



ZIMBABWE

MINISTRY OF HIGHER AND TERTIARY EDUCATION, SCIENCE AND
TECHNOLOGY DEVELOPMENT

HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)

2015

REGULATIONS AND SYLLABUS FOR THE

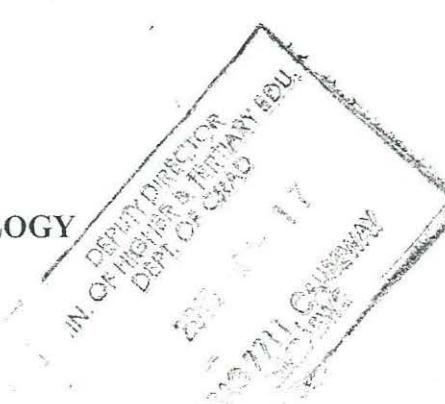
NATIONAL DIPLOMA

IN

INFORMATION TECHNOLOGY

COURSE CODE: 553/15/CO/O

Implementation date: January 2015



NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

PREAMBLE

The course is designed to develop a Programmer Analyst, Systems Administrator, Network Administrator and or Web Developer with the necessary knowledge, skills and attitudes to satisfy the basic needs of the Information and Communications Technology industry. The total duration of the course is 2360 contact hours for all modes of study. The minimum entry requirements into this course is English Language and Mathematics passed at ‘O’ Level with grade C or better and any other three ‘O’ Level subjects or relevant NFC subjects **and** a National Certificate in Information Technology or equivalent. The course is offered on a full time, part time, block release or open distance learning (ODL) basis. Assessment is through continuous assessment, and written examination. The course will consider gender mainstreaming, sustainable development, physical challenges, health dispositions, and the intersections between race, class and culture.

CONSULTATIONS	YEAR
1. Zimbabwe Banking Corporation	2014
2. Scientific and Industrial Research Centre (SIRDC)	2014
3. Barclays Bank (Zimbabwe)	2014
4. Standard Chartered Bank (Zimbabwe)	2014
5. Reserve Bank of Zimbabwe (RBZ)	2014
6. National Manpower Advisory Council(NAMACO)	2014
7. Ministry of Information Communication Technology	2014
8. Computer Society of Zimbabwe (CSZ)	2014
9. Prudent Communications	2014
10. Tel-One	2014
11. ZARNet	2014
12. M-Web (Zimbabwe)	2014
13. MAPs Communication	2014
14. School of Java	2014
15. Grain Marketing Board (GMB)	2014

PART I: COURSE REGULATIONS

1.0 TITLE AND LEVEL OF AWARD

National Diploma in Information Technology

2.0 AIM

The aim of the course is to equip the students with knowledge, skills and attitudes which will enable them to satisfy the needs of the Information and Communication Technology industry.

3.0 OBJECTIVES

On successful completion of the course, the student should be able to:

- 3.1 troubleshoot computer hardware and software problems
- 3.2 design and implement simple computer networks
- 3.3 analyse and design information technology related systems
- 3.4 develop applications using Object Oriented Programming techniques
- 3.5 apply appropriate software design techniques
- 3.6 apply various mathematical tools in the analysis of systems in the business environment
- 3.7 demonstrate a critical, logical and objective approach to problem solving
- 3.8 implement appropriate data structures and algorithms in problem solving
- 3.9 produce executable, well documented software system
- 3.10 evaluate the different database systems
- 3.11 develop quality websites for business and industrial applications using appropriate software
- 3.12 apply the various knowledge and skills acquired in an industrial set up.

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

4.0 STRUCTURE

SUBJECT TITLE	CODE	DURATION IN HOURS
ND1		
1.Computer Architecture and Servicing	553/15/S01	200
2. Data Communication and Networks	553/15/S02	200
3. Systems Analysis and Design	553/15/S03	200
4. Programming in Visual Basic.Net	553/15/S04	220
5. Software Design	553/15/S05	180
6. Mathematics and Statistics	553/15/S12	200
ND2		
7. On the Job Education and Training	553/15/S11	One year
ND3		
8. Computer Quantitative Methods	553/15/S06	200
9. Data Structures and Algorithms Using C++	553/15/S07	200
10. Software Project	553/15/S08	200
11. Database Concepts and Design	553/15/S09	200
12. Internet and Web Development	553/15/S10	200
13. National and Strategic Studies	401/13/S01	80
14. ESD	402/13/S01	80
TOTAL		2360

- *National and Strategic Studies and Entrepreneurship Skills Development are exempted to those who have passed the subjects at the other levels.*

5.0 DURATION (CONTACT HOURS)

2360 hours plus On the Job Education and Training for all modes of study.

- Full time: spread over at least two years institution based learning
- Part time: spread over at least four years institution based learning

6.0 ENTRY REQUIREMENTS

English Language and Mathematics passed at ‘O’ Level with grade C or better and any other three ‘O’ Level subjects or relevant NFC subjects **and** full National Certificate in Information Technology or equivalent.

7.0 MODE OF STUDY

Full time

Part time

Block Release

ODL

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

8.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Computer Architecture and Servicing 553/15/S01	3 hour written examination	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments 30% (weighted 10% each) • Skills Competency Testing 30% 	100%
Data Communication and Networks 553/S02	3 hour written examination	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments 30% (weighted 10% each) • Skills Competency Testing 30% 	100%
Systems Analysis and Design 553/S03	3 hour written examination	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments 30% (weighted 10% each) • Skills Competency Testing 30% 	100%
Programming in Visual Basic.Net 553/S04	Theory: 3 hour paper (Weighted 20%) Practical 3 hour paper (Weighted 20%)	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments 30% (weighted 10% each) • Skills Competency Testing 30% 	100%
Software Design 553/S05	3 hour written examination	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments 30% (weighted 10% each) • Skills Competency Testing 30% 	100%
Mathematics and Statistics 553/S12	3 hour written examination	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments (in class) 30% (weighted 10% each) • Skills Competency Testing (in class) 30% 	100%

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

ESD 402/S01	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%
NASS 401/S01	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%
Computer Quantitative Methods 553/S06	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments (in class) 30% (weighted 10% each)• Skills Competency Testing (in class) 30%	100%
Data Structures and Algorithms Using C++ 553/S07	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%
Database Concepts and Design 553/S09	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%
Internet and Web Development 553/S10	Theory: 3 hour paper (Weighted 20%) Practical 3 hour (Weighted 20%)	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%
Software Project 553/S08	See guidelines	See guidelines	100%
On the Job Education and Training 553/S11	See guidelines	See guidelines	100%

9.0 GRADING

0% to 49%	-	Fail
50% to 59%	-	Pass
60% to 79%	-	Credit
80% and above	-	Distinction

10.0 CONDITIONS OF AWARD

- 10.1 A candidate should attend at least 85% of learning sessions to qualify for examinations.
- 10.2 A candidate must pass all subjects to be awarded a National Diploma in Information Technology
- 10.3 A student must pass both coursework and examination to be awarded a pass.
- 10.4 Non submission of the required coursework will result in the candidate being deferred.

11.0 RE-WRITES

- 11.1 Re-write(s) should conform to current course structure.
- 11.2 Candidates should pass at least two thirds of the course to qualify for a referral.
- 11.3 Any candidate who fails to pass at least two thirds of the course should repeat the whole course, including the subjects they would have passed.
- 11.4 There is no time limit for which to re-write a failed examination.
- 11.5 There is no aggregation for re-writes.
- 11.6 All re-writes should pass on performance in the examination.
- 11.7 If a candidate fails coursework he/she repeats the subject

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

12.0 EXEMPTIONS

- 12.1 Exemptions are only granted in subjects already attained from a completed accredited qualification provided an exemption certificate specifying subjects of exemption is produced.
- 12.2 Exemption Certificate should be applied for at enrolment and produced before registration for examinations.

13.0 IRREGULAR PRACTICES

- 13.1 Cheating in continuous assessment and or examinations will result in disqualification from the whole course. The candidate will be suspended for two years from undertaking any HEXCO course.
- 13.2 The penalty for plagiarism shall be as in 13.1

14.0 EXPECTED COMPETENCIES

UNIT NO.	UNIT TITLE	CREDITS	ELEMENTS		COMPETENCIES
1	Software Engineering	12	1.1	Analyse information Systems/program requirements	<ul style="list-style-type: none">• Information system/program analysis
			1.2	Design information System/program	<ul style="list-style-type: none">• Information system/program design
			1.3	Code information system/ information	<ul style="list-style-type: none">• Coding using a chosen Object Oriented programming language
			1.3	Test information system/programs	<ul style="list-style-type: none">• Information System/Program testing
			1.4	Implement information system	<ul style="list-style-type: none">• Debugging
			1.5	Maintain and review information systems	<ul style="list-style-type: none">• Troubleshooting
			1.6	Document information system	<ul style="list-style-type: none">• Information system/program maintenance

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

UNIT NO.	UNIT TITLE	CREDITS	ELEMENTS		COMPETENCIES
2	Network Administration	14	2.1	Draw up network plan	<ul style="list-style-type: none"> • Knowledge of ICT Networking devices
			2.2	design network	<ul style="list-style-type: none"> • Network design
			2.3	Install network	<ul style="list-style-type: none"> • Network Installation and configuration
			2.4	Configure network	<ul style="list-style-type: none"> • Disaster recovery planning
			2.5	Carryout network maintenance	<ul style="list-style-type: none"> • Troubleshooting • Network maintenance
3	Hardware Installation and Maintenance	8	3.1	Install hardware	<ul style="list-style-type: none"> • Knowledge of ICT hardware components
			3.2	Formulate and implement hardware maintenance plan	<ul style="list-style-type: none"> • Hardware Maintenance planning
			3.3	Maintain hardware	<ul style="list-style-type: none"> • Hardware troubleshooting
			3.4	Maintain hardware inventory	<ul style="list-style-type: none"> • Hardware servicing • Asset records management
4	Database Administration	12	4.1	Design database	<ul style="list-style-type: none"> • Knowledge of types of database
			4.2	Implement database	<ul style="list-style-type: none"> • Database security implementation
			4.3	Implement security	<ul style="list-style-type: none"> • Database auditing
			4.4	Manage database disaster recovery plan	<ul style="list-style-type: none"> • Database maintenance
			4.5	Optimise database performance	<ul style="list-style-type: none"> • Database disaster recovery planning
			4.6	Perform database audit	<ul style="list-style-type: none"> • Database designing
			4.7	Troubleshoot and repair database	

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

UNIT NO.	UNIT TITLE	CREDITS	ELEMENTS	COMPETENCIES
5	Web Administration	14	5.1 Formulate project proposal 5.2 Analyse client requirements 5.3 Design web interface 5.4 Design database 5.5 Code web site/application 5.6 Test and launch web site/application 5.7 Maintain web site/application	<ul style="list-style-type: none"> • Proposal formulation • Web programming • Content Management • Search engines optimization • Use of site tracking tools • Maintenance of web applications/sites
6	Information Communication Technology Security Management	8	6.1 Formulate security policies 6.2 Implement security measures 6.3 Test security functionality 6.4 Carry out system security audit 6.5 Draw up and implement disaster recovery plan	<ul style="list-style-type: none"> • Security policy formulation • Setting up security measures • ICT Security auditing • Troubleshooting • Disaster recovery planning
7	Project management	6	7.1 Draw up a project proposal 7.2 Plan project activities 7.3 Manage resources 7.4 Produce project documentation	<ul style="list-style-type: none"> • Project Management • Project activities planning • Resources Management • Project documentation

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

UNIT NO.	UNIT TITLE	CREDITS	ELEMENTS	COMPETENCIES
8	Supervision	6	8.1 Plan work activities 8.2 Assign duties 8.3 Train subordinates 8.4 Appraise subordinates	<ul style="list-style-type: none">• Time management• Performance management• Training management• Communication• Supervision

15.0 RESOURCES

15.1 Lecturers' Qualifications

The minimum qualification for a lecturer is at least a Higher National Diploma in Information and Communication Technology OR equivalent, with a teaching qualification, plus at least two years post qualification experience.

15.2 Facilities, Tools and Equipment (a class of 20 students)

For an institution to successfully implement this diploma programme, the underlisted *minimum* infrastructure and equipment will need to be in place:-

Computer Laboratory (for Programming)

20 x Personal Computers and a laser printer
Computer Desks and chairs to accommodate 20 students (One student per PC)
PC Network
Internet Facility
Writing surface for the instructor (e.g. securely-mounted whiteboard)

Computer Laboratory (for Computer Servicing)

Appropriate software
10 x Personal Computers – maximum of 2 students per PC permitted
5 x Laptop Computer
2 x Dot Matrix Printers
1 x Laser Printer
10 x PC Servicing Tool Kit
Work Desks and chairs to accommodate 10 students
Writing surface for the instructor (e.g. securely-mounted whiteboard)
Antistatic mats, grounded wrist straps
Protective Clothing (to be provided by student)

Computer Laboratory (for Computer Networking)

Appropriate software

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

10 x Personal Computers – maximum of 2 students per PC permitted
5 x Laptop Computer
2 x Dot Matrix Printers
1 x Laser Printer
10 x Networking toolkits
10 x switches
4 x routers
10 x access points
10 x patch panels
Networking consumables (cables, face plates, inserts e.t.c)
Work Desks and chairs to accommodate 10 students
Writing surface for the instructor (e.g. securely-mounted whiteboard)
Antistatic mats, grounded wrist straps
Protective Clothing (to be provided by student)

Theory Classroom

Classroom furniture to accommodate 20 students
Writing surface for the Instructor (e.g. securely-mounted whiteboard)
Smart board
Computer and projector
Internet connection

In the above cases, there ought to be adequate lighting and ventilation.

