M, Chapters 5 – 14 Tutorial Letter 102, Units 5 – 14
13 - 15	20 Apr. up to examination date	Revision	
		Examinations	

	SECOND SEMESTER STUDY PROGRAMME		
Week	**Date (Mondays)**	**Activities**	**Tutorial matter**
1	13 July		F&M, Chapters 1 & 2 Tutorial Letter 102, Units 1 & 2, & Part II
2	20 July	Start Assignment 01	F&M, Chapters 3 & 4; Appendix A Tutorial Letter 102, Units 3 & 4, & Part II
3	27 July	Do Self-assessment (Section A) by 31/07/15. **(Do not submit.)**	F&M, Chapters 1 – 4; Appendix A Tutorial Letter 102, Units 1 – 4 & Part II
4	3 August		F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
5	10 August	Do Self-assessment (Section B) by 14/08/15. **(Do not submit.)**	F&M, Chapter 4; Appendix E Tutorial Letter 102, Unit 4 & Part II
6	17 August		F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
7	24 August	**Complete Assignment 01 (Due date: <u>26 August</u>)**	F&M, Appendix A & E Tutorial Letter 102, Units 1 – 4 & Part II & III
8	31 August	Start Assignment 02	F&M, Chapters 5 & 6 Tutorial Letter 102, Units 5 & 6
9	7 September		F&M, Chapters 7, 8 & 9 Tutorial Letter 102, Units 7, 8 & 9
10	14 September		F&M, Chapters 10 & 11 Tutorial Letter 102, Units 10 & 11
11	21 September		F&M, Chapters 13 & 14 Tutorial Letter 102, Units 13 & 14
12	28 September	**Complete Assignment 02 (Due date: <u>28 September</u>)**	F&M, Chapters 5 – 14 Tutorial Letter 102, Units 5 – 14
13 - 15	5 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** is NOT to be submitted but must be attempted.

Assignments 01 and 02 are to be submitted. See all the assignments in Section 8 of this tutorial letter.

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:

$(70 \times 0.4) + (90 \times 0.6)\%$ = 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:
$(82 \times 0.20) + (68 \times 0.80)\%$ = $(16.4 + 54.4)\%$ = 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	**557758**
02	**557796**
Semester 2	
Assignment	**Unique assignment number**
01	**592803**
02	**592946**

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: 13 Feb	-
	Part B: 27 Feb	-
02	Part A: 31 July	-
	Part B: 14 Aug	-
First semester		
Assignment	Due date	Weight towards semester mark
01	11 March	40%
02	13 April	60%
Second semester		
Assignment	Due date	Weight towards semester mark
01	26 August	40%
02	28 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 three 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 14 of this tutorial letter.

9   OTHER ASSESSMENT METHODS

There are no other assessment methods for this module

10   EXAMINATIONS

FIRST SEMESTER: **In order to be considered for the** first semester examination admission **in COS1521, a student** must submit Assignment 01 by 11 March 2015.

SECOND SEMESTER: **In order to be considered for the** second semester examination admission **in COS1521, a student** must submit Assignment 01 by 26 August 2015.

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

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   SOURCE CONSULTED
See section 4.1 and 4.2

13 CONCLUSION

Do not hesitate to contact any of your lecturers (**COS1521-15-S1@unisa.ac.za for semester 1 or COS1521-15-S1@unisa.ac.za for semester 2)** or tutors by email if you are experiencing problems with the **content** of this tutorial letter or any aspect of the module.

We wish you a fascinating and satisfying journey through the learning material and trust that you will complete the module successfully.

Enjoy the journey!

COS1521 lecturers

14   ADDENDUM

14.1   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: 13/02/15; Section B: 27/02/15 (First semester)
                            Section A: 31/07/15; Section B: 14/08/15 (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

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

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.)

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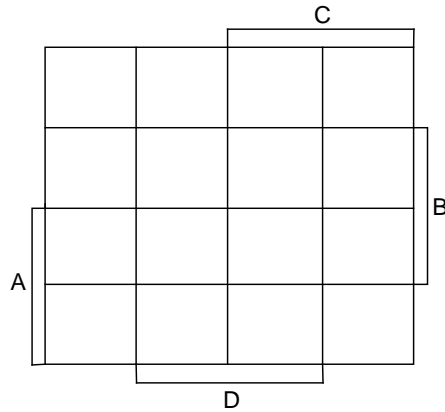$F_2 = (xw + w')'$
$F(w, x, y) = F_1 + F_2.$

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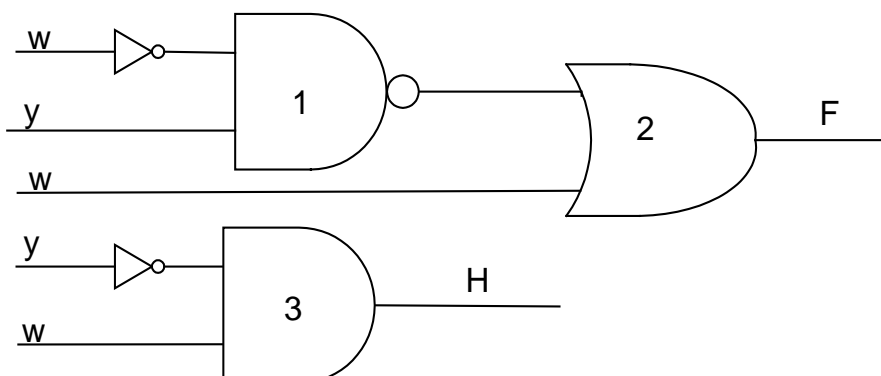
These two logic circuits are not equivalent. The outputs are F = (w'·y)' + w and H = y'·w. One of the four gates must be changed in order for the circuits to become equivalent. Which gate must be changed and what kind of gate must it become?

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:
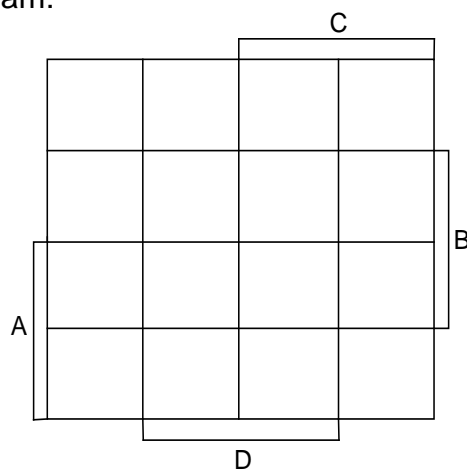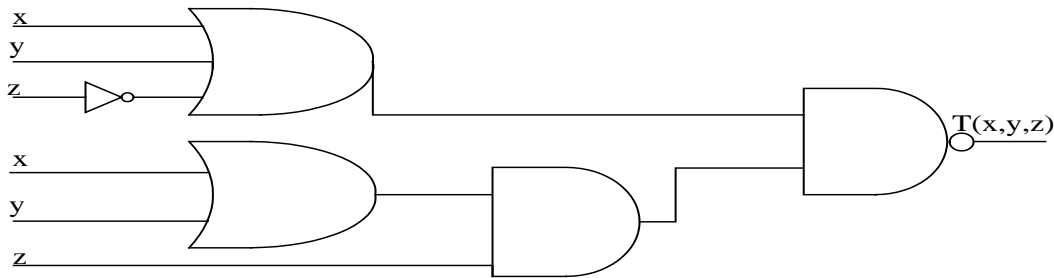

