# THE UNITED REPUBLIC OF TANZANIA
# MINISTRY OF EDUCATION AND VOCATIONAL TRAINING


# COMPUTER SCIENCE SYLLABUS FOR ADVANCED SECONDARY EDUCATION FORM V - VI

2010

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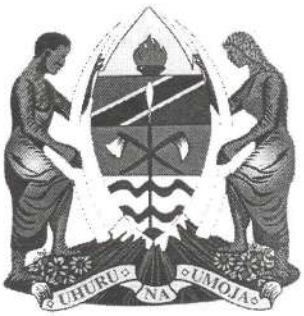


# COMPUTER SCIENCE SYLLABUS FOR ADVANCED LEVEL SECONDARY EDUCATION

## FORM V – VI

2010

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## 1.0 INTRODUCTION

### 1.1 Background

Computer Science subject is a new subject replacing computer studies at Advanced Secondary Education level. The subject provides a link between the ordinary secondary school course on Information and Computer Studies and the Computer science course at the university and other related courses in tertiary institutions. Computer Science is a principal subject and therefore it will form combinations together with other related subjects.

### 1.2 Rationale for the review

The review of Information and Computer Studies and other subjects for Ordinary Secondary School was done in 2005 to align the subjects with the competence based curriculum philosophy as well as learner centeredness. This was done in accordance with the pedagogical paradigm shift that the country is undertaking in the teaching and learning process. The computer studies subject was introduced in 1996 and since then no review has taken place. It was necessary for the review in order to update the course and meet the current technological demand.

The importance of computing skill and knowledge cannot be over-stated. Computer science subject offers knowledge and skills that enable its recipients to cope with the scientific changes and technological development. Many industries and organizations are using computer as a tool in their managerial, organizational and marketing. Therefore, A-level students must be prepared for such tasks and challenges.

Learners of this course will perform theory and practice as well as designing and implementing their own project works. The course also will develop self-learning attitude, innovation and enable direct and self employment to its graduates.

The target beneficiaries of this course are students who learnt Information and Computer Studies subject at ordinary secondary schools level.

## 2.0 AIMS AND OBJECTIVES OF EDUCATION IN TANZANIA

The general aims of education in Tanzania are to:

1. guide and promote the development and improvement of the personalities of the citizens of Tanzania, their human resources and effective utilization of their resources in bringing about individual and national development.
2. promote the acquisition and appreciation of culture, customs and traditions of the people of Tanzania.

3. promote the acquisition and appropriate use of literary, social, scientific, vocational, technological, professional and other forms of knowledge, skills and understanding for the development and improvement of society.
4. develop and promote self-confidence and an inquiring mind, an understanding and respect for human dignity and human rights and a readiness to work hard for personal self advancement and national improvement.
5. enable and expand the scope of acquisition, improvement and upgrading of mental, practical productive and other life skills needed to meet the changing needs of industry and the economy.
6. enable every citizen to understand the fundamentals of the national constitution as well as the enshrined human and civic rights, obligation and responsibilities.
7. promote the love for work, self and wage employment and to improve performance in the production and service sectors.
8. inculcate principles of national ethic and integrity, national and international cooperation, peace and justice through the study, understanding and adherence to the provision of the National Constitution and International basic charters.
9. enable a rational use, management and conservation of our environment.

## 3.0 AIMS AND OBJECTIVES OF SECONDARY EDUCATION

The aims and objectives of secondary education are to:

1. consolidate and broaden the scope of baseline ideas, knowledge, skills and principles acquired and developed at primary education levels.
2. enhance further development and appreciation of national unity, identify and ethnic personal integrity, respect for and readiness to work, human rights, cultural and moral values, customs, traditions and civic responsibilities and obligations.
3. promote the development of competency in linguistic ability and effective use of communication skills in Kiswahili and at least one foreign language.
4. promote opportunities for the acquisition of knowledge, skills, attitudes and understanding in prescribed or selected fields of study.
5. prepare students to tertiary and higher education; vocational, technical and professional.
6. Inculcate a sense and ability for self-study, self-reliance and self-advancement in new frontiers of science and technology, academic and occupational knowledge and skills.
7. prepare the student to join the world of work.

## 4.0 GENERAL COMPETENCES OF THE SUBJECT

By the end of the course students should have the ability to:

1. communicate effectively through writing and speaking and drawing for advancement of computer science.
2. use appropriately the computing techniques and methods in solving problems at individual and society level.
3. think logically critically and creatively.
4. work independently to advance science and technology.

## 5.0 GENERAL OBJECTIVES OF THE SUBJECT

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

1. identify variety of learning and career opportunities in computer science.
2. demonstrate an understanding of the roles and responsibilities of computer scientist as related to technological changes in computer science.
3. demonstrate computer and computing skills.
4. acquire knowledge and skills required for further studies in computer science and related fields.

## 6.0 ORGANIZATION OF THE SYLLABUS

The organization of the syllabus has taken on board the change associated with paradigm shift from content-based to competence-based curriculum. The following changes were added for improvement:

- General competences for the whole course.
- Competences for each class.
- Suggested areas for assessment.
- Number of periods per sub-topic.

### 6.1 Class Competences

Competences have been stated for each class/level of the computer science course. The class level competences are derived from the general competences.

### 6.2 Class Objectives

The class level objectives are derived from the general objectives and therefore from class level competences, the achievement of class level competences depends on the achievement of the class level objectives.

The objectives for each class are stated in general terms to indicate the scope of content to be covered within each level.

## 6.3 Content matrix

The syllabus matrix has the following areas.

- Topic/subtopic
- Specific objectives
- Teaching and learning resources
- Assessment
- Estimated number of periods

### 6.3.1 Topics/sub-topic

The topics have been derived from the class level competences and objectives. The content for this syllabus is significantly different from that in advanced computer studies syllabus of 1996. This is because; the former included topics from both computer science and ICT while presently concentrates on topics in computer science.

Topics have been divided into sub-topics. Each sub-topic comprises of a portion of the content of the topic in the matter. The sub-topics have also been arranged to attain a logical order.

### 6.3.2 Specific Objectives

Each sub-topic has more than one specific objective. These specific objectives are the expected outcomes in classroom instructions. They also reflect the process to attain competences within the cognitive, affective and psychomotor domains.

### 6.3.3 Teaching and Learning Strategies

The teaching and learning strategies indicate what the students and teacher are expected to do in the process of teaching and learning. Students are encouraged to work in small groups for maximum participatory and cooperative learning. The teacher shall assume the role of a facilitator to promote, guide and help students' learning activities. The whole teaching and learning process should be participatory and interactive, where the student learns by doing a series of logical activities. Though flexibility is at the heart of teaching and learning, the listed teaching and learning strategies are strongly advised for effective teaching and learning.

The suggested teaching and learning strategies are not exhaustive. The students and teacher may use any other strategies which suit the teaching and learning environment depending on the available resources.