Adequately licensed computer software should be available for training purposes – especially the under-listed:-

- Windows Operating System (at least Windows 7)
- MS Dos
- Computer Fault Diagnosis Software
- C++ compiler
- Spreadsheet (*Windows based*)
- Oracle
- Web Editing software
- SQL Server
- My SQL
- Graphics editing software (e.g. Adobe Photoshop)
- UML diagramming software (e.g. star UML, Argo UML)
- Database (*Windows based*)
- Word-processor (*Windows based*)
- Internet and E-Mail software
- Statistical Package
- Microsoft Visual Studio at least 2008

- Microsoft Projects

15.3 SUGGESTED REFERENCES

	AUTHOR	YEAR	TITLE	PUBLISHER
1	Beales R.P	2013	PC Systems Installations and Maintenance	Taylor and Francis
2	Berstsekas and Tsitsiklis	2002	Introduction to Probability	Athena Scientific
3	Billstein et al	1981	A Problem Solving Approach to mathematics for Elementary School Teachers	The Benjamin/Cummings Publishing Company Inc.
4	Blanchard E	2007	Introduction to Data Communication: A Practical approach	Southern Alberta Institute of Technology
5	Booch G. etal	2007	Object oriented analysis and Design with applications	Addison Wesley
6	Bostock and Chandler	2000	Core Maths for A Level	Nelson Thorns
7	Bryan Sullivan and Vincent Liu	2011	Web Application Security, A Beginner's Guide	McGraw-Hill Osborne Media
8	Connolly and Begg A	2005	A Practical Approach to Design, implementation and management	Addison Wesley
9	Coronel, Morris and Rob	2010	A Practical Approach to Design, implementation and management	Jo Sabatino
10	Crawshaw and Chambers	2001	Advanced Level Statistics	Nelson Thorns
11	Dale N	2003	C++ plus Data Structures, 3rd Edition	Jones and Bartlett Publishers
12	Date C.J	2004	An Introduction to Database Systems	Pearson Education

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

13	Douglas Downing , Michael Covington and Melody Covington	2012	Dictionary of Computer and Internet Terms	Barron's Educational Series
14	Drozdek a	2012	Data Structures and Algorithms in C++	Cengage Laerning
15	Forouzan A	2000	Data communication and Networks	Mc Graw Hill
16	Francis A.	1998	Business Mathematics and Statistics , 5th Edition	Letts Educational
17	Gary, B etal	2010	Systems Analysis and Design, 8th Edition	
18	Gilster R.	2002	PC Technician Black Book	Paraglyph Inc Press
19	Gupta P.C	2006	Data communications and Computer Networks	PHI Learning Pvt Ltd
20	Hennessy J.L and Patterson D.A	2011	Computer Architecture: A quantitative approach	Oxford University Press
21	Huges A.J.	1993	Applied Mathematics: For Business , Economics and the Social Sciences	Irwin Professional Publishing
22	Jennifer Niederst Robbins	2007	Learning Web Design: A Beginner's Guide to (X) HTML, StyleSheets, and Web Graphics	O'Reilly Media
23	Jourbet, T.J and Paynet R,N	2003	ADO.NET Programming	Wardware Publishing
24	Jourbet, T.J and Paynet R,N	2003	ADO.NET Programming	Wardware Publishing
25	Junpeng	2010	Communications and Networking	SCIYO
26	Kendall K.E & Kendall J.E	2010	Systems Analysis and Design, 8th Edition	Prentice Hall

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

27	Kruse R.L and Ryba A.J	2000	Data Structures and Program Design in C++	Prentice Hall
28	Kutti N.S and Padhye P.Y	2004	Data Structures in C++	Prentice Hall
29	Larman C	2004	Applying UML and Patterns	Arrich Gamma and Patterns
30	Liberty J	2002	Learning Visual Basic.Net	Kindle
31	Lucy T	2002	Quantitative Techniques	Cengage Learning
32	Malik D.S	2010	Data Structures Using C++	Course Technology, Boston
33	Mark A Lassoff	2014	PHP and MySQL for Beginners	LearnToProgram, Incorporated
34	Mauer L	2001	Sams Taech Yourself more Visual Basic.Net in 21 days	Sams Publishing
35	Neil Smyth	2007	JavaScript Essentials	Techotopia
36	Orsborn J.W	2007	Best Practices in quantitative Methods	Sage Publishing
37	Owen F. & Jones R.	1994	Statistic 4th Ed.	Pitman Publishing
38	Parhami B	2005	Computer Architecture: From microprocessors to supercomputers	Oxford University Press
39	Pilone & Pitman	2005	UML in a Nutshell	
40	Pressman R.S	2004	Software Engineering : a Practitioner's approach	McGraw hill
41	Rasmus Lerdorf and Kevin Tatroe	2004	Programming PHP	O'Reilly Media
42	Silbersc Hatz A. etal	2005	Database System concepts	Addison Willey
43	Singh S.K	2009	Database Systems Concepts Design and application	Pearson Education
44	Somerville I.	2007	Software Engineering	Pearson, Hong Kong

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

45	Stallings, W	2010	Computer Organisation and Architecture	Prentice Hall
46	Sue Jenkins	2009	Web Design All-in-One For Dummies	John Wiley and Sons Inc
47	Tannenbaunn A,S	2002	Computer Networks	Mc Graw Hill
48	Terry Felke-Morris	2014	Web Development & Design Foundations with HTML5	Addison-Wesley
49	Troelsen A	2006	Pro VB and the .NET platform	New York
50	Tse D and Viswanth P	2005	Fundamentals of wireless communication	Cambridge University Press
51	Valacich, George, Hoffer	2011	Essentials of systems Analysis and Design	Pearson
52	Walther S	2006	ASP.NET 2.0 Unleashed	New York
53	Whitehead G.	1993	Success in Business Calculations, 2nd Edition	Petterson Institute
54	Willis T and Newsome B	2006	Beginning Visual Basic	Wiley Publishing

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

PART II: SYLLABUS

SUBJECT TITLE: COMPUTER ARCHITECTURE AND SERVICING

SUBJECT CODE: 553/15/S01

DURATION: 200 HOURS

1.0 AIM

The aim of the subject is to enable the student to install, troubleshoot and maintain computer hardware in compliance with recommended health and safety practices.

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 describe computer organization
- 2.2 explain microcomputer structure and operation
- 2.3 describe and illustrate different logic devices in microcomputer
- 2.4 practice appropriate workshop safety and equipment care when working in an IT environment
- 2.5 describe, install , configure and troubleshoot computer peripherals
- 2.6 describe, install , configure and troubleshoot microprocessor components
- 2.7 describe, install , configure and troubleshoot computer memory components
- 2.8 describe, install ,configure and troubleshoot motherboard components
- 2.9 describe, install ,configure and troubleshoot computer software
- 2.10 draw up a hardware maintenance plan and maintain an asset register
- 2.11 apply customer care principles when dealing with clients

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/Q

3.0 TOPICS

- 3.1 COMPUTER ORGANISATION
- 3.2 MICROCOMPUTER STRUCTURE AND OPERATION
- 3.3 REGISTER STRUCTURE
- 3.4 SAFETY IN THE I.T ENVIRONMENT
- 3.5 COMPUTER PERIPHERALS CONFIGURATION AND INSTALLATION
- 3.6 MICROPROCESSOR
- 3.7 MEMORY
- 3.8 MOTHERBOARDS
- 3.9 SOFTWARE INSTALLATION AND CONFIGURATION
- 3.10 HARDWARE MAINTENANCE AND INVENTORY
- 3.11 CUSTOMER CARE

4.0 CONTENT

4.1 COMPUTER ORGANISATION

- 4.1.1 Basic Computer Organisation (laptop and desktop)
- 4.1.2 Computer words
 - Binary data words
 - Coded data words
 - Instruction words
- 4.1.3 Computer operating cycles
- 4.1.4 The microprocessor system

4.2 MICROCOMPUTER STRUCTURE AND OPERATION

- 4.2.1 Description of the general operations of computer systems
 - The computer instruction
 - The state diagram
 - Micro operations

4.2.2 Basic microcomputer elements

Functions of specified microprocessor components

- The register element
- Data bus, Address bus
- The ALU
- The control element (R/W control lines, I/O control)
- The memory element (Reset , Ready, wait states
- Memory referencing
- Data Movements

4.2.3 Comparison of different microprocessors e.g. Intel, Motorola, Cyrix and AMD

- Data bus, Address bus, and Instruction bus
- R/W control lines
- I/O control lines
- Reset in state
- Ready (application to wait states)
- System clock

4.3 REGISTER STRUCTURE

4.3.1 Description and examples of the different logic devices in microcomputer

- Basic flip-flop
- Flip-flop operation
- Sampling times
- Clocked flip flop
- Master-slave flip-flop
- States
- State equations

4.4 SAFETY IN THE IT ENVIRONMENT

- Functions and use of hand tools (Antistatic precautions)
- Precautions against Electrostatic Discharge (ESD) and Electromagnetic Interference (EMI)
- Power Management Problems and equipment used (UPS, SPS, Surge Suppressor, Power conditioner).
- Cleaning and Environmental Hazards (Dirt, dust, water, human skin oils)

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/Q

- Health hazards in repairing computer (High Voltage-CRT, Power Supply, Lasers, high power light sources).
- Disposal of computer components and the environment.

4.5 COMPUTER PERIPHERALS CONFIGURATION AND INSTALLATION

- Keyboard, Mouse and pointing device connectors/ports
- The monitor port (VGA, SVGA video port)
- MODEM port
- Speaker ports
- Printers
- Network cards
- External drives
- Hard Disk Drive controllers (IDE, EIDE, SCSI)
- COM ports
- The Power Supply and its components (Resistors, Capacitors, Diodes, Transistors)
- Common errors and troubleshooting

4.6 MICROPROCESSOR

- Installation and configuration of microprocessors
- Microprocessor modes and manufacturers
- Microprocessor packaging
- Microprocessor development (e.g. 8088 – core i7)
- Common errors and troubleshooting

4.7 MEMORY

- Installation and configuration of Memory components
- Memory types (SRAM, DRAM, EDO RAM, SDRAM, ROM, EPROM, and EEPROM)
- Memory Packaging (DIP, SIMM, So-DIMM, DIMM)
- Cache Memory, Video Memory, BIOS, Virtual Memory
- Memory Banks, Parity
- Common Problems and troubleshooting

4.8 MOTHERBOARD

- Installation and configuration of Motherboards
- System Board Architectures (Integrated, Non-Integrated)
- Bus Architecture: address bus, data bus, control bus
- Expansion bus (ISA, EISA, PCI, AGP, PCMCIA)
- BIOS, CMOS and IRQ settings

- Common motherboard troubleshooting and rectification

4.9 SOFTWARE INSTALLATION AND CONFIGURATION

- Operating systems (e.g Windows) Installation
- Application Software installation
- Network systems configuration
- Software problems trouble shooting and rectification

4.10 HARDWARE MAINTENANCE AND INVENTORY

- types of maintenance
- formulating hardware maintenance plan
- maintenance of hardware inventory

4.11 CUSTOMER CARE

- Customer Satisfaction
- Communicating and listening
- Interpreting verbal and non verbal cues
- Responding to customer's technical level
- Establishing personal rapport with the customer
- Professional conduct
- Conflict management

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Computer Architecture and Servicing 553/15/S01	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

6.0 ASSESSMENT SPECIFICATION GRID

OBJECTIVE	AREAS TO BE COVERED	WEIGHTING %
1	COMPUTER ORGANISATION	10
2	MICROCOMPUTER STRUCTURE & OPERATION	15
3	REGISTER STRUCTURE	15
4	SAFETY IN THE I.T ENVIRONMENT	5
5	COMPUTER PERIPHERALS	10
6	MICROPROCESSOR	10
7	MEMORY	10
8	MOTHERBOARD	10
9	SOFTWARE INSTALLATION	5
10	HARDWARE MAINTENANCE AND INVENTORY	5
11	CUSTOMER CARE	5
	TOTAL	100

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR	TITLE	PUBLISHER
1	Beales R.P	2013	PC Systems Installations and Maintenance	Taylor and Francis
2	Gilster R	2002	PC Technician Black Book	Paraglyph Inc Press
3	Hennessy J.L and Patterson D.A	2011	Computer Architecture, a quantitative approach	Oxford University Press
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NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/Q

SUBJECT TITLE: DATA COMMUNICATION AND NETWORKS

SUBJECT CODE: 553/15/S02

DURATION: 200 HOURS

1.0 AIM

The aim of the subject is to equip students with knowledge and skills of computer communication systems

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 describe the fundamental concepts of a computer network
- 2.2 identify and describe network standards and protocols
- 2.3 explain the function of each of the layers of the OSI Reference Model including the protocols involved.
- 2.4 explain TCP/IP model and compare it with OSI reference model
- 2.5 plan, design, install, configure, test and maintain a network

3.0 TOPICS

3.1 INTRODUCTION AND OVERVIEW

3.2 NETWORK STANDARDS

3.3 OSI REFERENCE MODEL

3.4 TCP/IP MODEL

3.5 NETWORK ADMINISTRATION

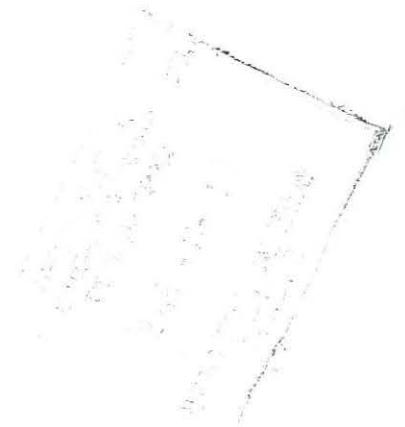
4.0 CONTENT

4.1 INTRODUCTION AND OVERVIEW

4.1.1 Fundamental components of a network

4.1.2 Data Transmission

- Analogue Signaling
- Digital Signaling
- Frequency, Bandwidth, Data rate
- Simplex, Half-Duplex, Duplex
- Synchronous and Asynchronous Transmission



NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/Q

- 4.1.3 Communication Media
 - bounded (Twisted pair, fibre optic , coaxial)
 - unbounded (microwave, radio e.t.c)

4.2 NETWORK STANDARDS

- 4.2.1 Identification and description of Network Standards and Protocols
 - representation and transmission of data
- 4.2.2 Terminology
 - analog, digital signaling
 - frequency, bandwidth, data rate
- 4.2.3 Transmission media
 - twisted pair, coaxial cables, fibre optical cables
 - wireless transmission (radio, microwaves, etc)
 - bandwidth / data rate / cost tradeoffs
- 4.2.4 Synchronous and asynchronous transmission
 - simplex, half-duplex and duplex data transfer
- 4.2.5 PSTN (Public Switched Telephone System)
 - basic structure (hierarchy of switching offices)
 - methods of encoding and decoding
 - modems and modulation techniques
 - codecs and PCM
 - multiplexing techniques
 - circuit switching and packet switching
- 4.2.6 Computer Terminals
 - character vs block transmission
 - PAD (Packet assemble disassemble)
- 4.2.7 ISDN (Integrated Service Digital Network)
 - N-ISDN
 - Evolution of PBX
 - B-ISDN and ATM (Asynchronous Transfer Mode)
- 4.2.8 Mobile User Technologies
 - paging systems (for beepers)
 - cordless telephones
 - cellular telephones

4.2.9 A physical Layer protocol RS-232-C

4.3 OSI REFERENCE MODEL

4.3.1 Physical layer

- Data encoding
- Physical medium attachment, accommodating various possibilities in the medium:
- Transmission technique (baseband (digital) or broadband (analog) signaling.
- Physical medium transmission: electrical, optical

4.3.2 Data link layer

- Link establishment and termination:
- Frame traffic control:
- Frame format
- Frame sequencing:
- Frame acknowledgment:
- Frame delimiting:
- Frame error detection and correction:
- Media access management:
- Data link layer protocols (PPP, SLIP)

4.3.3 Network Layer

- Network components (routers, gateways)
- Routing
- Subnet traffic control:
- Frame fragmentation
- Logical-physical address mapping
- Subnet usage accounting:
- IP, RIP, OSPF, BGP

4.3.4 Transport Layer

- Message segmentation:
- Message acknowledgment:
- Message traffic control:
- Error control
- Session multiplexing and demultiplexing:
- Buffering

- TCP, UDP

4.3.5 Session Layer

- Session establishment
- Session support
- Session Control protocol (SCP) , Point to point tunneling protocol(PPT)

4.3.6 Presentation Layer

- Character code translation: for example, ASCII to EBCDIC.
- Data conversion
- Data compression
- Data encryption
- SSL