What is the simplified expression of F, derived directly from the *Karnaugh* map?
A. F = AB'CD' + B'C'D + BC
B. F = B'C'D + ACD' + BC
C. F = B'C'D + BCD + CD'
D. F = AB'C'D' + A'B'C'D' + ACD' + BC

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

26

FIRST SEMESTER ASSIGNMENTS

14.2   FIRST SEMESTER: ASSIGNMENT 01

Due date: **11 March 2015**

Study material: **(1) F&M: chapters 1 - 4; Appendices A & E (textbook)**

                       (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 2.3.

Submission procedure: Via myUnisa (see 8.3)

Year mark weight: 40%

Unique assignment number: **557758**

Compulsory: To be considered for **examination** in this module, you must submit this assignment by 11 March 2015.

- Each multiple-choice question has four possible answers. 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 due date. We are notified and will 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 Turing, the output data of a computer depends on which factor (s)?

1. Input only
2. CPU speed and input
3. Input and program
4. Program and CPU speed

QUESTION 2

Since 1950, historians have divided computer software and hardware into generations. Which of them is referred to as the 'open-ended generation'?

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

QUESTION 3

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

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 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 thinks 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 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 $(77)_{10}$ to a hexadecimal number.

1. $(43)_{16}$
2. $(4D)_{16}$
3. $(54)_{16}$
4. $(5F)_{16}$

QUESTION 9

Convert $(10111.01)_2$ to an octal number.

1. $(25.01)_8$
2. $(52.2)_8$
3. $(27.2)_8$
4. $(53.1)_8$

QUESTION 10

Which one of the following number representations is NOT correct?

1. $(11.1)_{10}$
2. $(18.3)_8$
3. $(11.A)_{16}$
4. $(100.0)_2$

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 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 −37 using 7 bits?

1. $(0101100)_2$
2. $(1010011)_2$
3. $(1011011)_2$
4. $(0100101)_2$

QUESTION 15

Convert $(101.1101)_2$ to normalised form.

1. $(0.1011101)_2 \times (2^{-4})_{10}$
2. $(1.011101)_2 \times (2^4)_{10}$
3. $(1.011101)2 \times (22)_{10}$
4. $(0.1011101)_2 \times (2^3)_{10}$

QUESTION 16

Currently, computers store data in different forms. Which one of the following is not a *type of data* for computers?

1. Audio
2. Video
3. Byte
4. Numbers

QUESTION 17

Which one of the following refers to the process of converting quantized samples values to bit patterns when storing audio?

1. Sampling
2. Quantisation
3. Compression
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 XOR operator?

1. To set specific bits in a bit pattern.
2. To flip 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: $(101001)_2$ - $(1111)_2$.

1. $(11001)_2$
2. $(11110)_2$
3. $(11010)2$
4. $(11101)_2$

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 xy′ + [(x′ + y) . z)]?

1. 1
2. xy′z
3. xy′ + z
4. xy′ + x′z + yz

QUESTION 26

What is the simplest form of the Boolean function x′y + x′yz′ + x′yz?

1. 0
2. x′yz′ + x′y z
3. x′y
4. 1

QUESTION 27

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

1. x′y
2. x + y
3. x′ + y′
4. x′y′

QUESTION 28

Consider the following Boolean function:

$$F(x,y,z) = m_1 + m_2 + m_5 + m_7$$

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

1.

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

2.

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

3.

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

4.

