Computer Applications

Singapore-Cambridge General Certificate of Education Normal (Technical) Level (2018)

(Syllabus 7018)

CONTENTS

Singapore Examinations and Assessment Board

CAMBRIDGE
International Examinations

AIMS

The Computer Applications syllabus aims to prepare students to be technologically adept citizens, and to function and contribute effectively in an increasingly technologically-driven world. The syllabus emphasises fundamental knowledge and skills, and includes the appreciation and use of several software application packages for word processing, computer drawing and image editing, multimedia presentations and documents, spreadsheet calculations and charts, game design, programming; as well as, applications on the Internet.

Specifically, the aims of the syllabus are to enable students to:

1. acquire skills in using a variety of application software and associated computer hardware to accomplish tasks, communicate, and facilitate activities

2. develop an awareness of how computing technology is used in the home, school, workplace and community

3. appreciate the role computers play in everyday life and recognise the impact computers have on society and people

4. develop critical thinking and problem-solving skills.

ASSESSMENT OBJECTIVES

The examination will assess candidates' ability to:

(a) use software application packages and associated computer hardware to complete a series of designated tasks and sub-tasks

(b) solve problems for different problem scenarios and document the problem solutions

(c) understand fundamental computer terminology, systems and operations

(d) understand the role and impact of computer technology in everyday use.

Students will demonstrate understanding of the range and power of computer applications and the responsible use of information. They will be able to use relevant application software to solve problems in everyday context, and represent their problem solutions via data tables, flowcharts and programming statements. They will be able to use typical office productivity application software for word processing, multimedia presentations and spreadsheet calculations and charts. Students will also be able to demonstrate their skills in interface design, computer drawing and image editing through blogs and web pages, as well as animated stories and games.

SCHEME OF ASSESSMENT

Candidates will offer Paper 1, Paper 2 and Paper 3 in the year of the examination. All questions in all the three papers are compulsory.

Paper 1 (Written) (1 hour 15 minutes)
This paper will assess knowledge, understanding and application of concepts and skills in all the six modules:

- Computer Fundamentals (CPF)

- Media Elements (MEL)

- Document Processing (DOP)

- Spreadsheets (SST)

- Multimedia Communication (MMC)

- Media Computing (MEC)

The paper contains two sections. Section A (20 marks) contains 20 multiple-choice questions with 4 choices per question. Section B (40 marks) contains a variable number of short-structured questions of variable mark values. This paper carries 30% of the subject grade and covers assessment objectives (c) and (d). Further details of the paper are given in the Table of Specification for Paper 1.

Paper 2 (Lab-based) (1 hour 30 minutes)
This paper will assess skills in carrying out related tasks covering three modules:

- Media Elements (MEL)

- Document Processing (DOP)

- Multimedia Communication (MMC)

The skills are assessed through the use of a word processor to edit and format a given document and mail merge it with a given source data, computer graphics software to create a drawing; and presentation software to create a multimedia slide presentation with given media elements. The allotted time includes time for submitting the required work. This paper carries 35% of the subject grade and covers assessment objective (a). Further details of the paper are given in the Table of Specification for Paper 2.

Paper 3 (Lab-based) (1 hour 30 minutes)
This paper will assess skills in carrying out a series of tasks to provide solutions to two problem scenarios. The skills are assessed through the use of spreadsheet and programming software and the two problem scenarios will be described in the question paper. Tasks are set to cover two modules:

- Spreadsheets (SST)

- Media Computing (MEC)

Candidates will create a flowchart and save it as a word-processed document. The allotted time includes time for submitting the required work. This paper carries 35% of the subject grade and covers assessment objective (b). Further details of the paper are given in the Table of Specification for Paper 3.