4.3.7 Application Layer

- Resource sharing and device redirection
- Remote file access
- Remote printer access
- Inter-process communication
- Network management
- Directory services
- Electronic messaging (such as mail)
- Network virtual terminals
- HTTP, FTP, SMTP, POP3, IMAP

4.4 TCP/IP MODEL

- Development of TCP/IP
- TCP/IP layers
- Application of TCP/IP
- Comparison with OSI reference model

4.5 NETWORK ADMINISTRATION

- Network planning
- Network security basics
- Network management system e.g SNMP
- DHCP and DNS
- Cabling standards
- Network configuration (hardware and software)
- Network maintenance

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Data Communication and Networks 553/S02	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%

6.0 ASSESSMENT SPECIFICATION GRID

OBJ	TOPIC	WEIGHTING %
1	INTRODUCTION TO DATA COMMUNICATIONS	10
2	NETWORK STANDARDS	20
3	OSI REFERENCE MODEL	40
4	TCP/IP MODEL	10
5	NETWORK ADMINISTRATION	20
TOTAL		100

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR	TITLE	PUBLISHER
1	Blanchard E	2007	Introduction to data communication: a practical approach	Southern Alberta Institute of Technology
2	Forouzan A.	2000	Data Communication and Networks	McGraw Hill
3	Gupta P.C	2006	Data Communications and Computer Networks	PHI Learning Pvt Ltd
4	Junpeng	2010	Communications and Networking	SCIYO
5	Tannenbann A,S	2002	Computer Networks, 4th edition	Mc Graw Hill
6	Tse D and Viswanath P	2005	Fundamentals of Wireless Communication	Cambridge University Press

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT TITLE: SYSTEMS ANALYSIS AND DESIGN

SUBJECT CODE: 553/15/S03

DURATION: 200 HOURS

1.0 AIM

The aim of the subject is to enable the student to analyse, design, implement and maintain computer based information systems and IT related projects

2.0 OBJECTIVES

By the end of the course the student should be able to :

- 2.1 describe the role of systems analysis and design in a business organisation
- 2.2 follow channels of communication within business organisation structure
- 2.3 identify roles of systems development team
- 2.4 identify and explain life cycle activities and systems life cycle models
- 2.5 analyse, design and implement a solution with proper documentation
- 2.6 describe and implement systems security measures
- 2.7 plan and manage IT related projects

3.0 TOPICS

- 3.1 INTRODUCTION TO SYSTEMS ANALYSIS AND DESIGN
- 3.2 ORGANISATIONAL STRUCTURE
- 3.3. LIFE CYCLE OF THE BUSINESS INFORMATION SYSTEM
- 3.4 SYSTEMS DEVELOPMENT LIFE CYCLE
- 3.5 SYSTEMS SECURITY
- 3.6 PROJECT MANAGEMENT

4.0 CONTENT

4.1 INTRODUCTION TO SYSTEMS ANALYSIS AND DESIGN

- 4.1.1 Business Information Systems
- 4.1.2 Systems Overview and Concepts
- 4.1.3 Systems Analysis and the Systems Analyst

4.2 ORGANISATIONAL STRUCTURE

- 4.2.1 The Business Organisation Chart
- 4.2.2 Need for Communication
- 4.2.3 Identifying Audience
- 4.2.4 Problem-solving work sessions (to programmers, users etc)
- 4.2.5 Technical reviews e.g. technicians, suppliers etc.

4.3 LIFE CYCLE OF THE BUSINESS INFORMATION SYSTEM

- 4.3.1 The Life-Cycle Concepts
- 4.3.2 The Life-Cycle Activities
- 4.3.3 Systems Life Cycle models; Waterfall, Prototyping, RAD, JAD and SDLC
- 4.3.4 The need for system documentation
- 4.3.5 SSADM and OO approaches to systems analysis and design – tools and techniques

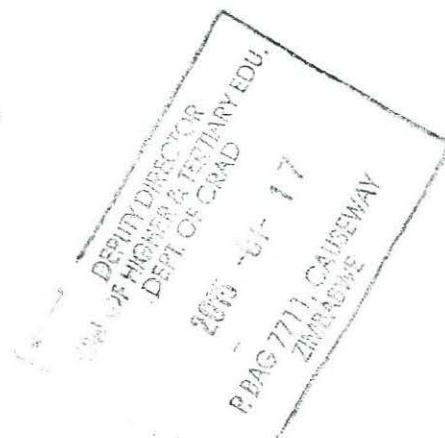
4.4 SYSTEMS DEVELOPMENT LIFE CYCLE

4.4.1 PRELIMINARY SURVEY

- Problem Identification
- Needs Identification
- Request for DP services from users
- Understanding the problem
- Defining the scope of the project
- Planning investigation
- Deliverables
- Request for Proposal (RFP)
- TOR

4.4.2 FEASIBILITY STUDY

- Definition
- Economic feasibility
- Technical feasibility
- Operational feasibility
- Social feasibility
- Schedule feasibility
- Deliverables



NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

4.4.3 REQUIREMENTS ANALYSIS AND SPECIFICATION

- **Fact finding techniques**
 - Record inspection
 - Observation
 - Sampling and Measuring
 - Interviewing
 - Questionnaires
 - Prototyping
 - JAD
- **Fact Recording Tools**
 - DFDs
 - Activity Narratives
 - Structured English
 - ER Diagrams
 - UML diagrams
- **Fact Analysis Tools**
 - Flowcharts
 - Data Dictionary
 - Decision Trees
 - Decision Tables

4.4.4 DESIGN PHASE

Interface Design

- Output Design
- Design of input
- Design of dialogue

File and Database Design

- File organisation and access methods
- File specification
- Data analysis
- Normalisation: First, Second and Third Normal forms

System controls design

- Source Document Control
- Input Control
- Processing Control
- Output Control

Procedural Controls

- Segregation of duties
- Audit Controls

Physical Facility Controls
End User Computing Controls

CASE

- Definition
- Types
- Advantages and disadvantages

Object Oriented Design

- Class diagrams
- Use Case diagrams
- Sequence diagrams

4.4.5 DEVELOPMENT & TESTING

- Program coding
- Validation and verification testing

Levels of testing

- o Unit testing
- o Program testing
- o System testing
- o Interface testing
- o User acceptance testing
- o ACM – Acceptance Criteria Matrix

- Test conditions

4.4.6 IMPLEMENTATION

- Implementation planning
- User training, programmer training and management orientation
- Management orientation
- Hardware and software installation
- Changeover strategies
- Implementation management

4.5 OPERATION AND MAINTENANCE

4.5.1 ROUTINE OPERATION

- Organising for data processing
- Data processing performance standards
- Customer relation
- Security

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4.5.2 PERFORMANCE EVALUATION

- Performance review
- Post installation review
- Periodic review

4.5.3 TYPES OF MAINTENANCE

4.5.4 MANAGEMENT OF CHANGE

- Guidelines for system modification
- Change control

4.6 SYSTEMS SECURITY

- 4.6.1 Logical and physical security
- 4.6.2 Risk management concepts
- 4.6.3 Backup strategies
- 4.6.4 Disaster Recovery plans and procedures

4.7 PROJECT MANAGEMENT

- 4.7.1 Phases of Project Management
- 4.7.2 Project Management tools and techniques, Network diagrams and Gantt Charts

CASE STUDY

The student should be able to carry out a case study on the analysis and design of a system, which can be implemented in Zimbabwe. In the case study, the student should be able to demonstrate an understanding of Entrepreneurial Skills

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Systems Analysis and Design 553/S03	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%

6.0 ASSESSMENT SPECIFICATION GRID

OBJ	TOPIC	WEIGHTING %
1	INTRODUCTION TO SYSTEMS ANALYSIS AND DESIGN	10
2	ORGANISATIONAL STRUCTURE	15
3	LIFE CYCLE OF THE BUSINESS INFORMATION SYSTEM	20
4	SYSTEMS DEVELOPMENT LIFE CYCLE	25
5	OPERATION AND MAINTANANCE	10
6	SYSTEMS SECURITY	5
7	PROJECT MANAGEMENT	15
	TOTAL	100

7.0 SUGGESTED REFERENCES

AUTHOR	YEAR OF PUBLICATION	TITLE	PUBLISHER
1 Gary B.	2010	Systems Analysis and Design, 8 th Edition	Cengage Learning
2 Kendall K.E & Kendall J.E	2010	Systems Analysis and Design, 8 th Edition	Prentice Hall
3 Pilone & Pitman	2005	UML in a Nutshell	O'Reilly Median Inc
4 Somerville I.	2007	Software Engineering	Pearson, Hong Kong
5 Valacich, George, Hoffer	2011	Essentials of systems Analysis and Design	Pearson

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT TITLE: **PROGRAMMING IN VISUAL BASIC.NET**

SUBJECT CODE: **553/15/SO4**

DURATION: **220 HOURS**

1.0 AIM

The aim of the subject is to equip students with knowledge, skills and attitudes for developing Windows and Web based applications using the Visual Basic.NET programming language.

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 apply Visual Basic programming concepts in problem solving.
- 2.2 implement data structures in Visual Basic programs.
- 2.3 implement the programming features inherent in Visual Basic.NET Language in solving Business problems.
- 2.4 utilise the VB.Net Platform in application development.
- 2.5 develop Desktop applications using Windows forms.
- 2.6 design user friendly interfaces using controls and menus.
- 2.7 create database based applications using ADO.NET.

3.0 TOPICS

3.1 VISUAL BASIC INTRODUCTION AND CONSTRUCTS

3.2 VISUAL BASIC DATA STRUCTURES AND OOP

3.3 THE VISUAL BASIC.NET LANGUAGE

3.4 THE .NET FRAMEWORK

3.5 WINDOWS FORMS I: DEVELOPING DESKTOP APPLICATIONS

3.6 WINDOWS FORMS II: CONTROLS, COMMON DIALOGUE BOXES AND MENUS

3.7 DEVELOPING DATABASE APPLICATIONS USING ADO.NET

4.0 CONTENT

4.1 VISUAL BASIC INTRODUCTION AND CONSTRUCTS

4.1.1 An Introduction to Visual Basic

- Program Development Cycle
- Programming Tools
- Fundamentals of Programming in Visual Basic

4.1.2 Visual Basic Controls

- Visual Basic Events
- Numbers
- Strings
- Input and Output

4.1.3 General Procedures

- Sub Procedures
- Function Procedures
- Modular Design

4.1.4 Decisions

- Relational and Logical Operators
- If Blocks
- Select Case Blocks

4.1.5 Repetition

- Do Loops
- Processing Lists of Data with Do Loops
- For... Next Loops

4.2 VISUAL BASIC DATA STRUCTURES AND OOP

4.2.1 Array based Systems

- Creating and Accessing One-Dimensional Arrays
- Manipulating Arrays
- Sorting and Searching
- Two-Dimensional Arrays

4.2.2 File Based Systems

- Sequential Files
- Using Sequential Files

4.2.3 Database Systems

- Database access using ADO
- Database access using OLE DB

4.2.4 Object-Oriented Programming concepts

- Classes and Objects
- Arrays of Objects; Events; Containment

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- Inheritance

4.3 THE VISUAL BASIC.NET LANGUAGE

- Visual Basic.NET
- Source Files
- Identifiers
- Keywords
- Literals
- Data Types
- Namespaces
- Symbolic Constants
- Variables and Variable Scope
- Access Modifiers
- Operators and Expressions
- Statements
- Classes
- Interfaces
- Structures
- Enumerations
- Exceptions
- Delegates
- Events
- Standard Modules
- Attributes
- Conditional Compilation

4.4 THE .NET FRAMEWORK

- Common Language Infrastructure (CLI) and Common Language Runtime (CLR)
- Modules and Assemblies
- Application Domains
- Common Language Specification (CLS)
- Intermediate Language (IL) and Just-In-Time (JIT) Compilation
- Metadata
- Memory Management and Garbage Collection
- .NET Framework Namespaces

4.5 WINDOWS FORMS I: DEVELOPING DESKTOP APPLICATIONS

- Creating a Form
- Handling Form Events
- Relationships between Forms
- MDI Applications
- Component Attributes
- 2-D Graphics Programming with GDI+
- Printing

4.6 WINDOWS FORMS II: CONTROLS, COMMON DIALOG BOXES, AND MENUS

- Common Controls and Components

- Control Events
- Form and Control Layout
- Common Dialog Boxes
- Menus
- Creating a Control

4.7 DEVELOPING DATABASE APPLICATIONS USING ADO.NET

- Universal Data Access
- Managed Providers
- Connecting to a SQL Server Database
- Connecting to an OLE DB Data Source
- Reading Data into a DataSet
- Relations between DataTables in a DataSet
- The DataSet's XML Capabilities
- Binding a DataSet to a Windows Forms DataGridView
- Binding a DataSet to a Web Forms DataGridView
- Typed DataSets
- Reading Data Using a DataReader
- Executing Stored Procedures through a SqlCommand Object

CASE STUDY

The student should be able to develop and test a software solution to a given problem, which can be implemented in Zimbabwe. In the case study, the student should be able to demonstrate an understanding of Entrepreneurial Skills.