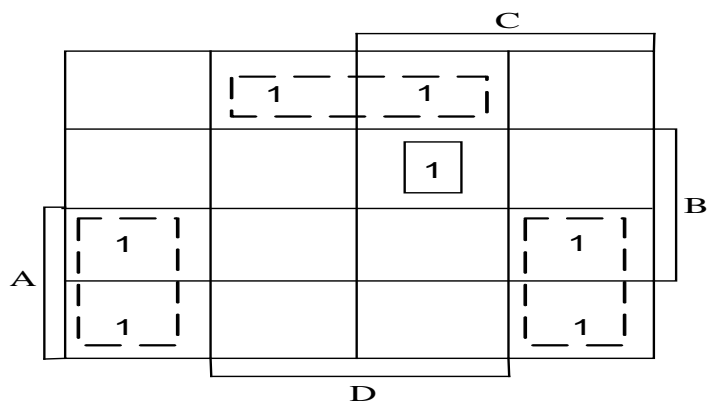|	y'z'	y'z	yz	yz'
x'			1	1
x		1		1

QUESTION 29
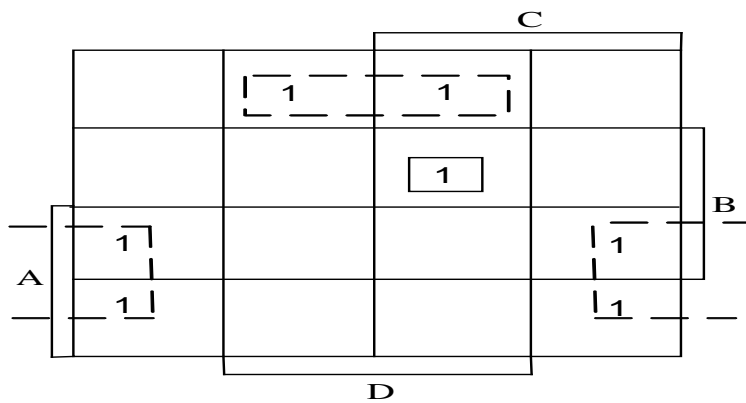
Consider the following Karnaugh map:
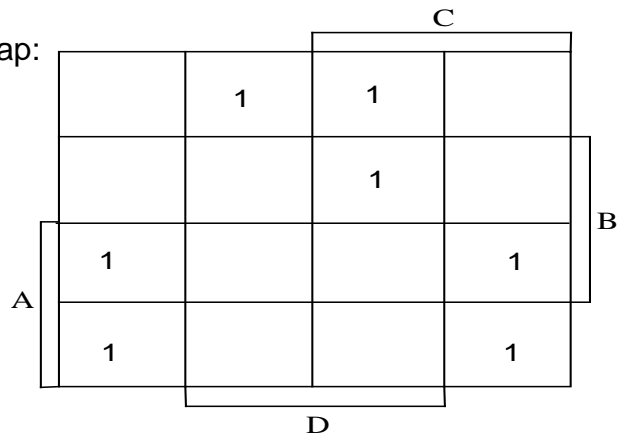
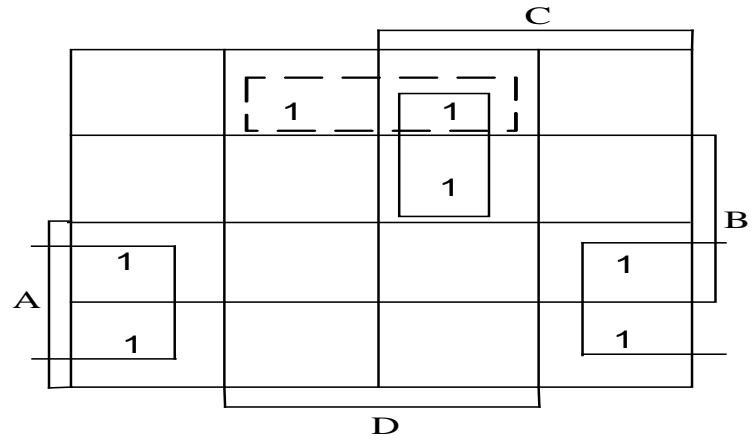**Which one of the following four Karnaugh maps reflects the correct forming of groups?**
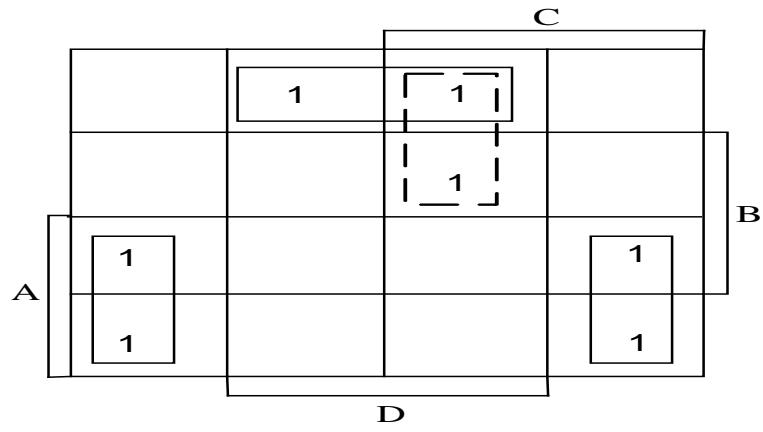
1.

2.

3.

4.

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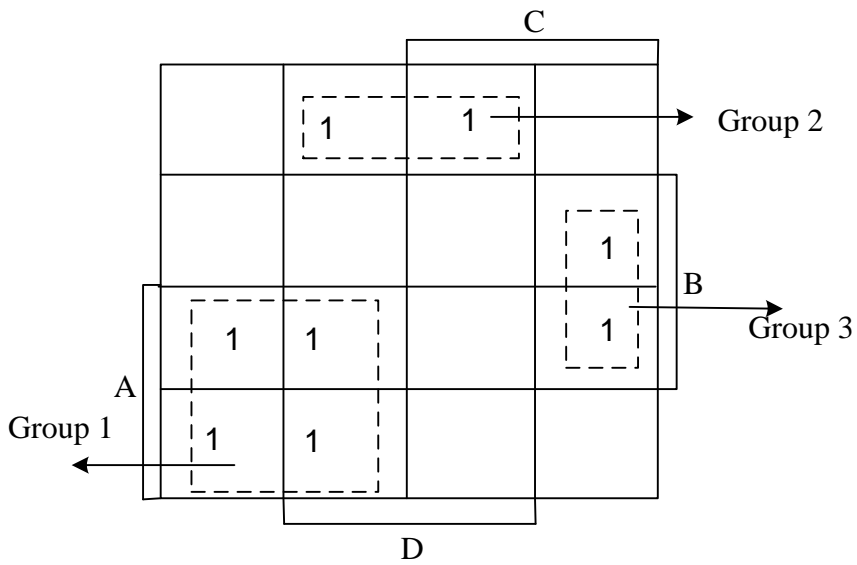
QUESTION 30

Which term represents Group 1?

1. A′C′
2. AC
3. AC′
4. A′

QUESTION 31

Which term represents Group 2?

1. A′B′D
2. A′BD
3. BC′D
4. CD

QUESTION 32

Which term represents Group 3?

1. BCD′
2. BC′D′
3. A′BD
4. B′CD′

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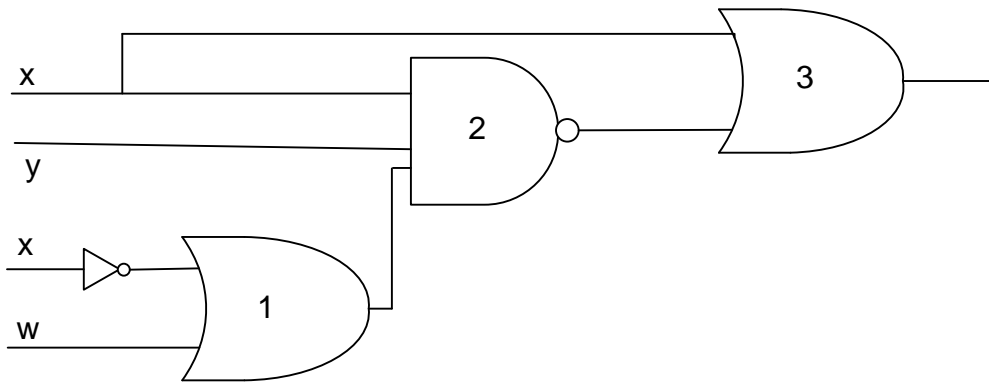
QUESTION 33

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 ′ + w ′).y′.x]′
2. [(x′ + w).y.x]′
3.   (x′ + w) + y′ + x
4. [(x.w) + y′ + x]′

QUESTION 35

What is the output of Gate 3?

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

QUESTION 36

Consider the following two logic circuits:

These two logic circuits are not equivalent. F = (xy)′ + y′ and H = y′. One of the two 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 2 must change to an AND gate.
2. Gate 1 must change to an AND gate.
3. Gate 2 must change to a NAND gate.
4. Gate 1 must change to an OR gate.
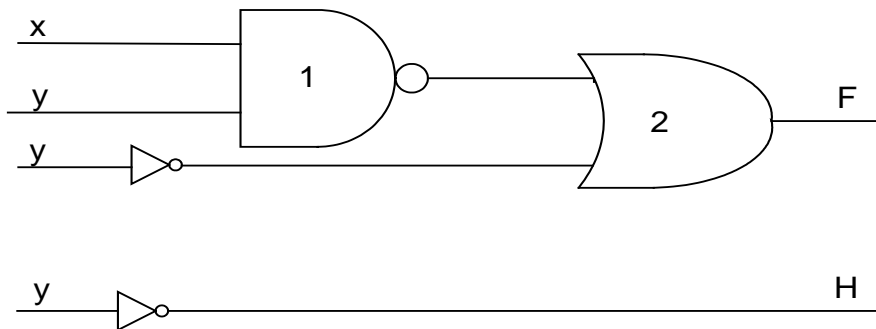
Consider the following scenario:

Three people go to a farm to gather apples. They can choose containers that can hold 10 or 15 or 17 or 20 apples. The containers are numbered C10, C15, C17 and C20 where the numbers indicate the number of apples that a container can hold. (E.g. C20 can hold 20 apples.)