Summary of details for each paper:

Paper	Mode	Duration	Weighting	Marks	Format	Modules Assessed
1	Written	1 hour 15 minutes	30%	20	Section A: 20 MCQ	All the six modules
				40	Section B: Variable no of Short-Structured Questions (SSQ)	All the six modules
2	Lab-based	1 hour 30 minutes	35%	70	3 related tasks	MEL, DOP, MMC
3	Lab-based	1 hour 30 minutes	35%	70	2 problem scenarios	SST, MEC

Table of Specification for Paper 1:

Name of Module	Percentage of Paper	Marks			
		Knowledge	Understanding	Application	TOTAL
Section A (20 MCQ) – 20 marks					
Computer Fundamentals	~ 8%	3	2	–	5
Media Elements	~ 5%	1	2	–	3
Document Processing	~ 5%	2	1	–	3
Spreadsheets	~ 5%	2	1	–	3
Multimedia Communication	~ 5%	1	2	–	3
Media Computing	~ 5%	2	1	–	3
Section B (Variable number of SSQ) – 40 marks					
Computer Fundamentals	~ 33%	4	7	9	20
Media Elements	~ 7%	–	2	2	4
Document Processing	~ 7%	–	2	2	4
Spreadsheets	~ 7%	–	–	4	4
Multimedia Communication	~ 7%	1	2	1	4
Media Computing	~ 7%	2	2	–	4
TOTAL		18	24	18	60
		30%	40%	30%	100%

Table of Specification for Paper 2:

Module	Description of Task	Weighting	Marks
Media Elements	Candidates will use computer graphics software to create a given drawing according to specifications given in the question paper; fill the drawing with colours; and submit the drawing. The drawing will be used for the 2nd or 3rd task.	30%	21
Document Processing	Candidates will use word-processing software to format and edit a given document according to specifications given in the question paper. Candidates are expected to demonstrate skills like importing text and images; page layout with columns, tables and/or text boxes; adding headers, footers and footnotes; as well as submit the required work.	40%	28
Multimedia Communication	Candidates will use presentation software to create a multimedia slide presentation with given media elements and according to specifications described in the question paper; and submit the required work.	30%	21
TOTAL		**100%**	**70**

Table of Specification for Paper 3:

Module	Description of Task	Weighting	Marks
Task 1 (first problem scenario)			
Spreadsheets	Candidates will use spreadsheet software to work on a given data table, by creating and completing columns in the data table and performing specified tasks like: • using operators, formulas and functions for calculations; • plotting and labelling charts; • data validation; • conditional formatting; • sorting and manipulating data; as well as submit the required work.	40%	28
Task 2 (second problem scenario)			
Media Computing	Candidates will use programming software to work on a given game scenario to demonstrate skills in selecting suitable pictures for background(s) and characters, creating scripts to animate characters, allowing user interaction through keyboard and/or mouse, as well as submit the required work.	40%	28
Algorithm (on one of the problem scenarios)			
Spreadsheets/ Media Computing	Candidates will create a flowchart to represent the algorithm for the problem solution of either the first or second task, which will be specified in the question paper; and describe the method of solution in short sentences; as well as submit the required work as a word-processed document.	20%	14
TOTAL		**100%**	**70**

USE OF CALCULATOR

An approved calculator may be used in Paper 1, Paper 2 and Paper 3.

CENTRE INFRASTRUCTURE FOR LAB-BASED EXAMINATION

The Centre will ensure adequate hardware and software facilities to support the examination of its candidates for Paper 2 and Paper 3, which will be administered over at most two shifts on the day of the examination for each of the papers. Each candidate should have the sole use of a personal computer for the purpose of the examination. The hardware and software recommended by the Ministry of Education should be used for the examinations. The candidates should be able to access software for computer graphics (bitmap and vector), word processing, presentation, spreadsheet, video editing, sound editing and programming. The Centre will be required to declare the name and version number of the software to be used for the cohort sitting for the examination at least two years before the cohort sits for the examinations.

SUBJECT CONTENT

The syllabus consists of six modules. Each module is further divided into units of study. The mnemonics and descriptions of these six modules are as follows.