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Programming in Visual Basic.Net 553/S04	Theory: 3 hour paper (Weighted 20%) Practical 3 hour paper (Weighted 20%)	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

6.0 ASSESSMENT SPECIFICATION GRID

OBJECTIVE	SUBJECT/TOPIC	WEIGHTING %
1	Simple data types -constants, variables, arrays,-records, Visual basic controls -checkbox, combobox, Command button, frames, listbox -option buttons, check boxes, textboxes, shapes, timers, Code -event procedure, assignment statement, if-then-else statement, select case statement, for .. next statement -key press procedure	20
2	Files -files ,sorting and sorting ,Databases ,Database access , procedures, Standard modules More advanced features -displaying and hiding forms, dialogue boxes ,common dialog controls, Error handling ,menus ,Directory list box	20
3 & 4	The Visual Basic.NET Language Source Files, Identifiers, Keywords, Literals, Data Types, Namespaces, Symbolic Constant, Variables and Variable Scope, Access Modifiers, Operators, Expressions, Statements, Classes, Interfaces, Structures, Enumerations, Exceptions, Delegates, Events, Standard Modules, Attributes, Conditional Compilation The .NET Framework -Common Language Infrastructure (CLI) and Common Language Runtime (CLR), Modules and Assemblies, Application Domains, Common Language Specification (CLS), Intermediate Language (IL) and Just-In-Time (JIT) Compilation, Metadata, Memory Management and Garbage Collection, .NET Framework Namespaces	20
5 & 6	Windows Forms I: Developing Desktop Applications Creating a Form, Handling Form Events, Relationships Between Forms, MDI Applications, Component Attributes, 2-D Graphics Programming with GDI+, Printing Windows Forms II: Controls, Common Dialog Boxes, and Menus Common Controls and Components, Control Events, Form and Control Layout, Common Dialog Boxes, Menus,	20

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

	Creating a Control	
7	Universal Data Access Managed Providers Connecting to a SQL Server Database Connecting to an OLE DB Data Source Reading Data into a DataSet Relations between DataTables in a DataSet The DataSet's XML Capabilities Binding a DataSet to a Windows Forms DataGridView Binding a DataSet to a Web Forms DataGridView Typed DataSets Reading Data Using a DataReader Executing Stored Procedures through a SqlCommand Object	20
	TOTAL	100

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR OF PUBLICATION	TITLE	PUBLISHER
1	Jourbet, T.J and Paynet R,N	2003	ADO.NET Programming	Wardware Publishing
2	Liberty J	2002	Learning Visual Basic.Net	Kindle
3	Mauer L	2001	Sams Taech Yourself more Visual Basic.Net in 21 days	Sams Publishing
4	Troelsen A	2006	Pro VB and the .NET platform	New York
5	Walther S	2006	ASP.NET 2.0 Unleashed	New York
6	Willis T and Newsome B	2006	Beginning Visual Basic	Wiley Publishing

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT TITLE: SOFTWARE DESIGN

SUBJECT CODE: 553/15/S05

DURATION: 180 HOURS

1.0 AIM

The aim of the subject is to develop skills of designing computer programs using functional, data and object oriented approaches

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 describe the basic constructions using different process specification tools
- 2.2 explain relationships among modules
- 2.3 apply functional oriented approach to software design
- 2.4 apply data oriented approach to software design
- 2.5 apply object oriented approach to software design
- 2.6 design user friendly interfaces
- 2.7 apply different testing techniques using live and artificial data

3.0 TOPICS

3.1 STRUCTURED PROGRAMMING CONCEPTS

3.2 DESIGN QUALITY

3.3 FUNCTIONAL ORIENTED DESIGN

3.4 DATA ORIENTED APPROACH

3.5 OBJECT ORIENTED APPROACH

3.6 USER INTERFACE DESIGN

3.7 TESTING

4.0 CONTENT

4.1 STRUCTURED PROGRAMMING CONCEPTS

4.1.1 Basic Constructs

- Sequence
- Iteration
- Selection/decision

4.1.2 Process Specification Tools

- Pseudo code
- Flowcharts
- Nassi Schneidermann
- Decision Tables
- Decision Trees
- Structured English

4.2 DESIGN QUALITY

4.2.1 Modules

- Relationship between modules
- Super Ordinates
- Subordinates
- Drivers
- Stubs

4.2.2 Cohesion

4.2.3 Coupling

4.2.4 Heuristics to software design

- Fan In
- Fan Out

4.3 FUNCTIONAL ORIENTED DESIGN

4.3.1 Top down approach

4.3.2 Bottom-Up approach

4.3.3 Top down versus bottom up approaches

4.3.4 Structure Charts

- Transform Analysis
- Transaction Analysis
-

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4.4 DATA ORIENTED APPROACH

- 4.4.1 Michael Jackson Methodology
- 4.4.2 Warnier Orr Methodology

4.5 OBJECT ORIENTED APPROACH

- 4.5.1 Objects
- 4.5.2 Object classes
- 4.5.3 Object Oriented Design concepts
 - inheritance
 - polymorphism
 - encapsulation
- 4.5.4 UML diagrams

4.6 USER INTERFACE DESIGN

- 4.6.1 User Interface guidelines
- 4.6.2 User System Interaction
 - Direct manipulation
 - Interface Models
 - Menu Systems
 - Command line interface
- 4.6.3 User Guidance
 - Documentations
 - Error messages
 - Help system design

4.7 TESTING

- 4.7.1 Testing approaches
 - Bottom-Up Testing
 - Top-Down Testing
- 4.7.2 Levels of testing
 - Unit Testing
 - Integration testing
 - System testing
- 4.7.3 Types of testing
 - Acceptance testing
 - Black box
 - White box
 - Functional

- Performance
- Regression

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Software Design 553/S05	3 hour written examination	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments 30% (weighted 10% each) • Skills Competency Testing 30% 	100%

6.0 ASSESSMENT SPECIFICATION GRID

OBJE	TOPICS	WEIGHTING %
1	STRUCTURED PROGRAMMING CONCEPTS	15
2	DESIGN QUALITY	15
3	FUNCTIONAL ORIENTED DESIGN	10
4	DATA ORIENTED APPROACH	10
5	OBJECT ORIENTED APPROACH	20
6	USER INTERFACE DESIGN	15
7	TESTING	15
	TOTAL	100

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR OF PUBLICATION	TITLE	PUBLISHER
1	Booch G. et.al	2007	Object oriented analysis and Design with applications	Addison Wesley
2	Larman C	2004	Applying UML and Patterns	Arrich Gamma and Patterns
3	Pressman R.s	2004	Software Engineering : a Practitioner's approach	McGraw hill
4	Sommerville I	2007	Software	Pearson

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

Engineering 8th
Edition

SUBJECT TITLE: MATHEMATICS AND STATISTICS

SUBJECT CODE: 553/15/S12

DURATION: 200 HOURS

1.0 AIM

The aim of the subject is to develop an understanding of Mathematics and Statistics

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 calculate areas, perimeters and volumes of different shapes.
- 2.2 use logarithms to solve problems.
- 2.3 solve equations using various methods
- 2.4 calculate cost prices, selling price, commission, compound interest and profit and loss.
- 2.5 explain data collection methods and sampling methods
- 2.6 present and represent data using tables, graphs, charts and picture forms.
- 2.7 extract data to calculate mean, median and mode .
- 2.8 solve problems using set theory.
- 2.9 solve probability problems.

3.0 TOPICS

- 3.1 METRIC SYSTEM
- 3.2 LOGARITHMS
- 3.3 ALGEBRA
- 3.4 PERCENTAGES AND THEIR APPLICATIONS
- 3.5 DATA COLLECTION
- 3.6 DATA PRESENTATION AND REPRESENTATION
- 3.7 MEASURES OF CENTRAL LOCATION
- 3.8 SET THEORY
- 3.9 PROBABILITY

4.0 CONTENT

4.1 METRIC SYSTEM

- 4.1.1 Calculate areas and perimeters of rectangle, circles, cylinders and irregular shapes.
- 4.1.2 Calculate volume of cylinders, cuboids and spheres.
- 4.1.3 Relate units of measurement.

4.2 LOGARITHMS

- 4.2.1 Solve arithmetic problems using logarithms.
- 4.2.2 Explain indices

4.3 ALGEBRA

- 4.3.1 Solve the following types of equations:-
 - simple equations
 - simple simultaneous equations
 - quadratic equations
 - quadratic simultaneous equations.
- 4.3.2 Boolean Algebra

4.4 PERCENTAGES AND THEIR APPLICATIONS

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- 4.4.1 Calculate cost price and selling prices.
- 4.4.2 Calculate profit and loss.
- 4.4.3 Explain and distinguish between mark-up and margin.
- 4.4.4 Calculate for Hire-Purchase agreements:

- deposit
- interest
- time
- instalment

- 4.4.5 Calculate commission.
- 4.4.6 Distinguish between simple and compound interest.
- 4.4.7 Calculate for compound interest:-

- rate
- time
- interest
- amount

4.5 DATA COLLECTION

- 4.5.1 Population and Sampling.
- 4.5.2 Methods of extracting data:-
 - interviews
 - postal questionnaires
 - observation (participatory and non-participatory).
 - extraction from existing sources (publications internet, etc)

4.6 DATA PRESENTATION AND REPRESENTATION

- 4.6.1 Narrative forms and reports.
- 4.6.2 Tabulation and frequency tables.
- 4.6.3 Construct and interpret:-
 - Line graph
 - Lorenz curve
 - Histogram

- Bar Charts
- Z-Charts
- Pictogram
- Statistical
- Ogives
- Tabulations
- Polygons
- Log and semi-log graphs
- Histograms

4.7 MEASURES OF CENTRAL LOCATION

- 4.7.1 Define mean, median and mode.
- 4.7.2 Calculate mean, median and mode.

4.8 SET THEORY

- 4.8.1 Definition of sets.
- 4.8.2 Interpreting set notation (union – intersection).
- 4.8.3 Solving problems using set theory.

4.9 PROBABILITY

- 4.9.1 Apply the rules of probability:-
 - Addition rule
 - Multiplication rule
- 4.9.2 Use tree diagrams in probability calculations.

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Mathematics and Statistics 553/S12	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments (in class) 30% (weighted 10% each)• Skills Competency Testing (in class) 30%	100%

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

6.0 ASSESSMENT SPECIFICATION GRID

OBJECTIVE	TOPIC	WEIGHTING (%)
1.	METRIC SYSTEM	15
2.	LOGARITHMS	15
3.	ALGEBRA	10
4.	PERCENTAGES AND THEIR APPLICATION	15
5.	DATA COLLECTION	10
6.	DATA PRESENTATION AND REPRESENTATION	15
7.	MEASURES OF CENTRAL LOCATION	10
8.	SET THEORY	15
9.	PROBABILITY	15
	TOTAL	100

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR	TITLE	PUBLISHER
1	Billstein et al	(1981)	A Problem Solving Approach to mathematics for Elementary School Teachers	The Benjamin/Cummings Publishing Company Inc.
2	Francis A.	(1998)	Business Mathematics and Statistics , 5 th Edition	Letts Educational
3	Huges A.J.	(1993)	Applied Mathematics: For Business , Economics and the Social Sciences	Irwin Professional Publishing
4	Owen F. & Jones R.	(1994)	Statistic 4 th Ed.	Pitman Publishing
5	Whitehead G.	(1993)	Success in Business Calculations, 2 nd Edition	Petterson Institute

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT TITLE: COMPUTER QUANTITATIVE METHODS

SUBJECT CODE: 553/15/S06

DURATION: 200 HOURS

1.0 AIM

The aim of the subject is to develop the student's ability to apply mathematical (computational) techniques and concepts in solving common I.T related problems

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 demonstrate an understanding of functions and solving linear and quadratic equations
- 2.2 formulate and solve linear equations up to 3×3
- 2.3 formulate and solve real life problems using matrices
- 2.4 differentiate algebraic functions
- 2.5 integrate algebraic functions
- 2.6 solve simple problems involving interest and annuities
- 2.7 demonstrate an understanding of change of events and finding their probabilities
- 2.8 identify and solve problems involving probability distribution
- 2.9 identify statistical parameters of given distributions
- 2.10 analyse data using graphs and statistical measures
- 2.11 demonstrate and understanding of data collection methods
- 2.12 estimate population parameters from sample parameters
- 2.13 demonstrate an understanding of hypothesis testing

3.0 TOPICS

- 3.1 FUNCTIONS
- 3.2 SYSTEMS OF LINEAR EQUATIONS
- 3.3 MATRICES
- 3.4 DIFFERENTIATION
- 3.5 INTEGRATION
- 3.6 INTRODUCTION TO FINANCIAL MATHEMATICS
- 3.7 INTRODUCTION TO PROBABILITY
- 3.8 PROBABILITY DISTRIBUTIONS
- 3.9 INTRODUCTION TO STATISTICS
- 3.10 DESCRIPTIVE STATISTICS
- 3.11 SAMPLING
- 3.12 APPROXIMATING POPULATION PARAMETERS FROM SAMPLE PARAMETERS AND CONFIDENCE INTERVALS
- 3.13 HYPOTHESIS TESTING

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

4.0 CONTENT

4.1 FUNCTIONS

- 4.1.1 Identification of different types of functions
- 4.1.2 Calculating the domain, range and inverse of a function
- 4.1.3 Determining the composite functions from given functions

4.2 SYSTEMS OF LINEAR EQUATIONS

- 4.2.1 Application of the elimination method in solving a system of equations
- 4.2.2 Using the Substitution method in solving equations
- 4.2.3 Solving linear equations using Cramer's Rule, Matrix Decomposition and Inverse Matrix Methods

4.3 MATRICES

- 4.3.1 Performing matrix algebra
- 4.3.2 Determining matrix determinants and their properties (up to 3×3)
- 4.3.3 Calculating the inverse of a matrix using the adjoint and elementary row operations (up to 3×3)

4.4 DIFFERENTIATION

- 4.4.1 Interpretation (essence) of the Derivative
- 4.4.2 Differentiating Sums, Products and Quotients, Chain rule, Exponential functions
- 4.4.3 Implicit differentiation
- 4.4.4 Application of Differentiation to Business Systems (i.e. Maxima and minima, point of inflexion)

4.5 INTEGRATION

- 4.5.1 Standard integrals
- 4.5.2 Integration of sums, products and quotients
- 4.5.3 Integration by substitution
- 4.5.4 Partial fractions
- 4.5.5 Integration by parts
- 4.5.6 Logarithmic and exponential functions
- 4.5.7 Applications of integration to business systems (including first order variables separate differential equations).

4.6 INTRODUCTION TO FINANCIAL MATHEMATICS

- 4.6.1 Introduction to sequencing and series
- 4.6.2 Convergence and divergence of a sequence
- 4.6.3 Simple and compound interest
- 4.6.4 Basics of discounting
- 4.6.5 Annuities (present and future value calculations)

4.7 INTRODUCTION TO PROBABILITY

- 4.7.1 Definition of sample points, sample spaces and events
- 4.7.2 Distinguishing between inclusive and exclusive events
- 4.7.3 Solving problems using Probability Laws
- 4.7.4 Application of probability trees and probability sample spaces in solving problems
- 4.7.5 Application of Conditional Probability and Baye's Theorem
- 4.7.6 Permutations and combinations

4.8 PROBABILITY DISTRIBUTIONS

- 4.8.1 Definition of Cumulative probabilities (non calculus)
- 4.8.2 Introduction to Binomial and Poisson distributions
- 4.8.3 Calculation of probabilities on Binomial and Poisson distributions
- 4.8.4 Obtaining the mean, variance and standard deviation of Binomial and Poisson distributions
- 4.8.5 Properties of the Normal distribution
- 4.8.6 Standardise and calculate probabilities on the Normal distribution
- 4.8.7 Using Normal distribution tables
- 4.8.8 Using Normal approximation to the Binomial distribution

4.9 INTRODUCTION TO STATISTICS

- 4.9.1 Definition of statistical parameters
- 4.9.2 Obtaining classes, class limits, class mid-point, frequencies, cumulative frequencies, relative frequencies in frequency distribution

4.10 DESCRIPTIVE STATISTICS

- 4.10.1 Drawing Bar charts and Pie charts, Histograms, Ogives and Frequency polygons
- 4.10.2 Calculating the arithmetic mean, geometric mean, harmonic mean, median and Mode
- 4.10.3 Application of Data Coding in calculating statistical measures
- 4.10.4 Calculating the Range, Standard Deviation and Variance
- 4.10.5 Evaluating Quartiles, Deciles and Percentiles

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- 4.10.6 Determining Quartile deviation, Coefficient of Variation
- 4.10.7 Defining Skewness
- 4.10.8 Calculating the Coefficient of Skewness

4.11 SAMPLING

- 4.11.1 advantages and disadvantages of the observation, personal interview, postal questionnaire and published documents as methods of data collection.
- 4.11.2 Distinguishing Random, Stratified, Systematic, Multi-Stage, Quota and Cluster sampling technique.