Person A can fill **C10 & C15**, **Person B** can fill **C10 & C17**, and **Person C** can fill **C17 & C20**.

If a person fills two containers with apples, then the output for that person is 1. For example, if A = 1, B = 1 and C = 0, then it means that only A and B fill their containers.

A Boolean function F(A,B,C) is defined as follows: **F(A,B,C) = 1 when a group of three persons A, B and C gathers more than 50 apples,** 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	0	1	1	0

QUESTION 39

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

QUESTION 40

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

14.3 FIRST SEMESTER: ASSIGNMENT 02

Due date: 13 April 2015

Study material: **(1) F&M: chapters 5 – 14, but 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 Tutorial Letter 102 in 2.3 of this tutorial letter.

Submission procedure: Via myUnisa (see 5.2)

Year mark weight: 60%

Unique assignment number: **557796**

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 one of the following statements is NOT true about cache memory?

1. It is faster than main memory.
2. It is slower than the CPU.
3. It is faster than the registers.
4. It contains a copy of a portion of main memory.

QUESTION 2

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

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

QUESTION 3

Which one of the following is NOT part of the three phases the CPU uses in its cycle to execute instructions in a program.

1. Decode
2. Execute
3. Run
4. Fetch

QUESTION 4

Which one of the following is NOT a network topology?

1. Ring

2. Star

3. Bus

4. Bridge

QUESTION 5

What is the name of a central controller on which all the other computer network devices are connected using dedicated point-to-point links?

1. A backbone

2. A ring

3. A hub

4. A workstation.

QUESTION 6

There are several layers in the Internet TCP/IP protocol suite. Each performs a different function.   What is the data link 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

QUESTION 8

Which one of the following is NOT part of the client in the FTP model?

1. Control connection

2. User interface

3. Control process

4. Data transfer process

QUESTION 9

Which of the following is NOT a basic requirement for the WWW?

1. Web server

2. Host name

3. Browser

4. HTTP.

QUESTION 10

Which of the following is NOT TRUE about Operating system?

1. An Operating system is an interface between the hardware of a computer and the user.

2. An Operating system is a program (or set of programs) that facilitates the execution of other programs.

3. An Operating system acts as general manager supervising the activity of each component.

4. An Operating system is a collection of devices that allows a computer to communicate with the outside world.

QUESTION 11

Which of the following techniques belongs to the *non-swapping* category?

1. Demand paging and demand segmentation
2. Partitioning and demand paging
3. Paging and demand segmentation
4. Partitioning and paging

44

QUESTION 12

Which of the following is NOT a component of Modern Operating system?

1. File manger
2. Memory manager
3. User manager
4. Device manager

QUESTION 13

What is the name of the technique in which the memory is divided into variable-length sections, each section holding one program and CPU switches between them?

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

QUESTION 14

Which one of the following is FALSE about the file manager?

1. It is responsible for archiving and backups
2. It supervises the creation, deletion, and modification of files
3. It controls access to files
4. It monitors every input/output device

QUESTION 15

Which major component of UNIX is regarded as the heart of the system and contains the most basic part of the operating system?

1. Kernel
2. Shell
3. Utilities
4. Applications

QUESTION 16

A list contains the following elements:

10 12 19 23 38 42 55 65 77 82 85 100 119 163 170

At the beginning, first = 1, mid = 8 and last = 15. What are the values of first, mid and last respectively after two more iterations of the binary search algorithm if the goal is 163?

1. 8, 11, 15
2. 9, 10, 11
3. 9, 12, 15
4. 13, 14, 15

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 in to two sublists – sorted and unsorted, and separated by an imaginary wall?

1. Selection sort

2. Bubble sort

3. Insertion sort

4. Deletion sort

46

QUESTION 19

Which one of the following is a pictorial representation of an algorithm?

1. Loop
2. Repetition
3. UML
4. Class.

QUESTION 20

Which construct is represented by the below Pseudocode?

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

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

QUESTION 21

Which one of the following is NOT a logical parts of the 'Summation' algorithm?

1. Swap the selection.
2. Initialization of the sum at the beginning.
3. A Loop, which in each iteration adds a new integer to the sum.
4. Return of the result after exiting from the loop.

QUESTION 22

Compilation _____.

1. is a form of interpretation
2. translates and executes the source code a line at a time
3. translates the whole source program into the object module before executing it
4. is used in the first *approach* to interpretation

QUESTION 23

Which translation analyzer parses a set of tokens to find instructions?

1. Lexical
2. Syntax
3. Semantic
4. Code generator

QUESTION 24

Which one of the following programming paradigm is considered to be imperative?

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

QUESTION 25

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

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

QUESTION 26

Which of the following operators compares data to see if a value is greater than, less than, or equal to another value?

1. Arithmetic operators
2. Relational operators
3. Logical operators
4. Control operators

QUESTION 27

In the Scheme version of LISP, if Names = (John Mathi Sipho Ruth Kali Busi Jonah), then (car (cdr (cdr Names))) would give a result of:

1. Mathi
2. Sipho
3. Ruth
4. Kali

QUESTION 28

One very popular model for the software development process is known as the waterfall model. Which one of the following statements is NOT TRUE about this model?

1. The developers add more functionality until the existing system works properly
2. The development process flows in only one direction
3. The analysis phase of the whole project should be completed before its design phase is started
4. Each phase is completed before the next phase starts

QUESTION 29

Which one of the following is regarded as disadvantage of Waterfall model?

1. The testing team can test the whole system.
2. The group that works on design phase needs complete results from analysis phase.
3. If there is a problem in part of the process, then the entire process must be checked.
4. The development process involves four phases only.

QUESTION 30

Which of the following is NOT a symbol of data flow diagrams?

1. Data storage
2. Process
3. Data flow
4. Start

QUESTION 31

_____ between modules in a software system must be maximised.

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

QUESTION 32

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

1. reusability, interoperability and portability
2. Changeability, usability and correctability
3. Changeability, flexibility and testability
4. Reliability, flexibility and timeliness

QUESTION 33

What is the other name for Glass-box testing?

1. Exhaustive testing
2. Random testing
3. Black-box testing
4. White-box testing

QUESTION 34

Which of the following is NOT TRUE of a loop in an array?