### 6.3.4 Teaching and Learning Resources

In the teaching of computer science a variety of teaching/learning resources will be needed in quality and quantity. In case the standard teaching and learning resources are not available, the teacher should work with students to collect or improvise alternative resources available in their environment. You are strongly advised to use the resources listed under the teaching and learning resources column in your teaching process. However flexibility is required in the context where the listed resources are not available.

### 6.3.5 Assessment

For every specific instructional objective, there is a suggested question or area for assessment. Formative and summative assessment should be geared towards mastering all the competences and skills developed within the course.

### 6.3.6 Estimated Number of Periods

The number of periods has been allocated per each sub-topic. Ten periods per week of 40 minutes each, have been allocated for both Form V and Form VI. According to the Education Circular No. 9 of 2004, there are a total of 194 effective teaching days per year. Each sub-topic is allocated with appropriate number of periods for teaching/learning depending on its length of content.

## 7.0 INSTRUCTIONAL TIME

This syllabus is to be covered in two academic years including two weeks reserved for mid-year and annual examinations each year. Lost instructional time should be compensated for.

## 8.0 ASSESSMENT OF THE SUBJECT

The table below shows the type of assessment and the accompanied assessment measures to be used. The assessment measures listed in the table contributes to continuous and final assessments of the student achievement. The frequency for each assessment measure has been indicated with the weight in %. You are therefore strongly advised to apply a wide selection

of assessment measures in order to develop students' ability for the mastery of the subject matter during the teaching and learning process.

| Type of Assessment | Assessment Measure | Frequency | | | | Weight % | Total % |
|---|---|---|---|---|---|---|---|
| | | Form V | | Form VI | | | |
| | | Term 1 | Term 2 | Term 1 | Term2 | | |
| Continuous Assessment | Practical test | 2 | 2 | 2 | - | 10 | |
| | Tests | 2 | 2 | 2 | - | 10 | |
| | Project | - | - | 1 | - | 10 | |
| | Individual assignments | 2 | 2 | 2 | - | 5 | |
| | Terminal Examinations | 1 | 1 | 1 | - | 15 | **50** |
| **Final Examination** | | - | - | - | 1 | 50 | **50** |
| **Total** | | | | | | | **100** |

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## FROM V

### Class Competences

By the end of Form V the student should have the ability to:

1. Use appropriate computer-based system in daily activity.
2. Develop algorithms.
3. Write and debug simple computer programs.
4. Evaluate the computer programs.
5. Design and develop websites.

### Class Objectives

By the end of Form V the student should be able to:

1. Explain advanced features of office-management software.
2. Describe a problem-solving model and fundamental programming construct required to solve the given problem.
3. Demonstrate skills in writing computer programs in structure languages.
4. Test for errors in written programs and debug programs.
5. Demonstrate skill in evaluating whether a given program or software meets the requirements.
6. Developed an understanding of the internal working of computer system.
7. Describe how community groups are affected by the growing use of information technology to facilitate e-commerce and communication.