4.12 APPROXIMATING POPULATION PARAMETERS FROM SAMPLE PARAMETERS AND CONFIDENCE LEVELS

- 12.1 Defining small and large sample parameters
- 12.2 Calculating Interval estimates of population mean and population proportion
- 12.3 Approximating population mean, proportion and standard deviation

4.13 HYPOTHESIS TESTING

- 13.1 Formulating the null and alternative hypothesis
- 13.2 Performing hypothesis tests on the mean and proportion of a population
- 13.3 Differences between means and the difference between proportions
- 13.4 Using the students' on small samples and normal distribution on large sample tests

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Computer Quantitative Methods 553/S06	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments (in class) 30% (weighted 10% each)• Skills Competency Testing (in class) 30%	100%

6.0 ASSESSMENT SPECIFICATION GRID

OBJECTIVE	TOPIC	WEIGHTING %
1	FUNCTIONS	5
2	SYSTEMS OF LINEAR EQUATIONS	5
3	MATRICES	5
4	DIFFERENTIATION	10
5	INTEGRATION	10
6	INTRODUCTION TO FINANCIAL MATHEMATICS	5
7	INTRODUCTION TO PROBABILITY	5
8	PROBABABILITY DISTRIBUTIONS	15
9	INTRODUCTION TO STATISTICS	5
10	DESCRIPTIVE STATISTICS	15
11	SAMPLING	5
12	APPROXIMATING POPULATION PARAMETERS FROM SAMPLE PARAMETERS AND CONFIDENCE LEVELS	5
13	HYPOTHESIS TESTING	10
	TOTAL	100

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR OF PUBLICATION	TITLE	PUBLISHER
1	Berstsekas and Tsitsiklis	2002	Introduction to Probability	Athena Scientific
2	Bostock and Chandler	2000	Core Maths for A Level	Nelson Thornes
3	Crawshaw and Chambers	2001	Advanced Level Statistics	Nelson Thornes
4	Lucy T	2002	Quantitative Techniques	Cengage Learning
5	Orsborn J.W	2007	Best Practices in quantitative Methods	Sage Publishing

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT: **DATA STRUCTURES AND ALGORITHMS USING C++**

SUBJECT CODE: **553/15/S07**

DURATION: **200 HOURS**

1.0 AIM

The aim of the subject is to impart skills on how to design and implement efficient algorithms and appropriate data structures in programs or software under development.

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 apply object oriented design concepts
- 2.2 use arrays and structures in programs
- 2.3 apply recursion in problem solving
- 2.4 develop programs that use searching and sorting algorithms
- 2.5 analyse algorithms selection for implementation
- 2.6 use pointers in creating linked lists
- 2.7 use pointers in creating array based lists
- 2.8 write programs implementing stacks data structures
- 2.9 solve problems using Queue data structures
- 2.10 apply tree data structure in problem solving
- 2.11 use graphs data structure in programs
- 2.12 write programs using files data structures

3.0 TOPICS

- 3.1 OBJECT-ORIENTED DESIGN
- 3.2 ARRAYS AND STRUCTURES
- 3.3 RECURSION
- 3.4 SEARCHING AND SORTING ALGORITHMS
- 3.5 ANALYSIS OF ALGORITHMS
- 3.6 POINTERS AND LINKED LISTS
- 3.7 POINTERS AND ARRAY BASED LISTS

3.8 STACKS

3.9 QUEUES

3.10 TREES

3.11 GRAPHS

3.12 FILES

4.0 CONTENT

4.1 OBJECT-ORIENTED PROGRAMMING

4.1.1 Definition of terms:

- Data structure
- Algorithm

4.1.2 Classes and Objects:

- Class structure
- Class members
- Access control
- Constructors and Destructors
- Abstract classes
- Interface classes
- Instantiation of a class

4.2 ARRAYS AND STRUCTURES

4.2.1 Declaration and Initialisation of arrays (single and multidimensional)

4.2.2 Implementation of arrays

4.2.3 Declaration and use of a structure

4.2.4 Arrays and structures

4.3 RECURSION

4.3.1 Concept of recursion

4.3.2 Determining output of a recursive function

4.3.2 Problem solving using recursion:

- Factorial
- Fibonacci sequence
- Tower of Hanoi
- Reversing an array by recursion
- Computing powers via linear recursion
- Converting a number from decimal to binary

4.4 SEARCHING AND SORTING ALGORITHMS

4.4.1 Concepts of searching and sorting

4.4.2 Searching:

- Sequential search
- Binary search
- Comparison of sequential searching and binary searching

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

4.4.3 Sorting:

- Bubble sort
- Selection sort
- Shell sort
- Insertion sort
- Merge sort
- Heap sort
- Comparison of sorting algorithms

4.5 ANALYSIS OF ALGORITHMS

4.5.1 Best, worst and average case

4.5.2 Big-Oh analysis:

- Linear algorithms
- $O(N^2)$ algorithms
- $O(N^3)$ algorithms

4.5.3 Calculating the running time for a program

4.6 POINTERS, LINKED LISTS AND ARRAY-BASED LISTS

4.6.1 Concepts of a pointer data type

4.6.2 Dynamic memory:

- Operator new
- Operator delete

4.6.3 Single linked lists

4.6.4 Declaration of a single linked list

4.6.5 Operations:

- Add
- Delete
- Create
- Search

4.6.6 Doubly and double linked circular lists

4.6.7 Declaration

4.6.8 Operations:

- Add
- delete

4.6.9 Merits and demerits of single and double linked lists

4.7 STACKS

4.7.1 Concept of a stack

4.7.2 Initialise stack

4.7.3 Empty stack

4.7.4 Full stack

4.7.5 Operation on a stack:

- Push
- Pop

4.7.6 Return the top element

4.7.7 Static and dynamic stacks

4.7.8 Application of stacks:

- Reversing a string
- Conversion from infix to postfix
- Evaluation of postfix

4.8 QUEUES

4.8.1 Concept of a stack

4.8.2 Initialisation of a queue

4.8.3 Empty and full queue

4.8.4 Front and back

4.8.5 Static and dynamic queues

4.8.6 Application of queues

- Recognising palindrome
- Evaluating infix
- Building a dqueue from two stacks

4.9 TREES

4.9.1 Binary Tree Theorem

4.9.2 Binary Tree Node Abstract Data Type (ADT)

4.9.3 Binary Tree Traversals

- Pre-order
- In-order
- Post-order

4.9.4 Binary Node implementation

4.9.5 Recursive Binary Search Tree operations

4.9.6 Iterative Insertion and Deletion

4.9.7 Comparing Binary Search Trees (BST) and Linear Lists

4.9.8 Application of BST

- Evaluation of expressions
- Sorting using a BST

4.10 GRAPHS

4.10.1 Concepts of Graphs (directed, undirected, vertex, edge, path, complete graph, weighted graph, adjacency matrix, adjacency list)

4.10.2 Graph Traversal

- Methods
- Depth-First algorithm
- Breath-First algorithm
- Topological sorting

4.11 FILES

4.11.1 Introduction to C++ streams

4.11.2 Types of Files

- Sequential
- Random
- Text

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- Binary
- 4.11.3 File Modes
- 4.11.4 File operations
 - Open
 - Read
 - Write

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Data Structures and Algorithms Using C++ 553/S07	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%

6.0 ASSESSMENT SPECIFICATION GRID

OBJECTIVE	TOPIC	WEIGHTING %
1 & 2	OBJECT-ORIENTED PROGRAMMING ARRAYS AND STRUCTURES	20
3 & 4	RECURSION SEARCHING AND SORTING ALGORITHMS	20
5 , 6, 7	ANALYSIS OF ALGORITHMS POINTERS AND LINKED LISTS POINTERS AND ARRAY BASED LISTS	20
8 & 9	STACKS QUEUES	20
10 , 11, 12	TREES GRAPHS FILES	20
	TOTAL	100

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR OF PUBLICATION	TITLE	PUBLISHER
1	Dale N	2003	C++ plus Data Structures, 3rd Edition	Jones and Bartlett Publishers
2	Drozdek a	2012	Data Structures and Algorithms in C++	Cengage Learning
3	Kruse R.L and Ryba A.J	2000	Data Structures and Program Design in C++	Prentice Hall
4	Kutti N.S and Padhye P.Y	2004	Data Structures in C++	Prentice Hall
5	Malik D.S	2010	Data Structures Using C++	Course Technology, Boston

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT TITLE: **SOFTWARE PROJECT**

SUBJECT CODE: **553/15/S08**

DURATION: **200 HOURS**

1.0 PREAMBLE

These guidelines have been prepared for use in the identification, development and assessment of the Project component at National Diploma level.

They are meant to provide guidance to the student, Project Supervisor and Assessors on the nature and essential components of the Project.

The guidelines are structured so as to indicate the expected main activities by the student and specific areas to be looked at within each activity. The activities have been further allocated individual measures of importance (weighting).

The Project Supervisor shall be required to approve the student's proposed problem before the project commencement. The mentor shall render warranted guidance to the student according to agreed schedule. The time allocated for the Software Project, which is to be conducted throughout the third part of the course, is 200 hours. Time shall be reserved for the student to consult his/her supervisor throughout this period.

2.0 AIM

To provide a platform for the student to consolidate Information Technology skills learnt during the course.

3.0 OBJECTIVES

On successful completion of the project, the student should be able to

- 3.1 identify problem or opportunity and produce a project proposal
- 3.2 carry out feasibility study and produce a feasibility report
- 3.3 carry out needs analysis and produce requirements specification
- 3.4 design the system and produce design specification
- 3.5 convert design specification into actual program code and test
- 3.6 develop an implementation and post implementation plan

4.0 LAYOUT OF SUBMITTED WORK

The Project documents shall be required to be in the format specified below and write-ups shall include necessary Headings, Definition of Terms and References

ACTIVITY		SPECIFIC AREAS	WEIGHTING %
1.	Project Identification	Executive summary, description of current system, scope, objectives and brief description of proposed system <i>(1% each)</i>	5
2	Feasibility study	Feasibility study techniques <i>(2% each technique)</i>	10
3.	Requirements Analysis	Fact finding and recording tools, analysis tools <i>(min 10 tools, 1% each)</i>	10
4.	Design	4.1 input, output and process design 4.2 database and file design 4.3 user interface design 4.4 design of system controls 4.5 DFDs upto 2 nd level 4.6 UML diagrams <i>(5% each)</i>	30
5.	Coding(using VB.net, PHP, JAVA) and Testing	5.1 Programming Practice e.g indentation and commenting <i>(7%)</i> 5.2 Programme Quality (User-Friendliness) <i>(8%)</i> 5.3 Programme Resilience (Non-Crash Properties) <i>(7%)</i> 5.4 Testing of Data Samples <i>(8%)</i>	30
6.	Implementation and post implementation plan	6.1 Presentation <i>(3%)</i> 6.2 Documentation (Incl User Manuals) <i>(4%)</i> 6.3 Conversion Plans (Incl Training) <i>(3%)</i>	10
7	Conclusion	Future plans	5

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

5.0 ASSESSMENT CRITERIA

60% DOCUMENTATION

40 % VIVA (panel to consist of 2 industrialists, 3 lecturers)

PROJECT VIVA MARKING GUIDE

CANDIDATE NUMBER: _____

PROJECT TITLE: _____

ASPECT	POSSIBLE MARK	SCORED MARK	REMARKS
Appearance	2		
Presentation	3		
Project Description	5		
System Objectives	10		
Flow of processes	5		
Description of Methodologies used	5		
Highlights on Benefits	5		
Testing done and future changes	5		
TOTAL	40		

EXAMINER'S COMMENTS:

SIGNATURE: _____ DATE: _____

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT TITLE: **DATABASE SYSTEMS CONCEPTS AND DESIGN**

SUBJECT CODE: **553/15/S09**

DURATION: **200 HOURS**

1.0 AIM

The aim of the subject is to enable an individual to design, set up and maintain a database environment

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 explain database concepts
- 2.2 describe and illustrate database systems architecture
- 2.3 categorise database according to size, purpose and location
- 2.4 distinguish and describe database models
- 2.5 employ the concepts of database life cycle in developing a database system
- 2.6 use database languages to define and manipulate databases
- 2.7 normalize data up to BCNF
- 2.8 employ database security and integrity techniques on databases
- 2.9 plan and implement disaster-recovery techniques/plans
- 2.10 manage database change and growth

3.0 TOPICS

- 3.1 DATABASE ENVIRONMENT
- 3.2 DATABASE SYSTEMS ARCHITECTURE
- 3.3 CLASSIFICATION OF DATABASE
- 3.4 DATABASE MODELS
- 3.5 DATABASE LIFE CYCLE
- 3.6 DATABASE LANGUAGES
- 3.7 NORMALISATION

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- 3.8 DATABASE SECURITY AND INTEGRITY
- 3.9 DISASTER – RECOVERY TECHNIQUES
- 3.10 DATABASE ADMINISTRATION

4.0 CONTENT

4.1 DATABASE ENVIRONMENT

4.1.1 Database concepts

- Definition of database
- Data as a resource
- File Processing evolution (Traditional to Database approach)

4.1.2 Database components and their relationships

- Hardware
- Software
- Data
- People
- procedures

4.2 DATABASE SYSTEMS ARCHITECTURE

4.2.1 three-level schema: external, conceptual and internal schema, logical and physical data independence

4.2.2 file organization methods

- clustering
- indexing
- hashing
- compression techniques

4.3 CLASSIFICATION OF DATABASE

4.3.1 Categorising databases

- According to number of users
- According to geographical location
- According to purpose

4.4 DATABASE MODELS

- Hierarchical
- Network
- Relational
- Object-oriented

4.5 DATABASE LIFE CYCLE

- database life cycle phases
- activities and personnel involved at each stage
- roles of personnel at each stage

4.6 DATABASE LANGUAGES (SQL)

- Data Definition Language (DDL), Databases views and indexes
- Data Manipulation Language (DML) (select, insert, Delete and update; Built-in functions, view creation and manipulation).