1. Can be used to read and write the elements in an array
2. Loops can be used to process elements
3. If there are 10, 100, or 1000 elements to be processed, loops make it easy to handle them all.
4. performs operations on data
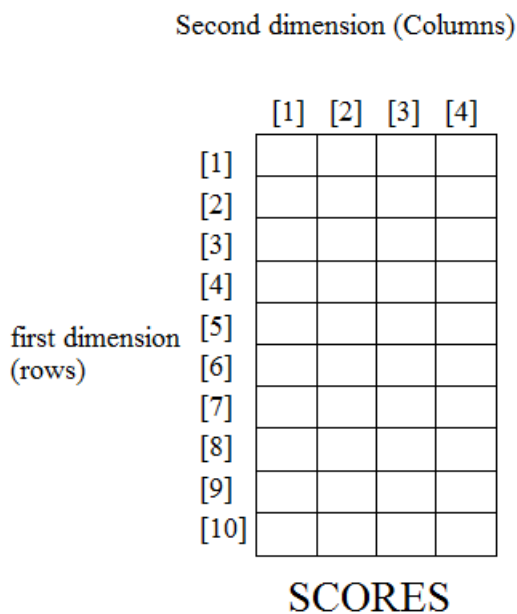
QUESTION 35

The common operations on arrays of structures are_____.

1. searching, updating, deletion, insertion and retrieval. (lower case)
2. copying, searching, deletion, retrieval, and traversal
3. searching, insertion, deletion, retrieval, and traversal.
4. updating, searching, copying, deletion, insertion, and traversal.

QUESTION 36

The below figure shows two-dimensional array, which holds the scores of students in a class. There are 10 students in the class and each student has four different scores for four quiz.

Which of the following variable scores represent the score of the 3rd student in the 2nd quiz?

1. SCORES [3] [2]
2. SCORES [2] [3]
3. SCORES [2] [2]

4. SCORES [3] [3]

QUESTION 37

Which one of the following best describes a record?

1. A collection of data in which each element contains the location of next element.
2. A file containing data, such as s file created within an application program.
3. A collection of different elements that can be stored on different locations.
4. A collection of related elements, possible of different types, having a single name.

QUESTION 38

In an array we have two identifiers, name them:

1. Data and link.
2. Class and node.
3. The Array of records and the data type
4. The name of the array and the name of each individual element.

QUESTION 39

A linked list is a suitable structure if:-

1. A small number of insertions and deletions are required.
2. A large number of insertions and deletions are needed.
3. A lot of searching and retrieval is needed
4. Collection of related elements is required

QUESTION 40

Which of the following best describe a file?

1. It is always sequential, hashed and indexed
2. It is a very small record which is loaded in to main memory
3. It is how you retrieve information
4. It is an external collection of related data treated as a unit

QUESTION 41

Which one of the following is NOT one of Hashing methods?

1. Direct hashing
2. Bucket hashing
3. Modulo division hashing
4. Digit extraction hashing

QUESTION 42

One of the disadvantages of open addressing is _____?

1. The first record is stored in the home address, but contains a pointer to the second record.
2. The bucket hashing accommodates more than one record.
3. Each collision resolution increases the probability of future collisions.
4. It uses multiple approaches when collision occurs.

QUESTION 43

Which UNIX directory is the highest level in the file system hierarchy?

1. Root directory
2. Home directory
3. Working directory
4. Parent directory

QUESTION 44

What is binary file?

1. A randomly accessible sequence of file.
2. A collection of related files stored in a secondary device.
3. A collection of data of data stored in the internal format of the computer.
4. A file of characters.

QUESTION 45

Which of the following is NOT a necessary component of a DBMS?

1. Hardware
2. Data
3. Software
4. Graphs

QUESTION 46

The database system has the following advantages as compared to the flat-file system EXCEPT:

1. In a flat-file system there is a lot of redundancy
2. A database system is usually more efficient than a flat file system, because a piece of information is stored in fewer locations
3. In a database system it is easier to maintain data integrity, because a piece of information is stored in fewer locations
4. In a flat-file it is easier to maintain the confidentiality of the information

QUESTION 47

In a replicated distributed database_____.

1. data is localised
2. each site holds an exact copy of another site
3. each relation need to have a key
4. data is stored in external device

QUESTION 48

What does retrieving a node means in linked lists?

1. Randomly accessing a node for the purpose of inspecting or copying the data in the node.
2. Copying a node at the middle or end of a linked list.
3. Representing a list of items in memory.
4. Checking a walking pointer to the first node.

QUESTION 49

What is a declarative language which is used on relational databases called?

1. ISO
2. SQL
3. LES
4. OO

QUESTION 50

Which one of the following is NOT classified as database model?

1. Distributed database
2. Relational databases
3. Normalised databases
4. Object-Oriented databases

II---oooOooo---II

SECOND SEMESTER ASSIGNMENTS

14.4   SECOND SEMESTER: ASSIGNMENT 01

Due date: **26 August 2015**

Study material: **(1) F&M: chapters 1 - 4; Appendices A & E (textbook)**

                                    (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 2.3.

Submission procedure: Via myUnisa (see 5.2)

Year mark weight: 40%

Unique assignment number: **592803**

Compulsory: To be considered for **examination** in this module, you must submit this assignment by 26 August 2015.

- Each multiple-choice question has four possible answers. 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 due date. We are notified and will 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.

Second semester assignment 01

QUESTION 1

What is the step-by-step solution to a problem in a computer program called?

1. An algorithm
2. A computer language
3. Instructions
4. Instructional architecture.

QUESTION 2

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

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

QUESTION 3

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

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

QUESTION 4

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 5

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

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

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 $(1110100101)_2$ to a hexadecimal number.

1. $(853)_{16}$
2. $(385)_{16}$
3. $(8A3)_{16}$
4. $(3A5)_{16}$

QUESTION 9

Convert $(122)_{10}$ to an octal number.

1. $(351)_8$
2. $(151)_8$
3. $(272)_8$
4. $(172)_8$

QUESTION 10

Which one of the following number representations is NOT correct?

1. $(101)_2$
2. $(270)_8$
3. $(FGB)_{16}$
4. $(47)_{10}$

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 −18 using 6 bits?

1. $(101101)_2$
2. $(101110)_2$
3. $(010010)_2$
4. $(101111)_2$

QUESTION 15

What is $(111.0101)_2$ in normalised form (in IEEE standard)?

1. $(0.1110101)_2 \times (2^{-2})_{10}$
2. $(1.110101)_2 \times (2^2)_{10}$
3. $(1.110101)_2 \times (2^3)_{10}$
4. $(1.110101)_2 \times (2^{-4})_{10}$

QUESTION 16

The precision of the fractional part of a number stored in a computer is defined by the _____

1. sign
2. mantissa
3. exponent
4. floating point

QUESTION 17

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

1. Audio storing can involve sampling, quantization and encoding.
2. Currently the dominant standard for storing audio is MP3.
3. Vector graphics is suitable for storing the fine details of photographic images.
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

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

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

QUESTION 20

Calculate: $(10001)_2 + (1111)_2$.

