

Content

Competency 01

Explorers the basic concepts of ICT together with its role and applicability in today's knowledge based society

1.1	Investigates the basic building blocks of information and their characteristics ...	2
1.1.1	Life cycle of data	2
1.1.2	Data vs. Information	4
1.1.3	Definition of Information	6
1.1.4	Characteristic of information	10
1.1.5	The need to handle large volumes and other complexities of data	13
1.2	Investigate the need of technology to create, disseminate and manage data and information	14
1.2.1	Applicability of information in day to day life	14
1.2.2	Drawbacks of manual methods in manipulating data and information.....	16
1.2.3	Infeasibility of applying manual methods where they can be harmful to humans.....	17
1.2.4	Emergency of ICT era	17
1.2.4.1	Usage of IT to overcome the drawbacks of manual methods of Data processing.....	18
1.2.5	Usage of information in various domains.....	18
1.2.6	Availability of technologies related to information retrieval and sharing ..	19
1.2.7	Development of computer networks, the Internet and WWW	19
1.2.8	Development of mobile communication, mobile computing and cloud computing	20
1.3	Formulates an abstract model of information creation and evaluates its compliance with ICT.....	23
1.3.1	Abstract model of information creation	23
1.4	Select and classifies the basic components of a computer system.....	23
1.4.1	Hardware	23
1.4.2	Software	26
1.4.3	Live ware (Human users / Operators).....	31
1.5	Analysis the activities of data processing	31
1.5.1	Steps in data processing	31

1.5.2	Data gathering methods	31
1.5.3	Automated data gathering tools.....	33
1.5.4	Data validation and Verification	33
1.5.5	Modes of data input	35
1.5.6	Data processing methods	36
1.5.7	Output methods.....	37
1.5.8	Data storage methods	38
1.6	Investigate the application of ICT in different domains	38
1.6.1	Application of ICT in different domains.....	38
1.7	Evaluates the impact of ICT in the society.....	41
1.7.1	Benefits caused by ICT	41
1.7.2	Issues caused by ICT.....	42
1.7.3	Confidentiality.....	43
1.7.4	Phishing	44
1.7.5	Piracy	44
1.7.6	Copyright / Intellectual property laws.....	45
1.7.7	Plagiarism.....	45
1.7.8	Licensed and Unlicensed software	45

Competency 02

Explores the evolution of computing devices, so as to be able to describe and compare the performance of modern computers

2.1	Elicits the significant changes occurred in the computers from generation to generation with more emphasis on the evolution of processors.....	48
2.1.1	History of computing	48
2.1.2	Generation of computer	51
2.1.3	Classification of computers.....	55
2.2	Explores the functionality of a computer in relation to the hardware and their interfaces.....	57
2.2.1	Major hardware components.....	57
2.2.2	Advantages of direct data input devices than keyboard input devices	62
2.2.3	Output devices and their features.....	62
2.2.4	CPU and its compatibility with motherboard	66
2.2.5	Storage Devices, permanent data storage devices and	

storage methods	68
2.2.6 Parallel and grid computing	76
2.2.6.1 Single processor computing vs. parallel computing	76
2.2.6.2 Grid computing	79
2.3 Explores the Von Neumann Architecture	79
2.3.1 Von - Neumann architecture	80
2.3.2 Fetch Execute cycle	82
2.3.3 Central processing unit - CPU	83
2.4 Examines PC memory system to identify different types of memory and their main characteristics	89
2.4.1 Hierarchy of memory	89
2.4.2 Volatile memory units and their characteristics.....	90
2.4.3 Non Volatile memories and their characteristics	96

Competency 03

Investigates how instructions and data are represented in computers and exploit them in arithmetic and logic operations

3.1 Analyses how numbers are represented in computers.....	100
3.2 Analyses how characters are represented in computers	121
3.2.1 Methods of character representation	122
3.2.2 EBCDIC - Extended Binary Coded Decimal Interchange Code	123
3.2.3 ASCII Codes	123
3.2.4 Unicode	125

Competency 04

Uses logic gates to design basic digital circuits and devices

4.1 Analyzes basic digital logic gates in terms of their unique functionalities.....	130
4.1.1 Digital logic gates and truth tables	132
4.1.2 Combinational Gates	135
4.1.3 Universal Gates	138

4.2	Simplifies logic expressions using laws of Boolean algebra and Karnaugh map.....	145
4.2.1	Simplify Boolean expressions using boolean Laws.....	145
4.2.2	Simplifying logic expressions using Boolean theorems and Karnaugh map.....	153
4.3	How to use the sequential circuits in integrated logical circuits of central processing unit and physical memory.....	175
4.3.1	Build units available in central processing unit.....	175
4.3.2	Storing bits in Digital circuits.....	177