4.7 NORMALISATION

- purpose and utilization
- normal forms up to BCNF
- limitations of normalisation

4.8 DATABASE SECURITY AND INTEGRITY

4.8.1 database integrity rules

- Entity, semantic and referential integrity
- Concurrence problems (Transaction, Locks and deadlocks)

4.8.2 database security techniques

- Authorisation mechanism
- Access matrix and delegation hierarchy
- Views
- Audit trails
- Encryption

4.9 DISASTER – RECOVERY TECHNIQUES

- 1.8.1 Disaster recovery policy**
- 1.8.2 Disaster recovery techniques**
 - Backup types
 - Log files
 - Check-point

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- Recovery strategies (Backward and Forward)
- Mirroring

4.10 DATABASE ADMINISTRATION

- Purpose of database administration
- Management of database Activity
- Managing database structure
- Managing DBMS structure
- Database economics and control

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Database Systems Concepts and Design 553/S09	3 hour written examination	A minimum of <ul style="list-style-type: none">• 3 Field Work based assignments 30% (weighted 10% each)• Skills Competency Testing 30%	100%

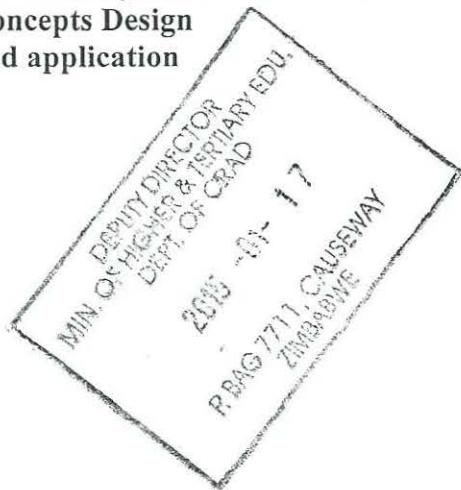
6.0 ASSESSMENT SPECIFICATION GRID

OBJECTIVE	SUBJECT / TOPIC	WEIGHTING %
1	DATABASE ENVIRONMENT	10
2	DATABASE SYSTEMS ARCHITECTURE	10
3	CLASSIFICATION OF DATABASES	10
4	DATABASE MODELS	5
5	DATABASE LIFECYCLE	10
6	DATABASE LANGUAGES (SQL)	15
7	NORMALISATION	10
8	DATABASE SECURITY AND INTEGRITY	10
9	DISASTER RECOVERY TECHNIQUES	10
10	DATABASE ADMINISTRATION	10
	TOTAL	100

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

7.0 SUGGESTED REFERENCES

	AUTHOR	YEAR OF PUBLICATION	TITLE	PUBLISHER
1	Connolly and Begg A	2005	A Practical Approach to Design, implementation and management	Addison Wesley
2	Coronel, Morris and Rob	2010	A Practical Approach to Design, implementation and management	Jo Sabatino
3	Date C.J	2004	An Introduction to Database Systems	Pearson Education
4	Silbersc Hatz A. etal	2005	Database System concepts	Addison Willey
5	Singh S.K	2009	Database Systems Concepts Design and application	Pearson Education



NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

SUBJECT TITLE: INTERNET AND WEB DEVELOPMENT

SUBJECT CODE: 553/15/S10

DURATION: 200 HOURS

1.0 AIM

The aim of the subject is to enable students to design, develop, test and maintain web sites/applications.

2.0 OBJECTIVES

By the end of the course the student should be able to:

- 2.1 define the concepts of Internet and Web Development
- 2.2 explain web design concepts
- 2.3 describe the web development process
- 2.4 create web pages for a site or application using HTML
- 2.5 use web and graphics editor software in creating web pages
- 2.6 create web pages that implement client side scripting
- 2.7 create web sites/applications that link to databases/files for posting or getting content
- 2.8 implement security measures on web pages of a site or application

3.0 TOPICS

- 3.1 INTRODUCTION TO INTERNET
- 3.2 INTRODUCTION TO WEB DESIGN
- 3.3 WEB DEVELOPMENT PROCESS
- 3.4 CREATING WEB PAGES USING HTML
- 3.5 EDITORS SOFTWARE
- 3.6 CLIENT SIDE SCRIPTING USING JAVASCRIPT
- 3.7 SERVER SIDE SCRIPTING USINH PHP
- 3.8 WEB SECURITY

4.0 CONTENT

4.1 INTRODUCTION TO INTERNET

- Definition of internet terminology (HTTP, WWW, FTP, TCP IP, Browsers, Search Engines, Uploading, E-mail, ISP, HTML, Cookies, SMTP etc).
- Types of internet connections (dial up, leased line, radio link, satellite etc).
- Application of internet (E-commerce, E-learning, chatting, etc).
- Internet and threats and counter measures (viruses, spam, pop-ups, pop-up stoppers, parental control, SSL etc).
- Online payment (open and secure)

4.2 INTRODUCTION TO WEB DESIGN

- Web design concepts
 - Web site and web application
 - Web server (IIS, Apache etc)
 - Web technologies (ASP, Cold Fusion etc)
 - Dynamic and static web pages
 - Image behaviour
 - Web optimisation
 - Database connectivity
 - World Wide Web consortium (W3C) design rules
 - Scripting languages
- Web hosting
 - Types of hosts
 - Guidelines for selecting host
 - Web publishing procedures
- Consideration when designing a website

4.3 WEB DEVELOPMENT PROCESS

- Web site/application requirements gathering
- Site planning
 - Site structure
 - Site maps
 - Navigation
- Content Management
- Site framework

4.4 CREATING WEB PAGES USING HTML

- Basic structure of an HTML program
- HTML components
 - Tags
 - Attributes
 - Tables

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- Frames
- Forms
- Navigation (site links, page links, search feature)
- Working with multimedia
 - Sound
 - Video
 - Images
- Inclusion of downloadable files

4.5 EDITORS SOFTWARE

- Using Web development editor to create web pages (Dreamweaver, FrontPage, Coffee cup, etc)
- Using graphics editor to create graphic objects (Photoshop, Macromedia Fireworks, PAINT)

4.6 CLIENT SIDE SCRIPTING USING JAVASCRIPT

- Variables
- Operators
- Looping
- Selection
- String objects
- Standard objects
- Functions
- Arrays
- Built in Functions (Date(), Now() etc)
- Working with events (OnLoad(), OnUnLoad(), OnMouseOver(), OnFocus(), OnClick() etc)
- Integrating JavaScript functions in HTML

4.7 SERVER SIDE SCRIPTING USING PHP

- Variables
- Operators
- Echo
- Strings
- Looping
- Selection
- Functions
- Arrays
- Forms
- Posting content to database/file
- Getting content from a database/file
- File uploading
- Integrating PHP functions in HTML

4.8 WEB SECURITY

- Authentication

- Validation of input forms
- Protection
- IP filtering
- HTML exclusion

5.0 ASSESSMENT SCHEME

SUBJECT TITLE AND CODE	WRITTEN EXAMINATION 40%	CONTINUOUS ASSESSMENT 60%	WEIGHTING
Internet and Web Development 553/S10	Theory: 3 hour paper (Weighted 20%) Practical 3 hour (Weighted 20%)	A minimum of <ul style="list-style-type: none"> • 3 Field Work based assignments 30% (weighted 10% each) • Skills Competency Testing 30% 	100%

6.0 ASSESSMENT SPECIFICATION GRID

PRACTICAL PAPER

OBJECTIVES	AREAS TO BE COVERED	WEIGHTING %
4, 5	CREATE WEB PAGES USING HTML	30
5, 6	CREATE DYNAMIC WEB PAGES THAT INCORPORATE JAVA SCRIPT FUNCTIONS AND EVENTS	20
5, 7	CREATE DYNAMIC WEB PAGES THAT INCORPORATE PHP FUNCTIONS FOR UPLOADING FILES, FORMS, POSTING AND GETTING CONTENT FROM SERVER	30
8	IMPLEMENTING SECURITY ON WEB PAGES	10
4, 5	CREATE GRAPHICS OBJECTS AND ANIMATION	10
TOTAL		100

THEORY PAPER

OBJECTIVES	AREAS TO BE COVERED	WEIGHTING %
1	INTRODUCTION TO INTERNET	15
2	INTRODUCTION TO WEB DESIGN	25
3	WEB DEVELOPMENT PROCESS	30
4	HTML TAGS	10
6, 7	WORKING WITH JAVASCRIPT AND PHP	10
8	WEB SECURITY	10
TOTAL		100

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

7.0 SUGGESTED REFERENCES

AUTHOR	YEAR	TITLE	PUBLISHER
1. Douglas Downing , Michael Covington and Melody Covington	2012	Dictionary of Computer and Internet Terms	Barron's Educational Series
2. Jennifer Niederst Robbins	2007	Learning Web Design: A Beginner's Guide to (X) HTML, StyleSheets, and Web Graphics	O'Reilly Media
3. Sue Jenkins	2009	Web Design All-in-One For Dummies	John Wiley and Sons Inc
4. Terry Felke-Morris	2014	Web Development & Design Foundations with HTML5	Addison-Wesley
5. Mark A Lassoff	2014	PHP and MySQL for Beginners	LearnToProgram, Incorporated
6. Neil Smyth	2007	JavaScript Essentials	Techotopia
7. Rasmus Lerdorf and Kevin Tatroe	2004	Programming PHP	O'Reilly Media
8. Bryan Sullivan and Vincent Liu	2011	Web Application Security, A Beginner's Guide	McGraw-Hill Osborne Media

SUBJECT TITLE: ON THE JOB TRAINING

SUBJECT CODE: 553/15/S11

DURATION: ONE YEAR

1. INDUSTRIAL ATTACHEMENT GENERAL GUIDELINES

- 1.1 The student shall be attached to a relevant company after completing National Diploma 1.
- 1.2 The minimum period of attachment is not less than 12 months.
- 1.3 A student will only be admitted to ND3 when he/she has completed the attachment.

2. GUIDELINES FOR STUDENTS

- 2.1 The student is subject to the regulations of the institute and Company regulations during the industrial attachments.
- 2.2 The student is expected to:
 - conform to the Company's regulations working time and discipline.
 - fulfil the supervisor's instructions concerning the training process.
 - write a log book on a daily basis and submit a report after finishing the training in a given department (or training unit).
 - put his/her best efforts to acquire extensive knowledge and skills in order to achieve required standard of training.
 - keep good relations with all the staff of the company.
 - promote the good name of the institution.
 - submit the completed attachment report form at the end of the attachment period.
- 2.3 The choice of company for the industrial attachment will not be based on any probable monetary benefits the students may stand to gain.

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- 2.4 The student must always bear in mind that his/her conduct during the industrial attachment period will reflect not only on him/her but also attachment placement and the relationship between the institution and the company.

3. GUIDELINES FOR THE INDUSTRY ON THE TREATMENT OF THE STUDENT DURING THE INDUSTRIAL ATTACHMENT

- 3.1 The student will be subject to the company's regulations and is expected to function like a full time employee of the company.
- 3.2 Wherever possible the company is required to assist the student by providing welfare measure such as accommodation close to the company, access to canteen facilities and company transport facilities etc.
- 3.3 If the company wishes to pay the student an extra allowance the arrangements is only between the two parties, that is, the student and the company involved.

4. ATTACHMENT DUTIES

- 4.1 Computer servicing
- 4.2 Networking
- 4.3 Systems analysis and design
- 4.4 Installation and use of software
- 4.5 Communication

5. INDUSTRIAL ATTACHMENT REPORT

College Department Date stamped signature of Head of Department (form invalid without this)

5.1 Section A

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

5.1.1 Name of Trainee

.....
5.1.2 Surname of Trainee

.....
5.1.3 Name of College

.....
5.1.4 Department

.....
5.1.5 Date of Birth

.....
5.1.6 Student Number

.....
5.1.7 I.D. Number

.....
5.1.8 Residential Address

Telephone Number

.....
Next of Kin

5.2 Section B (to be completed by the trainee)

5.3 Course being undertaken and level

5.4 Subjects covered at National Certificate and NDI levels with gradings.

Level	Subject	Grade	Year

5.5 Section C (to be completed by the course coordinator – lecturer)

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

5.5.1 Period on Industrial Attachment

From	To	Number of weeks

5.5.2 Duties performed by trainee (to be completed after attachment)

6. Name of company and Date stamp with address

Signature

6.1 Period student attached to the company

From	To	Number of weeks

6.2 Duties performed by the trainee

.....
.....
.....
.....
.....

6.3 Company supervisor's general comments on the student with regard to the following aspects.

6.3.1 Capability to execute assigned duties

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

- 6.3.2 Weakness towards executing duties
 - 6.3.3 Timeous completion of work
 - 6.3.4 Discipline
 - 6.3.5 Punctuality
 - 6.3.6 Any other aspects the supervisor might consider necessary
-
.....
.....
.....
.....

Signed certified and verified correctly

Name (Please print)

Signature

Designation

- 6.4 Assessment overall marks from company supervisor (out of 100%).

.....
.....
.....
.....
.....
.....
.....

- 6.5 College attachment coordinator's overall marks and remarks (out of 100%).

- 6.6 Total average marks awarded

.....
.....
.....

7. Section D (to be completed by trainee)

- 7.1 I certify that information given is true and correct

Signature

Date

NATIONAL DIPLOMA IN INFORMATION TECHNOLOGY – 553/15/CO/O

8. Section E (to be completed by college Head of Department) with regards information given above.

I declare that the student has (has not) fulfilled the industrial attachment component of the course according to his or her syllabus requirements.

Name (Please print)

Signature

Designation

Date stamp

9. Section F (Notes)

9.1 Forms are to be completed in duplicate and distributed as follows:

- One copy for the college Department
- One copy for the company at which student was attached

9.2 The student (trainee) must write a detailed report at the end of the attachment period and submit to the college course coordinator in mid October for assessment before November examinations session.

9.3 The student must attend a VIVA before a panel where he/she will be required to explain what he or she was doing during attachment period. The VIVA to conform to stipulated dates for project VIVAs as declared by Head of Department.

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
SCIENCE AND TECHNOLOGY DEVELOPMENT**

QUALIFICATION STANDARD

FOR

A

**PROGRAMMER ANALYST/NETWORK
ADMINISTRATOR/WEBSITE DEVELOPER/SYSTEMS
ADMINISTRATOR**

Foreword

This document constitutes the first draft of a standard for the occupation of a Programmer Analyst/Network Administrator/Website Developer/Systems Administrator which was developed using Occupational Competence Profiles (OCPs) as a basis.

This is in preparation for the registration of the Standards on the Zimbabwe Qualifications Framework (ZQF). The ZQF is expected to be administered by the Zimbabwe Examinations and Qualifications Authority (ZIMEQA) once the ZIMEQA Bill currently before parliament becomes law.

In line with the SADC Protocol on Education and Training, each SADC member state was tasked to come up with its own Qualifications Framework that shall subsequently be linked to the Regional Qualifications Framework (RQF). The development and registration of standards on a qualifications framework is meant to facilitate the upward and horizontal movement of individuals in their occupations, across occupations or in their areas of study – within the country or the SADC region.

As a draft, certain sections have not yet been addressed. These sections are denoted by a [TBA] and will be attended to as information is finalised.

For ease of reference, a definition of terms commonly used in this document is included in the document.

This particular standard, for the occupation of a Programmer Analyst/Network Administrator/Website Developer/Systems Administrator, was developed with the active participation of expert workers from the industry.

TABLE OF CONTENTS

	Page
Foreword	2
Definition of Terms	4
Level Descriptors	6
List of Units and their Credit Values	7
Summary of Standard	8
Unit Standard 1	10
Unit Standard 2	13
Unit Standard 3	16
Unit Standard 4	19
Unit Standard 5	22
Unit Standard 6	25
Unit Standard 7	28
Unit Standard 8	31

Definition of Terms

Assessment	A process of collecting evidence of a learner's work to measure and make judgements about the achievement or non-achievement of the specified National Qualifications Framework standards or qualifications.
Certification	Awarding of approved documentary evidence of a qualification.
Competences required in readiness for assessment	Critical relevant knowledge, skills and attitudes a learner requires in order to achieve specified outcomes before assessment.
Credit	The value assigned to a unit completed or a value assigned to a unit standard which reflects the relative time and effort required to complete the outcomes.
Date of promulgation	Date when standard and qualification have been approved, registered and gazetted.
Duration	The minimum notional hours required by a learner to attain all the competences in a unit standard.
Element	The smallest component of a unit with a meaningful outcome.
Generic skills	Universal skills which apply to more than one occupation.
Level descriptor	A specific indicator of competence level on the ZQF.
Occupation	A group of related economically beneficial work activities performed by a person.
Performance criteria	A statement of competence or achievement against which the attainment of outcomes is measured.
Qualification	Formal award of recognition of the achievement of the required competency and/or capability level of the Zimbabwe Qualifications Framework as may be determined by the relevant bodies registered for such purpose by the Authority.
Range statement	The context or conditions within which a competence is performed and assessed that include tools, equipment, materials and duration.
Review Date	Date of revision of qualification standard as and when necessary but not later than three years from date of issue.
Sector	A section of the economy in which operators produce or provide similar products or services.