1. $(11111)_2$
2. $(100100)_2$
3. $(101110)_2$
4. $(100000)_2$

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 $x'y + x$?

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

QUESTION 26

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

1. $xy'(z' + z)$
2. $xy'z' + xy'z$
3. xy'
4. 1

QUESTION 27

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

1. $x' + y$
2. 1
3. 0
4. $xy + y'$

QUESTION 28

Consider the following Boolean function:

$$F(x,y,z) = m_1 + m_3 + m_4 + m_7$$

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

1.

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

2.

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

3.

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

4.

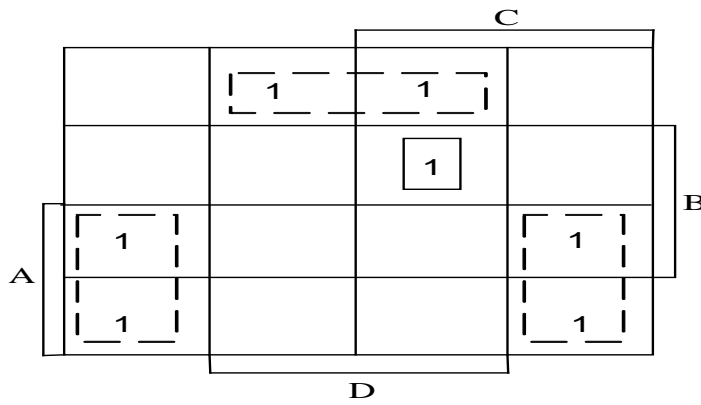|	y'z'	y'z	yz	yz'
x'	1		1	1
x				1

QUESTION 29
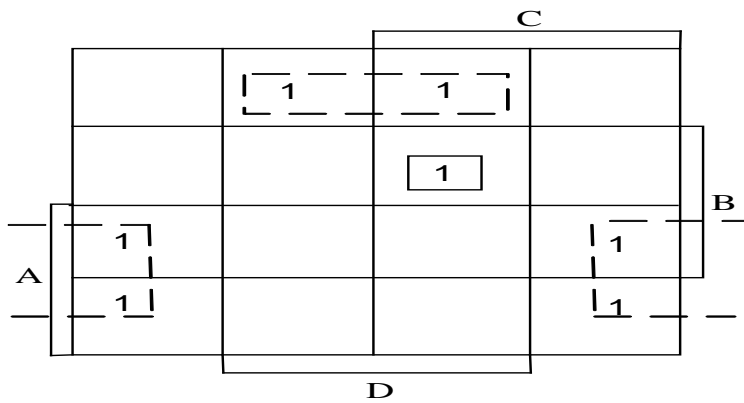
Consider the following Karnaugh map:
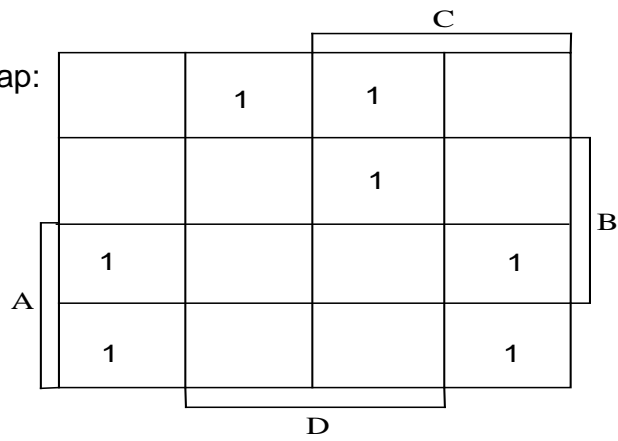
Which one of the following four Karnaugh maps reflects the correct forming of groups?

1.

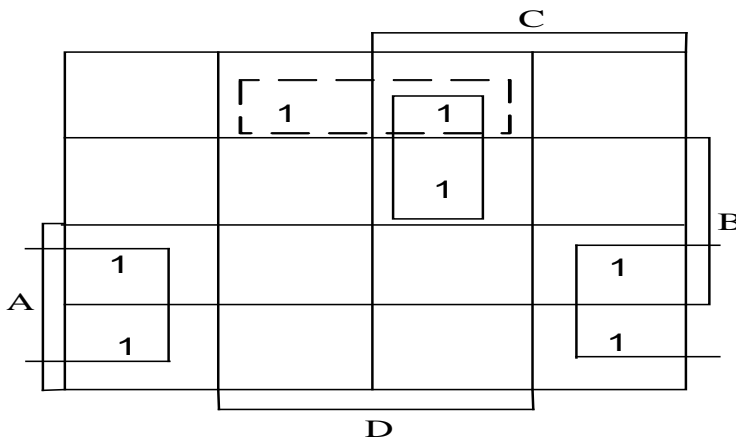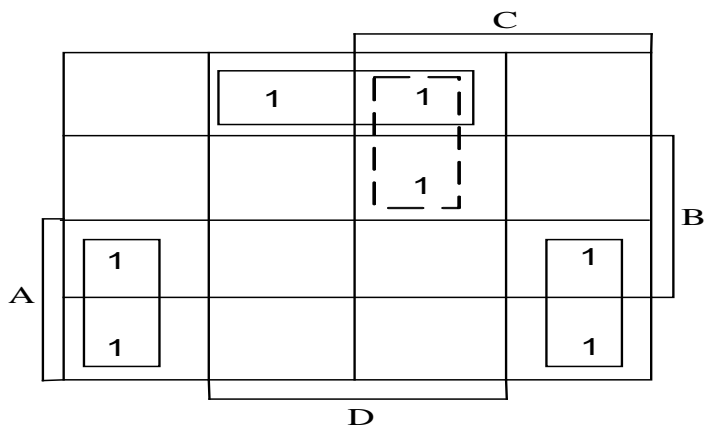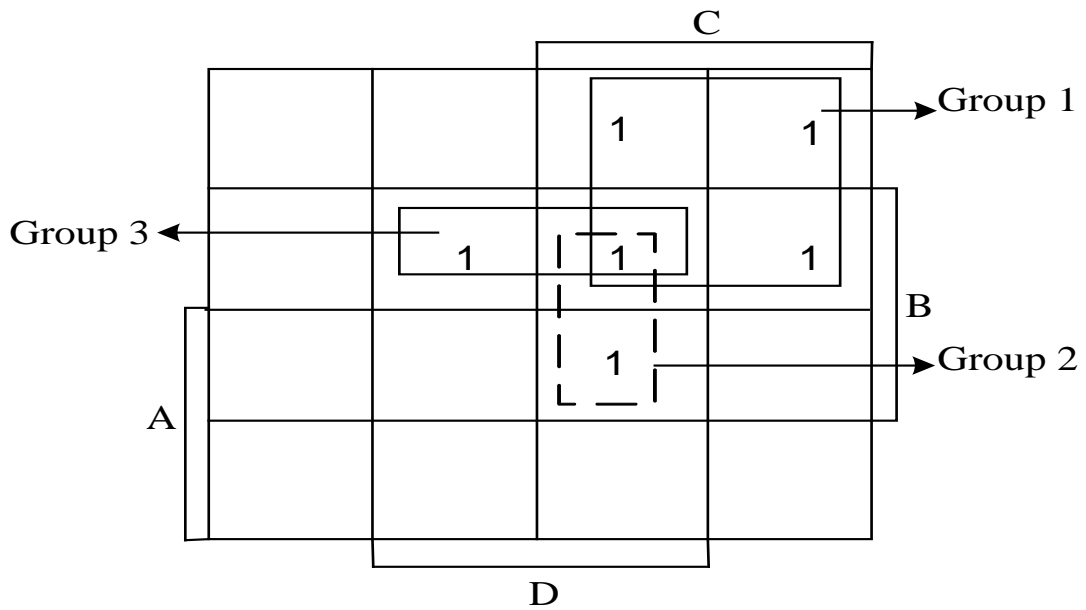
2.