Competency 05

Uses Operating system to manage the functionality of computers

5.1	Defines the term computer operating system (OS) and investigates its need in computer systems.....	182
5.1.1	Introduction to computer operating systems.....	182
5.1.2	Evolution of the operating system.....	185
5.1.3	Main function of an Operating system.....	188
5.1.4	Classification of operating systems.....	194
5.2	Explores how an operating system manages directories/folders and files in computers.....	197
5.2.1	File types.....	198
5.2.2	Directory and file management.....	199
5.2.3	File Security.....	201
5.2.4	File storage management.....	202
5.2.5	Defragmentation and Fragmentation.....	206
5.2.6	Maintenance of secondary storage.....	207
5.3	Uses of operating systems to manage the functionality of computers.....	210
5.3.1	Definition of process.....	210
5.3.2	Interrupts and interrupts handling.....	211
5.3.3	Process management.....	212
5.3.4	Processors and Process states.....	212
5.3.5	Process transitions.....	215
5.3.6	Process control block.....	215
5.3.7	Context switching.....	216

5.3.8 Process schedulers	217
5.4 Explores how an operating system manages the resources	227
5.4.1 Memory management	227
5.4.2 Input and output devices management	238

Competency 06

Explores the data communication and computer networking technologies to share information effectively

6.1 Explores of signals and their properties	246
6.1.1 Types of Signals	246
6.1.2 Properties of signals	248
6.2 Signal transmission media	253
6.2.1 Guided media.....	254
6.2.2 Free space or Unguided media	259
6.2.2.1 Radio waves	259
6.2.2.2 Microwaves.....	260
6.2.2.3 Salellite.....	260
6.2.2.4 Infrared	261
6.2.3 Properties of the signal transmission media	261
6.2.4 Simple topology	264
6.3 Investigates how digital data is encoding using signal elements	264
6.3.1 Agreeing in signal elements to represent data.....	264
6.4 Explores the use of public switched telephone network (PSTN) to connect two remote devices	277
6.4.1 Public switch telephone network	277
6.4.2 Modulation/Demodulation and Modems	278
6.5 Investigates how the problem of connecting multiple devices into a network is addressed.....	279
6.5.1 Use of network topology	279
• Bus topology.....	279
• Star topology.....	280
• Ring topology	281

•	Mesh topology	282
•	Tree topology	283
6.6	Explores the role of media Access Control (MAC) protocol	284
6.6.1	Local Area Network (LAN).....	284
6.6.2	Identifying the devices.....	284
6.6.3	Frames.....	286
6.6.4	Technologies approached to forward signals to the transmission media methodically	286
6.6.5	Transmission methods.....	291
6.7	Explores how the multiple networks are interconnected to form the internet	292
6.7.1	A device use to connect two or more networks	292
6.7.2	Need for globally unique uniform addressing independent of MAC Addresses and LAN technology	293
6.7.3	Basic devices used in computer networks.....	313
6.8	Role of the transport protocols available in internet	322
6.8.1	Delivering data from an application process to another application process	322
6.9	Explorers some applications on the internet.....	325
6.9.1	Domain name System (DNS).....	325
6.9.2	Hyper text transfer protocol (HTTP)	329
6.9.3	Server type.....	329
6.10	Investigates the role of reference models to describe the network architecture.....	333
6.10.1	Open system interconnected model	333
6.10.2	Transmission Control protocol -TCP/IP Model	342
6.11	Investigates the security aspects of the communication and protection of devices connected to the internet	344
6.11.1	Encryption and digital signature	344
6.11.2	Exploring of vulnerabilities, Threats and invasions to computer	

networks	350
6.11.3 Security	356
6.12 Explores the role of ISPs and technologies used to connect the domestic networks.....	358
6.12.1 Internet Service Provider - ISP	358
6.12.2 Establishing the internet connection	358
6.12.3 Domestic area networks that use personal IP address	359
6.12.4 Network address translator - NAT	360

Competency 7

Explores the system concept and uses systems analysis and design methodology in developing information system

7.1 Explorers characteristics of systems	362
7.1.1 Systems concept	362
7.1.2 Classification of systems	363
7.2 Compares and contrasts different types of manmade systems in terms of their objectives and functionality	365
7.2.1 Information systems	365
7.3 System development life cycle models (SDLC)	373
7.3.1 Information system Development models	373
7.3.2 System development methodologies	382
7.4 Examine the structured system analysis and development methodology (SSADM).....	383
7.4.1 Introduction to Structured System Analysis and Development Methodology.....	383
7.4.2 Stages of the System Development Life Cycle.....	384
7.5 Investigation of the requirement of a new system and its feasibility identification of the system / Investigation	385
7.5.1 Preliminary investigation	385
7.5.2 Feasibility study	386
7.6 Uses different methodologies to analyze the current system	388

7.6.1 Requirement analysis.....	388
7.6.2 Analytical tools.....	392
7.7 Planning the proposed system	412
7.8 Development of Proposed System	413
7.8.1 Program Coding	413
7.8.2 System Testing	414
7.9 System Deployment.....	422
7.9.1 Deployment methods	422
7.9.1.1 Installing Hardware and Software	425
7.9.1.2 User training	425
7.9.2 Summarizing, assisting and maintenance	426
7.10 Operation of new system with the pre-created packages	426
7.10.1 Advantages and disadvantages of using pre-created packages	426