Standard	Registered statement of desired education and training outcomes and their assessment criteria.
Unit	The smallest combination of work activities capable of being a full-time economically beneficial occupation.
Unit Standard	Registered statement(s) of desired education and training outcomes, their associated assessment criteria together with administrative information as specified.
ZQF	National qualifications framework approved by the minister for registration of national standards and qualifications.

LEVEL DESCRIPTORS

[TBA]

(Information on the description of levels still pending)

UNIT TITLES

NO.	UNIT	CREDITS
1	Software Engineering	12
2	Network Administration	14
3	Hardware Installation and Maintenance	8
4	Database Administration	12
5	Web Administration	14
6	Information Communication Technology Security Management	8
7	Project management	6
8	Supervision	6

SUMMARY OF STANDARD

UNIT NO.	UNIT TITLE	CREDITS	ELEMENTS
1	Software Engineering	12	1.1 Analyse information systems/program requirements 1.2 Design information system/program 1.3 Code information system/information 1.4 Test information system/programs 1.5 Implement information system 1.6 Maintain and review information systems 1.7 Document information system
2	Network Administration	14	2.1 Draw up network plan 2.2 design network 2.3 Install network 2.4 Configure network 2.5 Carryout network maintenance
3	Hardware Installation and Maintenance	8	3.1 Install hardware 3.2Formulate and implement hardware maintenance plan 3.3 Maintain hardware 3.4 Maintain hardware inventory
4	Database Administration	12	4.1 Design database 4.2 Implement database 4.3 Implement security 4.4 Manage database disaster recovery plan 4.5 Optimise database performance 4.6 Perform database audit 4.7 Troubleshoot and repair database
5	Web Administration	14	5.1 Formulate project proposal 5.2 Analyse client requirements 5.3 Design web interface 5.4 Design database 5.5 Code web site/application 5.6 Test and launch web site/application 5.7 Maintain we site/application
6	Information Communication Technology Security Management	8	6.1 Formulate security policies 6.2 Implement security measures 6.3 Test security functionality 6.4 Carry out system security audit 6.5 Draw up and implement disaster recovery plan
7	Project management	6	7.1 Draw up a project proposal 7.2 Plan project activities 7.3 Manage resources 7.4 Produce project documentation

UNIT NO.	UNIT TITLE	CREDITS	ELEMENTS
8	Supervision	6	8.1 Plan work activities 8.2 Assign duties 8.3 Train subordinates 8.4 Appraise subordinates

UNIT 1

Title:	Software Engineering
Unit Code	

ZQF Level: National Diploma

Credits: 12

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: TBA

Review Date: TBA

Aim of the unit standard

The unit will enable an individual to analyse, design, code, implement, maintain, test and document information systems.

ELEMENTS AND PERFORMANCE CRITERIA

Element 1.1 | Analyse information system/program requirements

Performance Criteria:

- 1.1.1 Information system problem statement is produced
- 1.1.2 Proposal is produced and submitted for approval
- 1.1.3 Fact finding is conducted using appropriate tools
- 1.1.4 Requirements specifications are listed
- 1.1.5 Feasibility study is conducted

Element 1.2 | Design information system/programs

Performance Criteria:

- 1.2.1 Relevant process flow diagrams are produced
- 1.2.2 Program logic is specified using pseudo code
- 1.2.3 System output, input and interface design are done
- 1.2.4 System security is designed

Element 1.3 | Code information system programs

Performance Criteria:

- 1.3.1 Programming language is selected and used appropriately
- 1.3.2 Data structures and functions are defined
- 1.3.3 Data validation is implemented

- 1.3.4 Security controls are implemented
- 1.3.5 Interfaces are created

Element 1.4	Test information system programs
--------------------	---

Performance Criteria:

- 1.4.1 Unit testing of programs and small components is conducted
- 1.4.2 Integration testing is performed
- 1.4.3 Identified program bugs are corrected
- 1.4.4 System testing is carried out to determine efficiency
- 1.4.5 User acceptance testing is done
- 1.4.6 Verification and validation of system is done

Element 1.5	Implement information systems
--------------------	--------------------------------------

Performance Criteria:

- 1.5.1 Implementation plan is drafted, reviewed and recommended
- 1.5.2 Change over plan is put in place
- 1.5.3 Implementation plan is put in place
- 1.5.4 Implementation resources are acquired

Element 1.6	Maintain and review information systems
--------------------	--

Performance Criteria:

- 1.6.1 All problems arising after system deployment are listed
- 1.6.2 Identified system problem areas modified
- 1.6.3 Detailed testing is done after every system upgrade

Element 1.7	Document information systems
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Performance Criteria:

- 1.7.1 Relevant documentation of system problem and proposal is produced
- 1.7.2 Detailed feasibility study report which justifies the necessity of the project is compiled
- 1.7.3 User requirements, functional specification document and system programs are documented according to ICT Policy standards
- 1.7.4 User manual booklet is prepared
- 1.7.5 System document is updated with changes on system upgrade

Competences required in readiness for assessment.

- Information systems analysis and design
- Information system coding
- Information system maintenance
- Planning

- Troubleshooting
- Programming

Generic Skills

Communication
Supervision
Management
Problem solving
Troubleshooting
Planning
Leading
Controlling
Organising
Hardware maintenance
Networking

Range Statement:

Tools and equipment

Computer
Programming software
Modelling tools
Internet connection
Printer

Materials

Bond paper
Toner cartridges

Duration

120 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

UNIT 2

Title:	Network Administration
Unit Code	

ZQF Level: **National Diploma**

Credits: **14**

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: **TBA**

Review Date: **TBA**

Aim of the unit standard

The unit will enable an individual to plan, design, install, configure, test and maintain a network

ELEMENTS AND PERFORMANCE CRITERIA

Element 2.1	Draw up network plan
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Performance Criteria:

- 2.1.1 User requirements are analysed and noted
- 2.1.2 Site survey visit is conducted
- 2.1.3 Work plan is drawn-up
- 2.1.4 Hardware and software requirements are listed

Element 2.2	Design network
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Performance Criteria:

- 2.2.1 Suitable network topology is identified
- 2.2.2 Network diagram is drawn
- 2.2.3 Power layout is designed

Element 2.3	Install network
--------------------	------------------------

Performance Criteria:

- 2.3.1 Site is prepared
- 2.3.2 Network components (trunking, cabling etc) are installed
- 2.3.3 Cables are tested for continuity

Element 2.4 | Configure network

Performance Criteria:

- 2.4.1 Software is installed
- 2.4.2 Network addressing is implemented
- 2.4.3 Network security is enforced
- 2.4.4 Connections are tested

Element 2.5 | Carryout network maintenance

Performance Criteria:

- 2.5.1 Maintenance schedule is compiled
- 2.5.2 Network links are monitored
- 2.5.3 Network disaster recovery plan is drawn up and implemented
- 2.5.4 Network is upgraded
- 2.5.5 Network problems are identified
- 2.5.6 Network repairs are carried out

Competences required in readiness for assessment.

Knowledge of ICT Networking devices
Network designing
Disaster recovery planning
Troubleshooting

Generic Skills

Communication
Supervision
Management
Problem solving
Troubleshooting
Planning
Leading
Controlling
Organising
Hardware maintenance
Networking

Range Statement:

Tools and equipment

Networking tool kit (crimping tools, cable testers etc)
Network components (routers, switches etc)
Computer
Internet connection
Printer

Materials

Unshielded Twisted Pair (UTP)
Protective clothing
Stationery
RJ45 connector

Duration

140 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

UNIT 3

Title:	Hardware Installation and Maintenance
Unit Code	

ZQF Level: National Diploma

Credits: 8

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: TBA

Review Date: TBA

Aim of the unit standard

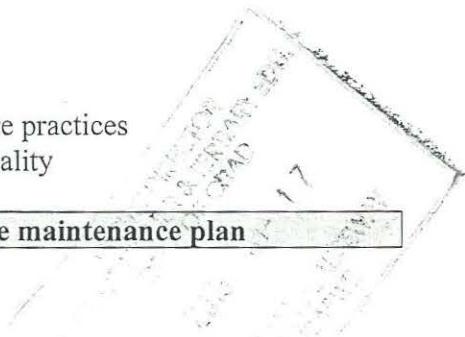
The unit will enable an individual to install, troubleshoot and maintain computer hardware

ELEMENTS AND PERFORMANCE CRITERIA

Element 3.1 | Install hardware

Performance Criteria:

- 3.1.1 Hardware requirements are compiled
- 3.1.2 Required hardware is procured
- 3.1.3 Installations are done in line with safe hardware practices
- 3.1.3 Hardware is configured and tested for functionality



Element 3.2 | Formulate and implement hardware maintenance plan

Performance Criteria:

- 3.2.1 Hardware maintenance plan is drawn up
- 3.2.2 Suitable tools and equipment are selected
- 3.2.3 Safe working practices are observed during installation
- 3.2.4 Safe keeping practices are observed during maintenance
- 3.2.5 Documentation is produced for all maintenance activities

Element 3.3 | Maintain hardware

Performance Criteria:

- 3.3.1 Routine procedures are followed during hardware maintenance
- 3.3.2 Hardware faults are identified and reported
- 3.3.3 Faults are fixed appropriately

3.3.4 Relevant hardware upgrade is done

Element 3.4	Maintain hardware inventory
--------------------	------------------------------------

Performance Criteria:

- 3.4.1 Purchased hardware is recorded
- 3.4.2 Recorded hardware is distributed to relevant offices
- 3.4.3 Hardware inventory is updated after every purchase/disposal

Competences required in readiness for assessment.

Knowledge of ICT hardware components

Hardware Maintenance planning

Hardware troubleshooting

Asset Management

Records management

Generic Skills

Communication

Supervision

Management

Problem solving

Troubleshooting

Planning

Leading

Controlling

Organising

Hardware maintenance

Networking

Range Statement:

Tools and equipment

Hardware technician toolkit

Work bench

ICT hardware spares and accessories

Computer

Internet connection

Printer

Materials

Stationery

Duration

80 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

UNIT 4

Title:	Database Administration
Unit Code	

ZQF Level: National Diploma

Credits: 12

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: TBA

Review Date: TBA

Aim of the unit standard

The unit will enable an individual to design, maintain and audit databases; and management of disaster recovery plan

ELEMENTS AND PERFORMANCE CRITERIA

Element 4.1	Design database
--------------------	------------------------

Performance Criteria:

- 4.1.1 Information requirements are gathered from end users
- 4.1.2 Appropriate database type is selected
- 4.1.3 Appropriate database platform/technology is chosen
- 4.1.4 Database schema is specified
- 4.1.5 Database is normalised
- 4.1.6 Database design diagrams are created

Element 4.2	Implement database
--------------------	---------------------------

Performance Criteria:

- 4.2.1 Database is created using an appropriate Database Management System (DBMS)
- 4.2.2 Database is populated with test data
- 4.2.3 Database is tested using queries and stored procedures

Element 4.3 | Implement security**Performance Criteria:**

- 4.3.1 User access levels are established
- 4.3.2 User time session is established
- 4.3.3 Established security measures are tested

Element 4.4 | Manage database disaster recovery plan**Performance Criteria:**

- 4.4.1 Disaster recovery plan is designed
- 4.4.2 Disaster recovery plan is implemented
- 4.4.3 Disaster recovery plan tests and changes are documented

Element 4.5 | Optimise database performance**Performance Criteria:**

- 4.5.1 Logs are cleared regularly
- 4.5.2 Database indices are created
- 4.5.3 Database tables space allocation is amended
- 4.5.4 Database networks performance is fine tuned

Element 4.6 | Perform database audit**Performance Criteria:**

- 4.5.1 Database audit tools are identified
- 4.5.2 Audit trails are performed
- 4.5.3 Database audit reports are produced

Element 4.7 | Troubleshoot and repair database**Performance Criteria:**

- 4.7.1 Database faults are investigated
- 4.7.2 Repair commands are applied
- 4.7.3 Database backup is done
- 4.7.4 Database related faults that affect database are fixed

Competences required in readiness for assessment.

Knowledge of types of database
Knowledge of database security
Database auditing
Database maintenance
Database disaster recovery planning
Database designing

Generic Skills

Communication
Supervision
Management
Problem solving
Troubleshooting
Planning
Leading
Controlling
Organising
Hardware maintenance
Networking

Range Statement:

Tools and equipment

Database management systems software
Modelling tools
Computer
Printer
Network
Internet connection

Materials

Stationery

Duration

120 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

UNIT 5

Title:	Web Administration
Unit Code	

ZQF Level: National Diploma

Credits: 14

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: TBA

Review Date: TBA

Aim of the unit standard

The unit will enable an individual to design, develop, deploy, maintain, and test web sites/applications

ELEMENTS AND PERFORMANCE CRITERIA

Element 5.1 | Formulate project proposal

Performance Criteria:

- 5.1.1 Timelines are set according to company project policy
- 5.1.2 Budget is prepared in accordance with the organisation's financial policy
- 5.1.3 Milestones are set according to project goals
- 5.1.4 Labour requirements are determined according to project goals
- 5.1.5 Workflow is planned according to project timelines
- 5.1.6 Project proposal report is produced and submitted to client

Element 5.2 | Analyse client requirements

Performance Criteria:

- 5.2.1 Design brief is discussed with client
- 5.2.2 Design brief is analysed
- 5.2.3 Design brief is evaluated with client
- 5.2.4 Analysis report is produced

Element 5.3 | Design web interface

Performance Criteria:

- 5.3.1 Site map is drawn
- 5.3.2 Website template is designed

- 5.3.3 Site framework is produced
- 5.3.4 Final website template is produced according to World Wide Web consortium (W3C) design rules

Element 5.4	Design database
--------------------	------------------------

Performance Criteria:

- 5.4.1 Data dictionary is defined
- 5.4.2 Entity relationships are formulated
- 5.4.3 Appropriate database engine is selected

Element 5.5	Code web site/application
--------------------	----------------------------------

Performance Criteria:

- 5.5.1 Appropriate development platform is selected in accordance with required functionality
- 5.5.2 Code is written according to web page functionality and object behaviour
- 5.5.3 Code is written to manipulate the database

Element 5.6	Test and launch web site/application
--------------------	---

Performance Criteria:

- 5.6.1 Web pages are tested
- 5.6.2 Database connections are tested
- 5.6.3 Browser compatibility is verified
- 5.6.4 Optimisation for search engines is done
- 5.6.5 Hosting option is selected
- 5.6.6 Files are uploaded
- 5.6.7 Website security is implemented

Element 5.7	Maintain web site/application
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Performance Criteria:

- 5.7.1 Maintenance schedule is prepared
- 5.7.2 Content pages are appended to documentation
- 5.7.3 Site activities are tracked and documented
- 5.7.4 Supporting scripts and add-ons are reviewed and updated

Competences required in readiness for assessment.