3.

4.

The next THREE questions refer to the Karnaugh map beneath:

QUESTION 30

Which term represents Group 1?

1. C
2. B′D′
3. A′
4. A′C

QUESTION 31

Which term represents Group 2?

1.   BCD
2.   A′BC
3.   BD
4.   CD

QUESTION 32
Which term represents Group 3?

1. BD
2. A'BD
3. D
4. ACD

The next THREE questions refer to the following combinational logic circuit:
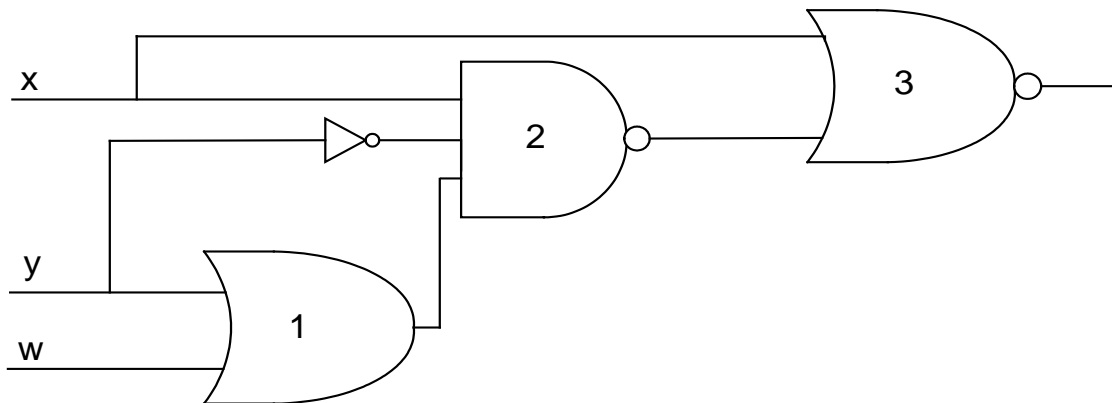
QUESTION 33
What is the output of Gate 1?

1. y' + w

2. yw

3. y' + w'

4. y + w

QUESTION 34
What is the output of Gate 2?

1. (y' + w) **+** y' **+** x

2. [(y·w) + y' **+** x]'

3. [(y + w)·y'·x]'

4. (y' + w')·y'·x

QUESTION 35
What is the output of Gate 3?
1. {[(y + w)·y'·x]' + x}'

2. {[(y·w) + y' **+** x]' · x}'

3. [(y' + w')· y'·x] · x'

4. [(y' + w) **+** y' **+** x] · x'

QUESTION 36

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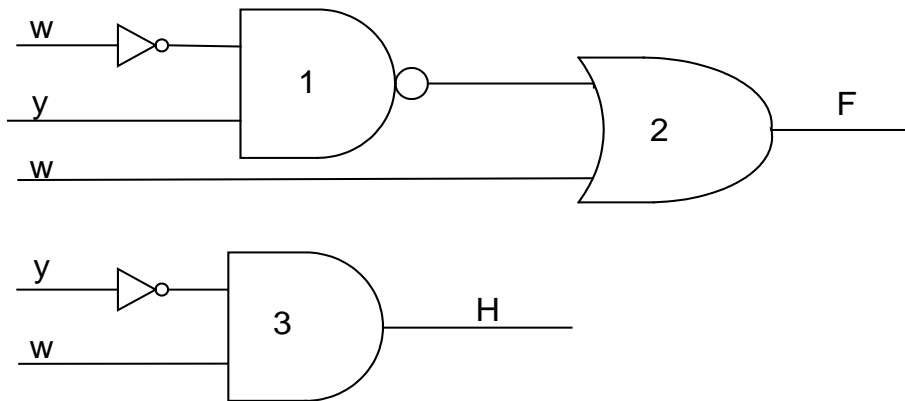
These two logic circuits are not equivalent. F = (w'y)' + w and H = y'w. One of the three gates can be changed so that the circuits can become equivalent. Which gate can be changed and what kind of gate must it become?

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

Consider the following scenario:

Three people (A, B and C) are to board a ferry boat to cross a river.

A weighs 70 kg;   B weighs 40 kg;   C weighs 20 kg.

If a person boards the boat, then the output for that person is 1. For example, if A = 0, B = 1 and C = 1, it means that only B and C boarded the boat.

A Boolean function F(A,B,C) is defined as follows: **F(A,B,C) = 1 when the total weight of the people who have boarded the ferry boat is more than 55 kg.** If this is not the case then F (A,B,C) = 0. Apart from any of these three people, it is assumed that no other parson can be on the boat.

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

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

			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	0	1	1	0

QUESTION 39

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

QUESTION 40

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

14.5 SECOND SEMESTER: ASSIGNMENT 02

Due date: <u>28 September 2015</u>

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 2.3 of this tutorial letter.

Submission procedure: Via myUnisa (see 5.2)

Year mark weight: 60%

Unique assignment number: **592946**

Compulsory: It contributes towards the year mark.

- Each multiple-choice question has four possible answers. 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 due date. We are notified and will 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.

Second semester assignment 02

QUESTION 1
Which one of the following is the correct order for the steps of a CPU machine cycle?

1.   Fetch, Decode, Execute
2.   Start, Decode, Execute
3.   Start, Fetch, Execute
4.   Decode, Fetch, Execute

QUESTION 2
In the fetch stage of the machine cycle used by the CPU, _____

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

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 a number of input/output ports is required.

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

QUESTION 5
Which WAN is a complex network operated by a service provider?