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| **1.0 COMPUTER BASICS**<br><br>1.1 Computer Organization | By the end of this sub-topic the student should be able to:<br><br>a) define computer hardware and software. | i. Teacher through question and answer to guide students to define the meaning of computer hardware and software.<br>ii. Students to discuss the meaning of computer hardware and software. | • Flip charts<br>• Marker pen<br>• Computer<br>• LCD Projector<br>• Lesson notes | Is the student able to define computer hardware and software?<br>Is the student able to differentiate computer hardware and software | 12 |
| | b) identify input and output devices. | i. Teacher to assist students to discuss the meaning of input and outputs devices.<br>ii. Students to discuss different input/output devices of a computer. | • Flip charts<br>• Marker pen<br>• Computer<br>• LCD Projector<br>• Lesson notes | Is the student able to identify input and output devices? | |
| | c) describe components of Central Processing Unit (CPU). | i. Teacher to use the question and answer technique to assist students to explain components of CPU<br>ii. Students to describe different parts of CPU | • Flip charts<br>• Marker pen<br>• Computer<br>• LCD Projector<br>• Lesson notes | Is the student able to describe components of Central Processing Unit (CPU)? | |
| | d) explain functions of each component of CPU. | i. Teacher to guide students to discuss the functions of Arithmetic and Logic Unit (ALU) and Control Unit (CU)<br>ii. Teacher to assist students to draw and to write the functions of each component of CPU. | • Flip charts<br>• Marker pen<br>• Computer<br>• LCD Projector<br>• Lesson notes | Is the student able to explain functions of each component of CPU? | |
| | e) describe the concept of computer memory | i. Teacher to use the question and answer technique to guide students to explain how computer memory store data and instructions.<br>ii. Teacher to guide students to discuss types of computer memory, difference between primary memory and second memory.<br>iii. Teacher to assist students to discuss the measurement of computer memory capacity, which is bits, bytes, kilobytes, megabytes gigabytes. | • Flip charts<br>• Marker pen<br>• Computer<br>• LCD Projector<br>• Lesson notes | Is the student able to describe the concept of computer memory? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | iv. Students to describe the function of different memory in storing data and instructions. | | | |
| 1.2 Computer Applications | By the end of this sub-topic the student should be able to:<br><br>a) use advanced features of Ms-word | i. Teacher to demonstrate the use of Advanced features of word processors for example:<br>• Inserting table of content<br>• Mail merge<br>• tables<br>ii. Students through practical work to use Advanced features of wordprocessors. | • Computer loaded with Ms-word program<br>• LCD Projector | Is the student able to use advanced features of Ms-word? | 45 |
| | b) use Ms-Excel to analyse data | i. Teacher to demonstrate the use of Advanced features of spreadsheet.<br>ii. Students through practical work to use advanced features of spread sheet. For example:-<br>• Cell referencing<br>• IF functions<br>• Sorting<br>• Scenarios and Goal seek<br>• Macros | • Computer loaded with Ms-Excel program<br>• LCD Projector | Is the student able to use Ms-Excel to analyse data? | |
| | c) use Ms-Access to manipulate database? | i. Teacher to assist students to do practical work on the use of the following Ms-Access features:<br>• Table and Relationships<br>• Form and sub-forms (creation)<br>• Query<br>• Report<br>ii. Students through project work to use different features of Database. | • Computer loaded with Ms-Access program<br>• LCD Projector | Is the student able to use Ms-Access to manipulate a database? | |
| **2. 0 DATA REPRESENTATION**<br><br>2.1 Digital Concept | By the end of this sub-topic the student should be able to:<br><br>a) describe concepts of analogue and digital quantities | i. Students to brainstorm on digital and analogue quantities.<br>ii. Teacher to lead students through question and answer techniques to define the terms digital and analogue.<br>iii. Students to discuss the differences between digital and analogue quantities. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe concepts of analogue and digital quantities? | 6 |
| | b) convert analogue | i. Teacher to facilitate students to explain the | • Flip charts | Is the student able to | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | quantity to digital quantity and vice versa | advantages of digital over analogue data.<br>ii. Teacher to guide students to explain how to convert from analogue quantity to digital<br>iii. Students to explain how to convert from digital quantity to analogue. | • Marker pen<br>• Lesson notes | show how to convert analogue quantity to digital quantity and vice versa? | |
| 2.2 Number systems | By the end of this sub-topic the student should be able to:<br>a) describe the binary, the octal, the decimal and the hexadecimal number systems | i. Students in small groups to discuss on the concept of number systems.<br>ii. Through question and answer techniques teacher to guide students to list symbols used in the binary, the octal, the decimal and the hexadecimal number systems.<br>iii. Students to do practice on counting numbers in binary and the hexadecimal systems. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the binary, the octal, the decimal and the hexadecimal number systems? | 13 |
| | b) convert a number from one system to another | i. Teacher to demonstrate on how to:<br>– convert decimal into binary, octal and hexadecimal<br>– convert binary into octal, decimal and hexadecimal<br>– convert octal into binary, decimal and hexadecimal<br>– convert hexadecimal into binary, binary and octal.<br>ii. Students to do exercise on converting number from one system to another. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to convert a number from one system to another? | |
| | c) perform arithmetic operations to binary number. | i. Teacher to demonstrate on binary addition, subtraction, multiplication and division.<br>ii. Students to exercise on binary addition subtraction multiplication and division. | • Lesson notes<br>• Flip charts<br>• Marker pen | Is the student able to perform arithmetic operations to binary number? | |
| 2.3 Data Coding | By the end of this sub-topic the student should be able to:<br>a) represent a character in a computer | i. Teacher to guide students through question and Answer to explore the concept of data coding.<br>ii. Teacher to facilitate students to demonstrate ASCII codes table.<br>iii. Through question and answer technique students to identify ASCII code for various characters | • Computer<br>• LCD Projector<br>• Flip charts<br>• Marker pen.<br>• Lesson notes | Is the student able to represent a character in a computer? | 11 |
| | b) represent signed and unsigned | i. Through think pair share students to discuss how signed and unsigned integers are represented in a | • Flip charts<br>• Marker pen | Is the student able to represent signed and | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | integer in a computer | computer<br>ii. Students in groups to do an assignment on signed and unsigned integer representation | • Lesson notes | unsigned integer in a computer? | |
| | c) represent a real number in a computer | i. Through discussion teacher to lead students to identify the three parts of a floating-point number which are sign, mantissa and exponent<br>ii. Students in groups to do an exercise about floating number representation. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to represent a real number in a computer? | |
| 2.4 Boolean Algebra | By the end of this sub-topic the student should be able to:<br>a) explain Boolean operations | i. Using think-pair-share technique teacher to lead students to define Boolean values and operations.<br>ii. Students in small groups to discuss the Boolean operations. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain Boolean operations? | 16 |
| | b) apply the basic laws and rules of Boolean Algebra | i. Using the question and answer technique teacher to guide students to state basic laws and rules of Boolean Algebra.<br>ii. Students in groups to perform exercise on Boolean laws and rules. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to apply the basic laws and rules of Boolean Algebra? | |
| | c) construct truth tables | i. Teacher to facilitate students to construct truth table of the given Boolean expression<br>ii. Students in groups to do exercise on truth table construction | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to construct truth tables? | |
| | d) write Boolean expression from truth table | i. Teacher to demostrate on how to obtain Boolean expression from given truth table.<br>ii. Students in small groups to perform exercise of obtaining Boolean expression from given truth table. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to write a Boolean expression for a given truth table? | |
| | e) apply the DeMorgan's theorem | i. Teacher to guide students to discuss the concept of DeMorgan theorem.<br>ii. Students in small group group to do exercise on applications of DeMorgan's theorem. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to apply the De-Morgan's theorem? | |
| 2. 5 Logic Gates | By the end of this sub-topic the student should be able to:<br>a) describe logic | i. Teacher to facilitate students to explain the functions of logic gates.<br>ii. Teacher to demonstrate operations of the inverter, the AND, the OR, NAND and the NOR gates.<br>iii. Students through think pair share to describe the | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student ble to describe logic gates? | 13 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | gates | relationship between Boolean operators and logic gates | | | |
| | b) design a combination logic circuit for a given Boolean Expression | i. Teacher to guide students to construct logic circuits for given Boolean expressions.<br>ii. Students in groups to design logic circuits from Boolean expression. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to design a combination logic circuit for a given Boolean Expression? | |
| | c) Construct half-adder and full adder. | i. Through Think-Pair-Share technique Teacher to guide students to explain the concept of half and full adder.<br>ii. Students to do exercise on construction of logic circuits using half and full adders. | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to construct half-adder and full adder? | |