Web programming
Content Management System (CMS)
Search engines optimisation and internet marketing
Use of site tracking tools

Generic Skills

Communication
Supervision
Management
Problem solving
Troubleshooting
Planning
Leading
Controlling
Organising
Hardware maintenance
Networking

Range Statement:

Tools and equipment

Computer
Internet connection
Printer
Projector
Database Management System software
Backup devices
Site tracking tools

Materials

Stationery

Duration

140 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

UNIT 6

Title:	Information Communication Technology Security Management
Unit Code	

ZQF Level: National Diploma

Credits: 8

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: TBA

Review Date: TBA

Aim of the unit standard

The unit will enable an individual to formulate and implement security measures and policies as well as carrying out security audit and managing disaster recovery plan.

ELEMENTS AND PERFORMANCE CRITERIA

Element 6.1 Formulate security policies

Performance Criteria:

- 6.1.1 Security objectives are established
- 6.1.2 Security policies are constructed in adherence to stipulated standards and policies
- 6.1.3 Security policies are assessed and reviewed.

Element 6.2 Implement security measures

Performance Criteria:

- 6.2.1 Potential information technology risks are identified
- 6.2.2 System security plan is prepared
- 6.2.3 Security measures and practices are applied

Element 6.3 Test security functionality

Performance Criteria:

- 6.3.1 Regular security checks are performed
- 6.3.2 Security system is subjected to possible attacks and system vulnerabilities are noted
- 6.3.3 Security breaches are documented and resolved

Element 6.4	Carryout system security audit
--------------------	---------------------------------------

Performance Criteria:

- 6.4.1 Audit reports are compiled
- 6.4.2 System security recommendations are documented
- 6.4.3 System security is enforced

Element 6.5	Draw up and implement disaster recovery plan
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Performance Criteria:

- 6.5.1 Disaster recovery plan is designed
- 6.5.2 Disaster recovery plan is implemented
- 6.5.3 Disaster recovery plan tests and changes are documented

Competences required in readiness for assessment.

Information Communication Technology Security Systems
ICT Security auditing
Troubleshooting
Disaster recovery planning

Generic Skills

Communication
Supervision
Management
Problem solving
Troubleshooting
Planning
Leading
Controlling
Organising
Hardware maintenance
Networking

Range Statement:

Tools and equipment

Computer
Security software
Internet
Printer

Materials

Stationery

Duration

80 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

UNIT 7

Title:	Project Management
Unit Code	

ZQF Level: **National Diploma**

Credits: **6**

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: **TBA**

Review Date: **TBA**

Aim of the unit standard

The unit will enable an individual to design, plan and manage project activities as well as managing project resources.

ELEMENTS AND PERFORMANCE CRITERIA

Element 7.1	Draw up a project proposal
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Performance Criteria:

- 7.1.1 Problem statement is formulated
- 7.1.2 Project timelines are set
- 7.1.3 Project budget is prepared
- 7.1.4 Milestones are set according to project goals
- 7.1.5 Labour requirements are determined according to project goals
- 7.1.6 Work flow is planned according to project timelines
- 7.1.7 Project proposal documentation is produced and submitted

Element 7.2	Plan project activities
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Performance Criteria:

- 7.2.1 Project activities are outlined
- 7.2.2 Project timelines are shown using appropriate tools
- 7.2.3 Evaluation of the whole project is done using appropriate techniques like network activity diagrams to determine critical path and project activity dependencies

Element 7.3	Manage resources
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Performance Criteria:

- 7.3.1 Suitable project resources are identified
- 7.3.2 All identified resources are acquired
- 7.3.3 Appropriate personnel are allocated responsibilities
- 7.3.4 Appropriate resources are allocated to specific tasks

Element 7.4	Produce project documentation
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Performance Criteria:

- 7.4.1 Detailed project plan documentation is produced
- 7.4.2 Project progress reports are compiled and reviewed at every stage and forwarded to relevant stakeholders
- 7.4.3 Final project documentation is produced at project completion and submitted to stakeholders

Competences required in readiness for assessment.

Project Management
Project activities planning
Resources Management

Generic Skills

Communication
Supervision
Management
Problem solving
Troubleshooting
Planning
Leading
Controlling
Organising
Hardware maintenance
Networking

Range Statement:

Tools and equipment

Computer
Printer
Project Management software
Internet

Materials

Stationery

Duration

60 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

UNIT 8

Title:	Supervision
Unit Code	

ZQF Level: National Diploma

Credits: 6

Occupation: Programmer Analyst/Network Administrator/
Website Developer/Systems Administrator

Date of Promulgation: TBA

Review Date: TBA

Aim of the unit standard

The unit will enable an individual to performance training and supervision within specified period in accordance with regulations and procedures.

ELEMENTS AND PERFORMANCE CRITERIA

Element 8.1 Plan work activities

Performance Criteria:

- 8.1.1 Activities are documented
- 8.1.2 Timelines for each activity are set
- 8.1.3 Resource requirements are determined
- 8.1.4 Work plan is drawn up

Element 8.2 Assign duties

Performance Criteria:

- 8.2.1 Job descriptions are outlined
- 8.2.2 Schedule of tasks is created
- 8.2.3 Duties are allocated to subordinates according to schedule
- 8.2.4 Performance is assessed and corrective measures are taken

Element 8.3 Train subordinates

Performance Criteria:

- 8.3.1 Training needs assessment is carried out
- 8.3.2 Courses are designed in accordance with training needs
- 8.3.3 Training is conducted
- 8.3.4 Post-training evaluation is carried out

Element 8.4	Appraise subordinates
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Performance Criteria:

- 8.4.1 Company code of conduct compliance is adhered to when performing assignments
- 8.4.2 Subordinates performance is assessed
- 8.4.3 Deviant subordinates are counselled
- 8.4.4 Disciplinary action is initiated

Competences required in readiness for assessment.

Time management
Performance management
Training management
Communication
Supervision

Generic Skills

Communication
Supervision
Management
Problem solving
Troubleshooting
Planning
Leading
Controlling
Organising
Hardware maintenance
Networking

Range Statement:

Tools and equipment

Computer
Printer
Projector

Materials

Stationery

Duration

60 hours

Assessment and Certification:

In order to gain credits for this unit standard, a candidate must be assessed and demonstrate competency in all the elements and performance criteria of this unit standard.

Assessment will be conducted by accredited assessors. The results of the assessment will be submitted to ZIMEQA. A candidate can apply to ZIMEQA for documentary evidence of their achievements.

MINISTRY OF HIGHER AND TERTIARY EDUCATION, SCIENCE AND TECHNOLOGY
DEVELOPMENT
SKILLS PROFICIENCY

INDUSTRY
INFORMATION TECHNOLOGY

TRADE/ OCCUPATION
PROGRAMMER ANALYST/ NETWORK
ADMINISTRATOR/ WEBSITE DEVELOPER/
SYSTEMS ADMINISTRATOR

CLASS/ LEVEL
NATIONAL DIPLOMA

DUTY A: DATABASE ADMINISTRATION

Pre-requisites:

Approval Date:

Review Date:

TASK	STEPS	PROFICIENCY INDICATORS	RELATED KNOWLEDGE	WORKPLACE ESSENTIAL SKILLS
A1 Design database	<ul style="list-style-type: none"> - Analyse the information requirements - Draw a conceptual design - Choose a database management system software - Produce a logical database design. - Produce physical design. 	<ul style="list-style-type: none"> - Entity relationship diagram are produced - Database tables - Normalized tables 	<ul style="list-style-type: none"> - Database models - Database management system software - Data Definition and Data manipulation languages - Data migration procedures 	<ul style="list-style-type: none"> - Communication - Planning - Troubleshooting - Research - Interpersonal - Literacy - Leadership
A2 Implement designed database	<ul style="list-style-type: none"> - Create a database using DBMS software - Assign user rights access levels - Connect all database - Populate the database 	<ul style="list-style-type: none"> - Database tables indices are produced - Functional database is produced 		
A3 Maintain database	<ul style="list-style-type: none"> - Set up the maintenance plan - Monitor data integrity 	<ul style="list-style-type: none"> - User access to the database is observed 		

	<ul style="list-style-type: none"> - Optimize data base performance - Investigate faults - Execute repair commands 	<ul style="list-style-type: none"> - Information from database is retrieved - Maintenance plan is produced - Database faults are fixed 		
A4	<p>Manage Disaster recovery</p> <ul style="list-style-type: none"> - Design a disaster recovery plan - Implement the disaster recovery plan - Perform database back ups - Document recovery plan tests and changes 	<ul style="list-style-type: none"> - Disaster recovery plan is produced - Database back- ups are produced 		

TOOLS AND EQUIPMENT NECESSARY TO COMPLETE THIS DUTY:

Computer
 Printer
 Modeling software
 Internet connectors
 Database Management system software

Materials
 Stationery

HEALTH, SAFETY AND ENVIRONMENTAL ISSUES RELATED TO THIS DUTY:

Human factors and ergonomics
 Fire extinguisher
 First Aid Kit

SPECIFIC WORKER TRAITS REQUIRED COMPLETING THIS DUTY:

Problem solving
 Team player
 Punctual
 Honest

Self-driven
Goal oriented

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DUTY B: INFORMATION SECURITY ENFORCEMENT

Pre-requisites:

Approval Date:

Review Date:

TASK	STEPS	PROFICIENCY INDICATORS	RELATED KNOWLEDGE	WORKPLACE ESSENTIAL SKILLS
B1 Formulate Security Policy	<ul style="list-style-type: none">- Identify potential risks- Research on existing security policies- Determine risk levels- Educate participants in policy formulation- Consult stakeholders in policy development- Compile a policy document- Review policy document- Circulate the document to members of staff for signing- Sent the documents for assertion	<ul style="list-style-type: none">- Security policy document is produced- Security manuals are produced- Amended security policy is availed	<ul style="list-style-type: none">- Types of information threats- Types of security information- Information security legal standards- Information security systems- Security systems auditing.	<ul style="list-style-type: none">- Communication- Planning- Troubleshooting- Research- Interpersonal- Literacy- Leadership

B2	Implement Security policy	<ul style="list-style-type: none"> - Train users on security policy - Set clear penalties and enforce them - Monitor for violation and take appropriate action - Test security functionality - Document implementation activities 	<ul style="list-style-type: none"> - Training manuals on security - Drawn up Security test plan - Test results documented 		
B3	Carry out System security audit	<ul style="list-style-type: none"> - Define the scope of the audit - Identify the tools to be used - Perform system security audit - Identify possible threats - Review security policy 	<ul style="list-style-type: none"> - Audit scope documented - Audit reports produced - Reviewed security policy document 		

TOOLS AND EQUIPMENT NECESSARY TO COMPLETE THIS DUTY:

Computer
 Security software
 Printer
 Internet
 Database recovery site

Materials

Stationery
 Data storage devices

HEALTH, SAFETY AND ENVIRONMENTAL ISSUES RELATED TO THIS DUTY:

Personal Protective Equipment
 Workshop Safety and Health
 Human factor and ergonomics
 First Aid Kit
 Fire Extinguishers

SPECIFIC WORKER TRAITS REQUIRED COMPLETING THIS DUTY:

Problem solving
 Team player

Punctual
Honest
Self-driven
Goal oriented

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SKILLS PROFICIENCY**

INDUSTRY
INFORMATION TECHNOLOGY

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ADMINISTRATOR/ WEBSITE DEVELOPER/
SYSTEMS ADMINISTRATOR

CLASS/ LEVEL
NATIONAL DIPLOMA

DUTY C: SOFTWARE AND HARDWARE INSTALLATION AND MAINTENANCE

Pre-requisites:

Approval Date:

Review Date:

TASK	STEPS	PROFICIENCY INDICATORS	RELATED KNOWLEDGE	WORKPLACE ESSENTIAL SKILLS
C1 Software and Hardware sourcing/procurement	<ul style="list-style-type: none"> - Perform software and Hardware needs analysis - Determine the availability of hardware and software - Generate list of required software and Hardware - Identify potential suppliers for the required hardware and software - Request suppliers to submit quotations of required products 	<ul style="list-style-type: none"> - List of required hardware and software produced - List of potential suppliers - Quotations of required products - Comparative schedule - Completed order form 	<ul style="list-style-type: none"> - Procurement procedures. - Hardware handling precautions. - Basic knowledge of working with electronics assets. - Hardware and software configuration. - Software versions 	<ul style="list-style-type: none"> - Communication - Planning - Troubleshooting - Research - Interpersonal - Literacy - Leadership

	<ul style="list-style-type: none"> - Select the most appropriate suppliers - Produce the software and hardware 		and compatibility.	
C2	Formulate installation plan	<ul style="list-style-type: none"> - Establish installation objectives - Identify installation activities - Compile installation plan 	<ul style="list-style-type: none"> - Installation plan is produced - Installation procedures are observed 	
C3	Install hardware and software	<ul style="list-style-type: none"> - Prepare installation environment - Perform the installation - Configure and customize - Test functionality - Commission the installation - 	<ul style="list-style-type: none"> - Document of Installation details 	
C4	Formulate maintenance plan	<ul style="list-style-type: none"> - Establish maintenance objectives - Identify maintenance activities - Compile maintenance plan - 	<ul style="list-style-type: none"> - Maintenance plan document 	
C5	Carry out maintenance	<ul style="list-style-type: none"> - Adopt maintenance plan - Implement the maintenance plan - Respond to improve maintenance requests - Document maintenance activities - Monitor hardware and software performance - Review the maintenance plan 	<ul style="list-style-type: none"> - Reviewed maintenance plan document 	
C6	Track IT	<ul style="list-style-type: none"> - Create IT asset Register 	<ul style="list-style-type: none"> - Accurate asset register is 	

inventory	<ul style="list-style-type: none"> - Conduct regular audits to verify the accuracy of the Register - Maintain the asset register 	produced		
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TOOLS AND EQUIPMENT NECESSARY TO COMPLETE THIS DUTY:

Computer
 Security software
 Printer
 Internet
 Database recovery site

Materials

Stationery
 Data storage devices

HEALTH, SAFETY AND ENVIRONMENTAL ISSUES RELATED TO THIS DUTY:

Personal Protective Equipment
 Workshop Safety and Health
 Human factor and ergonomics
 First Aid Kit
 Fire Extinguishers

SPECIFIC WORKER TRAITS REQUIRED TO COMPLETE THIS DUTY:

Problem solving
 Team player
 Punctual
 Honest

Self-driven
Goal oriented

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DUTY D: PROJECT MANAGEMENT

Pre-requisites:

Approval Date:

Review Date:

TASK	STEPS	PROFICIENCY INDICATORS	RELATED KNOWLEDGE	WORKPLACE ESSENTIAL SKILLS
D1 Initiate IT projects	<ul style="list-style-type: none">- Clarify and justify project purpose- Analyse stakeholder needs- Establish project activities- Set project time line- Prepare project request budget- Analyse project risks	<ul style="list-style-type: none">- Project proposal is produced- Project feasibility document is produced	<ul style="list-style-type: none">Project writingReport writingProject plan writingResources managementProcurement proceduresProject modellingQuality standards	<ul style="list-style-type: none">- Communication- Planning- Troubleshooting- Research- Interpersonal- Literacy- Leadership