1.   A backbone
2.   A point-to-point
3.   A hub
4.   A workstation.

QUESTION 6

Which set of rules has been created by the Internet to divide the services needed to perform a task?

1. Links
2. Servers
3. Protocols
4. Packets.

QUESTION 7

Transport layer protocols have been designed for the TCP/IP protocol suite. Which one of the following is a property of the user datagram protocol (UDP)?

1. It uses sequence numbers, acknowledgment numbers and checksums.
2. It is slow.
3. It does not provide a logical connection between packets belonging to a single message.
4. It uses buffers at the sender's site.

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

QUESTION 11

An operating system (OS) can be programmed in such way that its code is independent of the machine language of the computer on which it is running. This property refers to the _____ of the OS.

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

QUESTION 12

_____ is multiprogramming without swapping.

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

QUESTION 13

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

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

QUESTION 14

Which of the following states, in computer program processing, can a job acquire?

1. Hold and running
2. Hold and terminate
3. Ready and waiting
4. Ready 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 11 18 20 37 41 49 70 77 82 84 100 109

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 37?

1. 4, 5, 6
2. 2, 5, 8
3. 1, 3, 6
4. 7, 10, 13

QUESTION 17

Suppose a list contains the following elements:

    47 27 18 55 24 99 12

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

1. 12 18 24 55 27 99 47
2. 12 18 27 55 24 99 47
3. 12 27 18 55 24 99 47
4. 47 27 18 55 24 99 12

QUESTION 18

Certain constructs are needed for a structured program. Which construct tests a condition?

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

QUESTION 19

What is a high-level design tool that shows the relationships between different modules of a program called?

1.   A flowchart
2.   A pseudocode
3.   A structure chart
4.   An algorithm

QUESTION 20

The step-by-step solution that expresses a logical solution to a particular problem of interest is called a(n)
_____

1. computer program.
2. process.
3. program structure.
4. algorithm.

QUESTION 21

_____ is a pictorial representation of an algorithm.

1. Pseudocode
2. UML
3. A subroutine
4. A Gantt chart

QUESTION 22

The only language understood by computer hardware is _____ language.

1.   machine
2.   symbolic
3.   high-level
4.   natural

QUESTION 23

C, Pascal and Java can be classified as _____ languages.

1.   high-level
2.   symbolic
3.   machine
4.   natural

QUESTION 24

The development of _____ contributed to the effective solving of programming problems in the sense that it enables the programmer to focus on the logic of the problem to be solved, instead of focussing on the technical detail of the computer.

1.   the graphical user interface
2.   high-level languages
3.   compilers
4.   text editors

QUESTION 25

The following statement regarding a functional language is NOT TRUE:

1.   It encourages modular programming.
2.   In functional programming, a program is considered to be a mathematical function.
3.   LISP and Scheme are examples of functional languages.
4.   It uses the principles of mathematical reasoning to answer queries.

QUESTION 26

C^{++} uses the following principles:
A.   encapsulation
B.   functionality
C.   polymorphism
D.   inheritance.

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

QUESTION 27

Some common concepts in procedural and object-oriented languages are:
A.   identifiers
B.   data types
C.   variables
D.   literals
E.   constants
F.   expressions.

Alternatives:
1.   A, B, C, D, E and F
2.   Only C, D, E and F
3.   Only A, B, E and F
4.   Only A, B, C and D

QUESTION 28

The waterfall model is one of the most common models for the development process of the software lifecycle. Which one of the following statements regarding the waterfall model is TRUE?

1.   The developers first complete a simplified version of the whole system.
2.   The phases gain complexity with each iteration of the package.
3.   A problem can easily be located.
4.   Each phase is completely finished before the next phase is started.

QUESTION 29

Modelling tools used in procedure-oriented analysis, include

A.   dataflow diagrams
B.   entity-relationship diagrams
C.   use case diagrams
D.   state diagrams
E.   class diagrams
F.   state charts.

Alternatives:
1.   A, B, and D
2.   C, E and F
3.   C, D and E
4.   D, E and F.

QUESTION 30

Modularity 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 by-product of inheritance.
4.   the same as cohesion.

QUESTION 31

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

1.   flexibility
2.   efficiency
3.   usability
4.   security

QUESTION 32

The following statement regarding program testing is NOT TRUE:

1.   Control structure testing is a method used in black-box testing.
2.   Glass-box testing can be done by a software engineer or a dedicated team.
3.   Black-box testing tests the functionality of the software in terms of what it is supposed to accomplish.
4.   In glass-box testing (white-box testing), the internal structure of the software is known.

QUESTION 33

Documentation is needed in order to use software properly and maintain it efficiently.   System documentation_____

1.   describes the installation and the servicing of the software.
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

Which one of the following is NOT a data structure?

1. Array
2. Record
3. Linked list
4. Index

QUESTION 35

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. only one-dimensional.
4. a collection of elements called fields.

QUESTION 36

Which of the following operations can be defined on an array?

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

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

QUESTION 37

Which algorithm must be applied to a linked list before an item is inserted into it?

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

QUESTION 38

How many pointers are used when trying to find an element in a linked list?

1. 0
2. 1
3. 2
4. 3

QUESTION 39

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

1. The name of a linked list is the name of the head pointer that points to the last node of the list.
2. A linked list is a suitable structure if a large number of insertions and deletions are needed.
3. The same operations defined for an array can be applied to a linked list.
4. A linked list can grow infinitely and shrink to an empty list.

QUESTION 40

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

1. There are four files associated with an update program: the old and new master files, transaction file, and error report file.
2. A loop is used to read and process records one by one.
3. The new master file contains changes to be applied to the old master file.
4. All the files need to be sorted on the same key to make the updating process efficient.

QUESTION 41

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

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

QUESTION 42

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

1. Modulo division hashing
2. Direct hashing
3. Indirect hashing
4. Digital extraction hashing

QUESTION 43

_____ uses a node that can accommodate more than one record.

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

QUESTION 44

Which type of hashing method guarantees that there are no synonyms and collusions?

1. Modulo division hashing
2. Direct hashing
3. Indirect hashing
4. Digital extraction hashing

QUESTION 45

The _____ level of a database defines the logical view of the data.

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

QUESTION 46

In which database model can entities be accessed through several paths?

1. Hierarchical
2. Network
3. Relational
4. Distributed

QUESTION 47

The total number of rows in a relation is called the _____ of the relation.

1. degree
2. size
3. depth
4. cardinality

QUESTION 48

What is a declarative programming language which is used on relational databases called?

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

QUESTION 49

Which of the following databases are used in a distributed database model?

A. Fragmented.
B. Replicated.
C. Repeated.

Alternatives:
1. Only A and B
2. Only A and C
3. Only B and C.
4. A, B and C

QUESTION 50

An object-oriented database tries to keep the advantages of a _____ model and at the same time allows the applications to access structured data.

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

II---oooOooo---II

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.