| **3.0 PROBLEM SOLVING**<br><br>3.1 Problem Solving Steps | By the end of this sub-topic the student should be able to:<br>a) explain the five steps in the programming process | i. Teacher to guide students to discuss the five steps in problem-solving.<br>ii. Students in groups to use real-life examples to explain the five steps in problem-solving procedures. | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the five steps involved in the programming process? | 5 |
| 3.2 Algorithm Presentation | By the end of this sub-topic the student should be able to:<br><br>a) define the term Algorithm | i. Teacher to guide students through questions and answers technique to define the term Algorithm.<br>ii. Student to brainstorm on the meaning of algorithm. | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define the term Algorithm? | 41 |
| | b) construct algorithms | i. Teacher to demonstrate on how to construct algorithms.<br>ii. Students step by step to construct algorithms. | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to construct algorithms? | |
| | c) use flow-charts to present algorithms | i. Teacher to demonstrate standard flow-chart symbols.<br>ii. Teacher to demonstrate on how to use flow chart to present algorithms.<br>iii. Students to present algorithms using flow-chart | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use flow-charts to present algorithms? | |
| | d) use pseudo-code to present algorithms | i. Teacher to guide students to explain the concept of pseudo-code<br>ii. Teacher to assist students to describe control | • Manila sheet<br>• Flip charts<br>• Marker pen | Is the student able to use pseudo-code to present algorithms? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | structure in pseudo-code, which are sequence, selection/decision and iterations<br>iii. Students in groups to develop algorithm and present them as Pseudo-code. | • Lesson notes | | |
| **4.0 C++ PROGRAMMING**<br><br>4.1 Programming Languages | By the end of this sub-topic the student should be able to:<br><br>a) identify levels of Programming languages | i. Teacher to assign students to do library and internet search on information about the evolution and levels of programming languages.<br>ii. Students in groups to discuss the evolution and levels of programming languages. | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to identify levels of Programming languages? | 13 |
| | b) state the difference between compilers, interpreters and assemblers - the relative advantages (and disadvantages) of each. | i. Teacher to guide students to explain the concept of assemblers, interpreters and compilers.<br>ii. Students in groups to discuss the difference between assemblers, interpreters and compilers<br>iii. By using the think-pair-share technique students to identify the relative advantages and disadvantages of assemblers, interpreters and compilers. | • Manila sheet<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to state the differences between compilers, interpreters and assemblers - the relative advantages (and disadvantages) of each? | |
| | c) define source code and object code. | i. Teacher to assist students through question and answer technique to define source code and object code.<br>ii. Students in small groups to discuss the concept of source code and object code. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define source code and object code? | |
| 4.2 Introduction to C++ Program | By the end of this sub-topic the student should be able to:<br><br>a) describe a general structure of C++ program | i. Teacher to demonstrate simple C++ programs, such as program to display the message "Welcome to C++ "on the screen.<br>ii. Student to practice on simple cc++ program such as program to display the message "welcome to c++" on screen.<br>iii. Teacher to lead students through think pair share techinique to explain general structure of the presented program.<br>iv. Through the question and answer technique | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | the student able to describe a general structure of C++ program? | 19 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | teacher to assist students to identify various parts of the program; such as, the # include declarative statement, comments, the main () function, input and output statements, opening and closing bracket. | | | |
| | b) compile and run C++ program | i. Teacher to demonstrate how to type program code, compile and run a program.<br>ii. Students to do practice in typing program code compile and run a C++ program. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | is the student able to Compile and run C++ program? | |
| 4.3 Data Types | By the end of this sub-topic the student should be able to:<br>a) identify fundamental data type | i. By using question and answer technique teacher to lead students to identify three fundamental data type in C++ which are: characters, integers and floats.<br>ii. Students in small groups to discuss the fundamental data type. | • Computer<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to identify fundamental data type? | |
| | b) declare characters, integer and floats (real numbers) | i. Teacher to facilitate students to brainstorm on why it is important to declare a variable before it can be used.<br>ii. Students to discuss memory requirements for a character, an integer number and a float number<br>iii. Teacher to demonstrate declaration syntaxes of characters, integer and floats.<br>iv. Students in small groups to discuss ranges of integers and floats.<br>v. Students to practice on how to declare characters, integers and floats. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to declare characters, integer and floats? | 8 |
| 4.4 Variables and Constants | By the end of this sub-topic the student should be able to:<br>a) describe variables and constants | i. Through question and answer teacher lead students to discuss the difference between variables and constants.<br>ii. Teacher to demonstrate how constants and variables are declared.<br>iii. Students to do practice in variable and constants declaration. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe variables and constants? | 3 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | b) explain the importance of having constants in programs | i. Through question and answer teacher lead students to discuss the importance of having constants in programs.<br>ii. Student in small groups to discuss the importance of having constant in programs. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the importance of having constants in programs? | |
| 4.5. Input/Output | By the end of this sub-topic the student should be able to:<br>a) write command to display the results. | i. Teacher to guide students to explain the concept of Cout commands.<br>ii. Teacher to demonstrate the Cout commands.<br>iii. Students to do exercises on writing Cout commands and to display results. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to write command to display the results? | 8 |
| | b) write command to read inputs from the user | i. Teacher to facilitate students to explain the concept of Cin commands.<br>ii. Teacher to demonstrate the *Cin* command.<br>iii. Students to do exercises on the *Cin* command. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to write command to read inputs from the user? | |
| 4.6 Expressions and Assignments | By the end of this sub-topic the student should be able to:<br>a) define operators and operands | i. Through questions and answers technique teacher assist student to identify operators and operands in C++ programs.<br>ii. Students in small groups to define operators and operands. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define operators and operands? | 10 |
| | b) describe types of operators | i. Students in small groups to discuss type's operators.<br>ii. Teacher to lead students on how to describe types of operators. | | Is the student able to describe types of operators? | |
| | c) write mathematical expressions | i. Teacher to demonstrate on how to write mathematical expressions in C++ programs.<br>ii. Students to write mathematical expressions in C++ programs. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to write mathematical expressions? | |
| | d) explain operator precedence in mathematical expressions | i. Teacher to assist students to discuss the concept of precedence in mathematical expression.<br>ii. Through think-pair share technique students to discuss operator precedence in mathematical expressions. | • flip charts<br>• Marker pén<br>• Lesson notes | Is the student able to explain operator precedence in mathematical expressions? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | | | | |
| 4.7 Decisions | By the end of this sub-topic the student should be able to:<br><br>a) use the *if...else... if* statement | i. Teacher to assist student discussion on explain various formats of the *if...else...* if statement.<br>ii. Teacher to demonstrate various formats of the *if..,else...* if statement.<br>iii. Students to do practice on the if…else… if statement. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the *if...else... if* statement? | 10 |
| | b) use the *switch...case* statement | i. Teacher to facilitate students to explain the concept of the *switch...case* statement.<br>ii. Teacher to demonstrate the switch… case statement.<br>iii. Students to do practice on the *switch...case* statement. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the *switch...case* statement? | |
| 4.8 Iteration | By the end of this sub-topic the student should be able to:<br><br>a) distinguish the three types of loops in C++ | i. Teacher to guide students to explain concept of loops in C++, which are *while...*, *do.. while..* and *for* .. loops.<br>ii. Students in small groups to discuss the difference between the three types of loops. | • Computer<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to distinguish the three types of loops in C++? | 20 |
| | b) use the *while* ... loop | i. Teacher to guide students to demonstrate the while… loop.<br>ii. Students to do practice on the *while...* loop. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the *while* ... loop? | |
| | c) use the *do...while* loop | i. Teacher to demonstrate the *do...while* loops.<br>ii. Students to do practice on the *do...while* loop. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | .Is the student able to use the *do...while* loop? | |