MODULE 1 – COMPUTER FUNDAMENTALS (CPF)
This module introduces students to information communication technology and equips them with a basic knowledge of computing and communication devices. There is emphasis on fundamental computing knowledge and skills, and the impact of technology on people and society. Current developments in hardware and software are included where applicable. Computer usage and applications covered will range from the use of a desktop computer to internet technologies, and will include topics on computer ethics and security.

MODULE 2 – MEDIA ELEMENTS (MEL)
This module introduces students to design and drawing with computer software. The basic concepts, tools and techniques for creating and manipulating 2D vector graphics are covered. Students will edit and work with bitmap graphics and learn the difference between vector and bitmap graphics. Students will learn that vector graphics (drawings in 2D) are the foundation for 3D graphics and animation. They will be introduced to the concept of frames and frame rate when they engage in creating and editing video/movie clips. Students will also learn how to create and edit sound/voice clips for different purposes.

MODULE 3 – DOCUMENT PROCESSING (DOP)
This module introduces students to the design of visually effective documents through the combined use of text and graphics. Students will learn page layout, page and text format, as well as work with data in tables and mail merge. Students will also learn to embed a chart (with or without data table) from spreadsheet application software into a word document, as well as use auto shapes for drawing flowcharts.

MODULE 4 – SPREADSHEETS (SST)
This module introduces students to the use of spreadsheets to solve problems in real-life situations and flowcharts to represent the algorithms. Students will use the spreadsheet for required calculations; and understand the use of formulas, functions and cell referencing. Students will also learn to format cells, perform what-if analysis, sort data and develop an appreciation of the use of spreadsheets in everyday decision-making. Students will learn to express problem solutions using statements, flowcharts, formulas, functions, and mathematical and conditional expressions. They will learn to apply data formatting, understand the need for data validation, check for error conditions, and run and test the solutions on a computer.

MODULE 5 – MULTIMEDIA COMMUNICATION (MMC)

This module introduces students to the use of application software for multimedia presentations and documents. Students will learn to communicate messages, information and ideas effectively. They will also learn to use information responsibly. Students will learn that multimedia presentations and documents may incorporate the different media elements: text, graphics, sound, animation and video. Students will recognise the importance of storyboarding, learn and apply the principles of interface design as they engage in creating multimedia documents for presentations and for publishing on the Internet.

MODULE 6 – MEDIA COMPUTING (MEC)

This module introduces students to a scripting software, which has drag-and-drop program elements in a mouse-based editor that prohibits syntax errors. Students are taught programming and problem solving through the activity of storytelling, using English-like statements, short instructions, and flowcharts. Students will learn how media elements such as text, graphics and sound may be combined into an entertaining multimedia animated story or game. The animation allows students to see the state of the program, and provides an easy-to-see relationship between the program construct and the animated action.

LEARNING OUTCOMES

The learning outcomes for each module are as follows:

Module 1 – Computer Fundamentals (CPF)

Units of study

1.1   Computer systems

1.2   Computer operations

1.3   Computer software

1.4   Impact of computer technology

1.5   Computer abuse and misuse

1.1   Computer systems

Candidates should be able to:

1.1.1   list the different secondary storage media for data and programs

1.1.2   determine the storage media for files of different sizes

1.1.3   state what each device is used for in an application area

1.1.4   state the difference between RAM (random access memory) and ROM (read-only memory)

1.1.5   determine system specifications in terms of processor speed, RAM, and price

1.1.6   name the key components on a computer system board such as RAM, CPU and hard disk drive

1.1.7   distinguish between primary and secondary storage

1.1.8   show awareness of storage capacity of primary storage (i.e. RAM)

1.1.9   know the relative size of bits, bytes, kilobytes, megabytes, gigabytes and terabytes

1.1.10   name the different types of communication devices (e.g. mobile devices, hub, router and modem)

1.1.11   understand the difference between wired and wireless communications

1.1.12   name the components of a computer network

1.1.13   understand the concept of a network

1.1.14   understand the difference between a local area network (LAN) and a wide area network (WAN)

1.1.15   understand and state that computers in a network can share resources such as documents, databases and software

1.1.16   understand the difference between Internet and intranet.