| | d) use the *for*...loop | i. Teacher to demonstrate the *for..* loop.<br>ii. Students to do practice on the *for..* loop. | • Computer loaded with C++ compiler<br>• LCD Projector | Is the student able to use the *for*...loop? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | | • flip charts<br>• Marker pen<br>• Lesson notes | | |
| 4.9 Functions | By the end of this sub-topic the student should be able to:<br><br>a) explain the advantages of breaking a program into subprograms | i. Teacher to guide students through examples to discuss advantages of breaking programs into sub-programs.<br>ii. Students to explain the advantage of breaking a program in subprograms. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the advantages of breaking a program into subprograms? | 11 |
| | b) differentiate functions which return values and those which do not | i. Teacher to guide students to explain functions which return values and those do not.<br>ii. Teacher to demonstrate functions which return values and those do not.<br>iii. Students in groups to discuss the difference between function which return value and which do not return values.<br>iv. Students to do practice on C++ functions. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to differentiate functions which return values and those which do not? | |
| | c) differentiate value parameters and reference parameters. | i. Teacher to demonstrate functions parameters.<br>ii. Teacher though the question and answer technique to guide students to identify value and reference parameter in functions.<br>iii. Students in groups to discuss the difference between value and reference parameters in functions.<br>iv. Students to do practice on function parameters. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes<br>• | Is the student able to differentiate value parameters and reference parameters? | |
| 4.10 Arrays and Strings | By the end of this sub-topic the student should be able to:<br>a) explain the need of arrays | i. By using think-pair-share technique teacher assist students to identify the need of arrays | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the need of arrays? | 21 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | b) define and implement one and two-dimensional arrays | i. Teacher to guide students to explain how to declare one and two dimensional arrays.<br>ii. Teacher to demonstrate on using one and two dimensional arrays.<br>iii. Students to do practice in one and two dimensional arrays. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define and implement one and two-dimensional arrays? | |
| | c) write commands for string input | i. Teacher to demonstrate on the *getline.cin* command<br>ii. Students to practice in the *getline.cin* command | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to write commands for string input? | |
| | d) describe string operations | i. Teacher to facilitate students to explain string in-built functions such us *strcat, strcpy, strncat, strcmp, stricmp.*<br>ii. Teacher to demonstrate string in-built functions such us *strcat, strcpy, strncat, strcmp, stricmp.*<br>iii. Students to do practice on string functions. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe string operations? | |
| **5.0 WEBSITE DEVELOPMENT**<br><br>5.1 Design Website | By the end of this sub-topic the student should be able to:<br><br>a) describe the various factors to be considered in the construction of web pages | i. Teacher to guide students to discuss the meaning of website.<br>ii. Students in groups to discuss various factors to be considered for successful website design. Note the factors include web site structure, audience awareness, content purpose, site map, use of the workspace available on each page, arrangement of elements on screen, appropriateness of embedded graphics/sound/animations, use of frames and meaningful contextual links, grouping related information into tables/lists, providing channels for feedback, providing details and structuring contents for easy printing. | • Computer loaded with internet browser<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the various factors to be considered in the construction of web pages? | 13 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | b) prepare a webpage structure | i. Teacher to guide students in groups to develop a webpage structure.<br>ii. Teacher to assist students individually on how to develop a web page structure.<br>iii. Students to do practice on how to develop a webpage structure. | • Computer loaded with internet browser<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to prepare a webpage structure? | |
| 5.2 HTML | By the end of this sub-topic the student should be able to:<br>a) explain the concept of HTML | i. Teacher to guide students to discuss the concept of HTML.<br>ii. Students to describe the HTML. | • Computer loaded with internet browser<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the concept of HTML? | 40 |
| | b) explain various parts of HTML | i. Students in groups to discuss on parts of HTML.<br>ii. Students to demonstrate various parts of HTML. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain various parts of HTML? | |
| | c) use HTML to develop website | i. Students to do practical works on the use of HTML to manipulate paragraphs, create tables, numbered and unnumbered lists, create links, manipulate background, font colour and styles.<br>ii. Students to do assignment of using HTML to develop a website.<br>iii. Teacher to demonstrate on the use of HTML in developing website. | • Computer loaded with internet browser<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use HTML to develop website | |
| | d) describe effect of image quality and graphics on the speed of downloading a webpage. | i. Students to brainstorm and to identify different types of files formats for images.<br>ii. Teacher to demonstrate on the use of the right resolution and file format for images and photographs in order to keep download time short. | • Computer loaded with internet browser<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe effect of image quality and graphics on the speed of downloading a webpage? | |
| 5.3 An introduction to Java Script | By the end of this sub-topic the student should be able to: | i. Teacher to facilitate students to explain the concept of Java script.<br>ii. Students in groups to discuss the concept of Java script. | • Computer loaded with internet browser and Java compiler | Is the student able to describe java scripts? | 13 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | a) describe java scripts | | • LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | | |
| | b) explain the use of java scripts. | i. Teacher to demonstrate Java scripts.<br>ii. Students to do practice on the use of Java scripts. | • Computer loaded with internet browser and Java compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the use of java scripts? | |
| | c) use of JavaScript in web development | i Teacher to demonstrate on how to write JavaScript.<br>ii Students in groups to apply JavaScript in web development process | | Is student able to use JavaScript in website development? | |
| 6.0 SYSTEM DEVELOPMENT<br><br>6.1 Basic concept | By the end of this sub-topic the student should be able to:<br><br>a) define a system | i. Students in groups to brainstorm on the meaning of system.<br>ii. Teach through question and answer to guide student to define a system. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define a system? | 6 |
| | b) identify the basic elements of a system | i. Through think-pair-share technique teacher guide students to identify the basic elements of a system, which are environment, inputs, outputs, processes, interfaces and storage.<br>ii. Students in small groups to discuss roles of each element of a system. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to identify the basic elements of a system? | |
| 6.2 System Analysis | By the end of this sub-topic the student should be able to:<br><br>a) identify major tasks involved in solving a problem | i. Using the question and answer techniques teacher to lead students to list major tasks in solving a problem.<br>ii. Students to discuss major tasks in solving a problem. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to identify major tasks involved in solving a problem? | 8 |
| | b) list some methods of information | i. Through question and answer technique teacher to lead students to identify common methods of | • flip charts<br>• Marker pen | Is the student able to list some methods of | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | ESTIMATED NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | gathering | information gathering, which are interviews, surveys, questionnaires, observations and document review.<br>ii. Students in small group to discuss each technique of information gathering including merits and demerits | • Lesson notes | information gathering? | |
| 6.3 System Design | By the end of this sub-topic the student should be able to:<br><br>a) represent system information flow | i. Teacher to demonstrate data flow diagram symbols.<br>ii. Student to do exercises on construction of data flow diagrams. | • Manila sheets<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to represent system information flow? | 5 |
| 6.4 System Implementation | By the end of this sub-topic the student should be able to:<br><br>a) prepare computer based solution | i. Teacher to assist student in groups to discuss how to choose a programming language to use.<br>ii. Through question and answer technique teacher to guide students to discuss on how to write a good readable program code.<br>iii. Student to practice writing a good readable program code. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to prepare computer based solution? | 10 |
| | b) Explain different types of testing program | i. Teacher to facilitate students to explain the meaning and types of testing. The types including unit testing, system testing and acceptance testing.<br>ii. Student in groups to discuss different types of testing and their uses. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to Explain different types of testing? | |
| 6.5 System Documentation | The student should be able to differentiate different types of documents | i. Teacher to lead students to brainstorm on the importance of documenting system development.<br>ii. By using question and answer technique teacher to guide the students to identify types of documentation, which are system documentation, technical documentation and user manuals.<br>iii. Students in groups to discuss three types of documentations. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to differentiate different types of documents? | 3 |

## FORM VI

### Class Competences

By the end of Form VI the student should have the ability to:

1. Construct data structure in computer programming.
2. Write simple window-based programs.
3. Manage information system in an organization.
4. Design simple computer networks.
5. Solve problems related to data security.

### Class Objectives

By the end of Form VI the student should be able to:

1. Identify various data structure required for knowledge representation.
2. Demonstrate skills in writing window-based programs.
3. Describe complete information system in an organisation.
4. Identify various roles of IT experts in IT environment.
5. Develop an understanding of the ethics of computer use and impact of information in the society.
6. Identify potential security threats of the digital era.

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| **7. 0 DATA STRUCTURE AND ALGORITHMS**<br><br>7.1 Introduction | By the end of this sub-topic the student should be able to:<br><br>a) define data structure | i. Teacher to facilitate students to explain the concept of data structure.<br>ii. Students to discuss on different types of data structure as static and dynamic. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define data structure? | 3 |
| 7.2 Static Data Structure | a) describe pointers, records, array and user defined data structure | i. Teacher to guide students through question and answer technique to explain pointers, records, array data structure.<br>ii. Teacher to assist students to explain the operations of static data structure.<br>iii. Students to practice on construction of their own data structure, such as array of records. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes<br>• Computer loaded with C++ compiler<br>• LCD projector | Is the student able to describe pointers, records, array and user defined data structure? | 26 |
| | b) process data by inserting and deleting items of data in records | i. Teacher to demonstrate inserting and deleting data items into record structure using C++.<br>ii. Students to practice on inserting and deleting item in record structure. | | Is the student able to process data by inserting and deleting items of data in records? | |
| 7.3 Dynamic Data Structure | By the end of this sub-topic the student should be able to:<br><br>a) describe dynamic data structure<br>b) state advantages and disadvantages of dynamic data structure over static data structure. | i. Teacher use think - pair -share technique to guide students to explain the meaning of dynamic data structure.<br>ii. Students in small groups to explain advantages and disadvantages of dynamic data structure over static data structure. | • Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to state advantages and disadvantages of dynamic data structure over static data structure? | 26 |
| | c) explain operation of linked-list, stack, queue, and binary tree | i. Teacher to assist students to brainstorm the definition of linked-lists, stacks, queues.<br>ii. Teacher to demonstrate operations on linked list, stack, queue, and binary tree.<br>iii. Students to practice on operations of linked list, stack, queue, and binary tree. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• Manila sheets<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain operation of linked-list, stack, queue and binary tree? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| 7.4 Recursive Algorithms | By the end of this sub-topic the student should be able to:<br>a) define recursive algorithm | i. Through question and answer technique teacher to lead the students to define recursive algorithm.<br>ii. Students in small groups to define recursive algorithm. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define recursive algorithm? | 15 |
| | b) implement recursive algorithms | i. Students to do library search how to implement recursive algorithms.<br>ii. Teacher to guide students on to implement do recursive algorithms | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to implement recursive algorithms? | |
| 7.5 Searching Algorithms | By the end of this sub-topic the student should be able to:<br>a) describe how the linear searching algorithm works | i. Students in small groups to discuss how to search an element in one-dimensional arrays and linked lists.<br>ii. Teacher to guide students to write linear searching algorithm. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe how the Linear searching algorithm works? | 11 |
| | b) implement linear searching algorithms | i. Teacher to guide students to assist students to demonstrate on how to implement linear searching.<br>ii. Students in groups to do practice in implementing linear searching algorithm using arrays and linked-list. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to implement linear searching algorithms? | |
| 7.6 Sorting Algorithm | By the end of this sub-topic the student should be able to:<br>a) describe how bubble sorting algorithm works | i. Teacher to facilitate students to explain how bubble sorting algorithms work.<br>ii. Students in small groups to discuss bubble sorting algorithms. | • flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe how Bubble sorting algorithm works? | 13 |
| | b) implement Bubble sorting algorithm | Students in groups to implement bubble sorting algorithm in one dimensional arrays. | • Computer loaded with C++ compiler<br>• LCD Projector<br>• flip charts | Is the student able to implement Bubble sorting algorithm? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | | • Marker pen<br>• Lesson notes | | |
| **8. 0 INFORMATION SYSTEMS**<br><br>8.1 Introduction | By the end of this sub-topic the student should be able to:<br><br>a) define an Information System | i. Through question and answer technique teacher to lead students to explain the concept of information system.<br>ii. Students in groups to discuss the characteristics of an information system. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define an Information System? | 6 |
| | b) describe components of information system | i. Through question and answer technique teacher to guide students to identify components of information systems, which are information system hardware, databases, software for database management, communications channels, input-output interfaces, operators and users .<br>ii. Students in groups to discuss how components of information system link to each other. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe components of information system? | |
| 8.2 The Relational Database | By the end of this sub-topic the student should be able to:<br><br>a) Describe relational database | i. Teacher to facilitatae students to discuss the concept of relational database model.<br>ii. Teacher to guide students to explain goals of relational database model. e.g. To minimize data redundancy and to retrieve information easily.<br>iii. Students in small groups to discuss the relational database. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to Describe relational database? | 28 |
| | b) Describe the Entity- Relationship Model | i. Through question and answer technique teacher to lead the students to identify the elements of the entity-relationship model. e.g. entities, relationship and attributes. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the Entity-Relationship Model? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | ii. Students in groups to discuss the elements of entity-relationship model.<br>iii. Teacher to assist students to demonstrate how to construct E-R diagrams.<br>iv. Students in groups to practice on how to construct E-R diagram to represent a real-life database. | | | |
| | c) describe various keys in tables | i. Teacher to facilitate students to explain various keys in the tables; such as candidate key, primary key, foreign key, and composite key.<br>ii. Students in groups to perform exercises to identify keys in the tables | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe various keys in tables? | |
| | d) explain the concept of functional dependencies | i. Teacher to facilitate students to explain functional dependencies in databases.<br>ii. Students in small groups to discuss functional dependencies in databases. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the concept of functional dependencies? | |
| | e) normalize databases up to the 3rd normal form. | i. Through question and answer technique teacher to lead students to explain how data inconsistence can occur in a database due to the data redundancy.<br>ii. Teacher to guide students to explain the meaning of database normalization.<br>iii. Students to describe the first three normal forms.<br>iv. Students in small groups to practice on normalizing databases up to the 3rd normal form | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to normalize databases up to the 3rd normal form? | |
| 8.4 Database Management | By the end of this sub-topic the student should be able to: | i. Teacher to facilitate students to explain the concept of SQL. | • Computer loaded with Ms-Access or any other database | Is the student able to use SQL to update and retrieve | 22 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | a) use SQL to update and retrieve information from database | ii. Teacher to demonstrate syntaxes of SQL statement of update and retrieve information from databases.<br>iii. Students to practice on database updating and data retrieving from database using SQL. | software<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | information from database? | |
| 9.0 DATA COMMUNICATION AND NETWORKING<br>9.1 Introduction | By the end of this sub-topic the student should be able to:<br>a) explain how data communication takes place | i. Using the question and answer technique teacher to guide students to discuss how data communication takes place.<br>ii. Students in small groups to discuss on how data communication applied at home, school etc. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain how data communication takes place? | 10 |
| | b) explain the basic data communication model | i. Teacher to guide students to brainstorm on the basic elements involved in the basic data communication model.<br>ii. Students to discuss on the basic data communication model. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the basic data communication model? | |
| 9.2 Network Types and Topologies | By the end of this sub-topic the student should be able to:<br>a) describe the characteristics of the different types of network, including the Local Area Network (LAN), Wide Area Network (WAN) and Metropolitan Area Network (MAN). | i. By question and answer technique teacher to lead students to explain the concept of computer network.<br>ii. Teacher to facilitate students to explain the different types of computer networks.<br>iii. Students in small groups to discuss characteristics of computer networks. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the characteristics of the different types of network? | 21 |
| | b) identify the characteristics of basic network topologies? | i. Teacher to guide students to describe the concept of network topology.<br>ii. Teacher to lead students to explain the basic network topologies; such as such as bus, ring and star. | • Computer, network cables, hubs<br>• Manila sheets<br>• Flip charts<br>• Marker pen | Is the student able to identify the characteristics of basic network topologies? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | iii. Using question and answer technique teacher to guide students to discuss advantages and disadvantages of each basic network topology. | • Lesson notes | | |
| | c) describe the characteristics of a client-server network and a peer-to-peer network | i. Teacher to guide students to explain the concept of client-server networks and peer- to-peer networks.<br>ii. Students in small groups to discuss factors to be considered in choosing either client-server network or a peer-to-peer networks. | • Computer, network cables<br>• Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the characteristics of a client-server network and a peer-to-peer network? | |
| 9.3 Transmission Media | By the end of this sub-topic the student should be able to:<br>a) explain various data transmission media. | i. Teacher to facilitate students to explain various data transmission media.<br>ii. Teacher to guide students to explain different types of cables and their characteristics.<br>iii. Students in groups to discuss various data transmission media. | • Computer network cables samples<br>• Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain various data transmission media? | 18 |
| | b) describe the advantages and limitations of the different types of cables | i. Teacher to guide students to discuss advantages of various types of cables.<br>ii. Students in small groups to discuss limitations of the different types of cables for data transmission. | • Computer, network cables<br>• Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the advantages and limitations of the different types of cables? | |
| | c) explain the basic features of a wireless computer network. | i. Teacher to facilitate students to explain basic features of a wireless computer networks<br>ii. Teacher to demonstrate on computer wireless data transmission.<br>iii. Students in groups to discuss the main features of wireless computer network. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes<br>• Computer with internet connection and wireless transmission cable | Is the student able to explain the basic features of a wireless computer network? | |
| | d) describe the factors that need to | i. Teacher to facilitate students to | • Manila sheets | Is the student able to | |

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| | be considered in choosing between wired and wireless computer networks. | explain the basic differences between wired and wireless computer networks<br>ii. Students to discuss in small groups the factors to be considered in choosing between wired and wireless computer networks. | • Flip charts<br>• Marker pen<br>• Lesson notes | describe the factors that need to be considered in choosing between wired and wireless computer networks? | |
| 9.4 Multiplexing | By the end of this sub-topic the student should be able to:<br>a) define multiplexing | i. Teacher to guide students to explain the meaning of multiplexing.<br>ii. Students in groups to discuss the concept of multiplexing. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define Multiplexing? | |
| | b) distinguish between different types of multiplexing | i. Teacher to facilitate students to explain different types of multiplexing.<br>ii. Through question and answer technique teacher to guide students to discuss advantages and disadvantages of each type of multiplexing. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to distinguish between different types of multiplexing? | 7 |
| **10.0 VISUAL PROGRAMMING**<br>10.1 Introduction | By the end of this sub-topic the student should be able to:<br>a) describe the techniques and tools used for Visual Basic (VB) programming. | i. Teacher to lead students to explain the concepts of visual programming.<br>ii. Teacher to guide students to explain techniques and tools to be used for visual basic programming. | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the techniques and tools used for Visual Basic (VB) programming? | 5 |
| 10.2 Customize Forms | By the end of this sub-topic the student should be able to:<br>a) use the elements used in the toolbox | i. Teacher to guide students to explain the elements of the toolbox.<br>ii. Teacher to assist students to demonstrate how to use the elements of toolbox.<br>iii. Students to do practice on the elements of toolbox. | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the elements used in the toolbox? | 10 |

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|---|---|---|---|---|---|
| 10.3 Control structures | By the end of this sub-topic the student should be able to:<br><br>a) use the *if... then... else* selection statement | i. Teacher to guide students to demonstrates how to use the *if...else...* statement in Visual Basic.<br>ii. Students to do practice on the *if...else* statement in Visual Basic. | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the *if... then... else* selection statement of Visual Basic? | 15 |
| | b) use *the while..., do...while, do... until* and *for* repetition structures | i. Teacher to guide students to demonstrate the *while…, do…while,* do.. *until* and for repetition structure.<br>ii. Students to do practice on the *while…, do…while,* do.. *until* and for repetition structure. | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the *while..., do...while, do... until* and for repetition structures of Visual Basic? | |
| 10.4 Sub and Function Procedure | By the end of this sub-topic the student should be able to:<br><br>a) create new procedure and functions | i. Teacher to guide students to demonstrate on how to create procedure and functions<br>ii. Students to do practice on how to create new procedure and functions. | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to create new procedure and functions? | 5 |
| 10.5 Graphical user Interface | By the end of this sub-topic the student should be able to:<br><br>a) use the *TextBox* control to receive user input and display text | i. Teacher to facilitate students to explain the *Text Box* control.<br>ii. Teacher to demonstrate the *TextBox* control.<br>iii. Students to practice on the *TextBox* control | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the *TextBox* control to receive user input and display text? | 58 |
| | b) use the *MaskedEdit* control | i. Teacher to lead students to explain the *MaskedEdit* control.<br>ii. Teacher to demonstrate the *MaskedEdit* control. | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts | Is the student able to use the *MaskedEdit* control? | |

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| | | iii. Students to practice on *MaskedEdit* control. | • Marker pen<br>• Lesson notes | | |
| | c) use the *ComboBox* and *ListBox* | i. Teacher to guide students to explain the *ComboBox* and *ListBox* tools.<br>ii. Teacher to demonstrate the *ComboBox* and *ListBox* tools.<br>iii. Students to do practice on *ComboBox* and *ListBox tools.* | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to use the *ComboBox* and *ListBox?* | |
| | d) create *menus* and *pop-up* menus | i. Teacher to demonstrate on *menus* and *pop-up* menus.<br>ii. Students to practice on *menus* and *pop-up* menus. | • Computer loaded with Visual Basic compiler<br>• LCD Projector<br>• Flip Charts<br>• Marker pen | Is the student able to create *menus* and *pop-up* menus? | |
| 10.6 Project | By the end of this sub-topic the student should be able to :<br>write a visual basic program based on a realistic problem. | i. Teacher to facilitate students in small groups to do the following:<br>a) Identify real-life problem<br>b) Analyse the problem<br>c) Develop algorithm to solve the problem<br>d) Code the program using visual basic<br>e) Test the program<br>f) Document the program<br>ii. Students to choose a problem and step by step do the project. | • Computer<br>• LCD Projector<br>• Flip charts<br>• Marker pen<br>• Lesson notes<br>• Sample Projects | Is the student able to write a visual basic program based on a realistic problem? | 20 |
| **11.0 COMPUTER SECURITY AND PRIVACY**<br><br>11.1 Data Protection | By the end of this sub-topic the student should be able to:<br>a) describe the concept of data protection | i. Teacher to facilitate students to brainstorm on the concept of data protection and the rationale for data protection.<br>ii. Students to discuss on the potential risks associated with data storage (data | • Blackboard<br>• Chalks<br>• flip charts<br>• makers<br>• Computer | Is the student able to describe the concept of data protection? | 15 |

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|---|---|---|---|---|---|
| | | loss, virus and worms, misuse of data, hackers). | • LCD Projector<br>• Lesson notes | | |
| | b) describe measures taken to prevent data loss and unauthorized data access | i. Teacher to guide students to discuss measures used to overcome loss of data.<br>ii. Students in groups to discuss measures used to overcome unauthorised access of data; such as password, data encryption. | • Blackboard<br>• Chalks<br>• flip charts<br>• Computer<br>• LCD Projector<br>• Marker pen<br>• Lesson notes | Is the student able to describe measures taken to prevent data loss and unauthorized data access? | |
| 11.2 Physical Security | By the end of this sub-topic the student should be able to:<br><br>a) describe the concepts of physical security | i. Teacher to assign students to do library and internet search on the concept of physical security.<br>ii. Students to discuss on the concepts of physical security. | • Computer<br>• Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the concepts of physical security? | 10 |
| | b) describe methods used to protect computer theft and physical damage. | i. Teacher to assign students to do library and internet search for methods to protect computer theft and physical damage.<br>ii. Teacher to guide students to discuss on methods to protect computer theft and physical damage. | • Computer<br>• Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe methods used to protect computer theft and physical damage? | |
| 11.3 Troubleshooting | By the end of this sub-topic the student should be able to:<br><br>a) define the concept of simple computer problems | i. Teacher to guide students to discuss the concept of simple computer problems.<br>ii. Students to explain the concept of simple computer problems. | • Computer and appropriate software<br>• LCD projector<br>• Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to define the concept of simple computer problems? | 13 |
| | b) apply troubleshooting techniques to solve simple computer problems | i. Teacher to facilitate students to explain the concept of troubleshooting.<br>ii. Students to discuss the troubleshooting techniques.<br>iii. Teacher to demonstrate application of | • Computer and appropriate software<br>• LCD Projector<br>• flip charts<br>• Marker pen | Is the student able to apply troubleshooting techniques to solve simple computer problems? | |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| | | troubleshooting techniques in solving a hardware problem.<br>iv. Students to do practical work on troubleshooting. | • Lesson notes | | |
| 11.4 Software Piracy and Copyright | By the end of this sub-topic the student should be able to:<br>a) explain the concept of software piracy | i. Teacher to guide students to do internet search on software piracy and copyright .<br>ii. Students to discuss on the concept of software piracy.<br>iii. Students to discuss on copyright issues. | • Computer<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain the concept of software piracy? Is the student versed on copyright issues? | 15 |
| | b) describe the basic ideas of intellectual property and copyright. | i. Teacher to facilitate students to explain on the basic ideas of intellectual property .<br>ii. Students to discuss on the role of copyright for the produced intellectual property.<br>iii. Students to discuss on legal implications upon abuse of a copyright protected materials. | • Computer<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to describe the basic ideas of intellectual property and copyright? | |
| | c) explain open source and non-open source software. | i. Students to explain the meaning of open and non-open source software.<br>ii. Teacher to guide students through question and answer to identify some examples of open source and non-open source software. | • Computer<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain open source and non-open source software? | |
| 11.5 Ethical and Legal Issues | By the end of this sub-topic the student should be able to:<br>a) analyse ethical issue and their legal implications | i. Teacher to assign students to do internet search on ethical and legal issues related to computer security and Privacy.<br>ii. Students to discuss in groups on ethical and legal issues related to computer security and privacy. | • Computer<br>• LCD Projector<br>• flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to analyse ethical issue and their legal implications? | 5 |
| **12.0 I.T. ENVIRONMENT**<br>12. 1 IT Career | By the end of this sub-topic the student should be able to: | i. Teacher to facilitate students to discuss various roles of IT career opportunities such as system information manager, system analyst, | • Manila sheets<br>• Flip charts<br>• Marker pen | Is the student able to identify various IT career opportunities? | 3 |

| TOPIC /SUBTOPIC | SPECIFIC OBJECTIVES | TEACHING/ LEARNING STRATEGIES | TEACHING AND LEARNING RESOURCES | ASSESMENT | NUMBER OF PERIODS |
|---|---|---|---|---|---|
| Opportunities | a) identify various IT career opportunities | system administrator, programmer, IT trainer, operator, data clerk, webmaster, laboratory technician and maintenance engineer.<br>ii. Students through small groups to discuss on the relationships of the various roles of IT career opportunities. | • Lesson notes | | |
| 12.2 IT and Environment | By the end of this sub-topic the student should be able to:<br><br>a) explain how IT interact with the environment in our daily-life. | i. Teacher to assign students to do a literature or internet search on how IT interact with the environment.<br>ii. Students in groups to discuss impact of IT in our daily life with emphasis on advantages and disadvantages. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to explain how IT interacts with the environment in our daily-life? | 15 |
| | b) identify various methods that can be used for safe disposal of computer hardware. | i. Through question and answer technique teacher to guide students to identify:<br>- Ideal time for a computer hardware disposal.<br>- Better and safe methods of disposing computer hardware.<br>ii. Students to identify different methos used for safe disposal of computer hardware. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to identify various methods that can be used for safe disposal of computer hardware? | |
| | c) identify health hazards associated with the use of information technologies. | i. Teacher to guide students to write down on health related precautions required when working with a computer.<br>ii. Students in groups to discuss the health related, precautions required when working with a computers. | • Manila sheets<br>• Flip charts<br>• Marker pen<br>• Lesson notes | Is the student able to identify health hazards associated with the use of information technologies? | |


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