1.2   Computer operations

Candidates should be able to:

1.2.1   distinguish between input, process and output operations

1.2.2   understand that meaningful information can be output only after the computer has processed the correct input data

1.2.3   identify the input, process and output of a computer application

1.2.4   state ways in which data can be lost

1.2.5   list measures to prevent loss of data

1.2.6   state the proper way to handle and care for equipment (include removing devices safely)

1.2.7   understand the need to make backups for possible recovery in case the originals are damaged.

1.3   Computer software

Candidates should be able to:

1.3.1   state that instructions are required to operate a computer and these instructions are contained in computer programs or software

1.3.2   state that an operating system is software to control the input-process-output operations taking place in a computer system

1.3.3   state that file compression can be used to reduce file size but that these files may have to be expanded before use

1.3.4   understand that application software refers to programs designed for user-related tasks (i.e. may be single and multi-users)

1.3.5   understand that interfaces can be command-driven or graphical

1.3.6   be aware of copyright issues

1.3.7   understand the dangers of the Internet (including cyber-wellness)

1.3.8   use safety measures when on the Internet (include firewall).

1.4   Impact of computer technology

Candidates should be able to:

1.4.1   identify the situations in which computers are used in society

1.4.2   state how the use of computers has affected the way people live and work

1.4.3   state the various services available on the Internet such as on-line news, cyber-shopping, on-line registrations, seat reservations and examinations.

1.5   Computer abuse and misuse

Candidates should be able to:

1.5.1   understand the effect of computer virus

1.5.2   list measures to prevent computer virus

1.5.3   list examples of computer crimes

1.5.4   list measures to prevent computer crimes

1.5.5   show awareness of data privacy.

Module 2 – Media Elements (MEL)

Units of study

2.1   Vector graphics

2.2   Bitmap graphics

2.3   Video and audio

2.4   3D drawing

2.1   Vector graphics

Candidates should be able to:

2.1.1   create a drawing (vector graphic) using lines, curves, circles/ovals, and rectangles/polygons

2.1.2   use basic tools for drawing, for example:

- copy and paste
- duplicate
- move and arrange *(for align and order)*
- resize
- flip (reflection)
- skew (shear, slant)
- rotate
- group and ungroup
- shape
- trim
- weld

2.1.3   save the drawing as vector graphics

2.1.4   manipulate the nodes and control points of a vector graphic to shape it

2.1.5   save drawings as bitmap graphics

2.1.6   fill a drawing with colours

2.1.7   understand open and closed objects (and be able to close open objects)

2.1.8   use the text tool and fonts as part of a graphic design (e.g. fit text to path and envelope effects)

2.1.9   apply effects to drawing, for example, blend/morph, combine, intersect and transparency

2.1.10   state that vector graphics can be resized without loss of details.

2.2   Bitmap graphics

Candidates should be able to:

2.2.1   understand that an image is composed of individually coloured pixels

2.2.2   understand the purpose of different file formats for bitmap graphics

2.2.3   state that resizing bitmap graphics can result in a loss of quality

2.2.4   understand concept of dots per inch

2.2.5   join images to compose a picture (e.g. making a collage)

2.2.6   animate bitmap graphics

2.2.7   add special effects.

2.3   Video and audio

Candidates should be able to:

2.3.1   create a video or movie clip

2.3.2   understand concept of frames and frame rate

2.3.3   extract parts of a sound clip/track

2.3.4   edit sound clip/track for a purpose

2.3.5   record and store digital voice.

2.4   3D drawing

Candidates should be able to:

2.4.1   understand concepts of planes

2.4.2   understand concepts of views

2.4.3   create a 3D drawing

2.4.4   orientate a 3D drawing

2.4.5   edit a 3D drawing.

Module 3 – Document Processing (DOP)

<u>Units of study</u>

3.1   Text and images

3.2   Page properties

3.3   Text formatting

3.4   Tables

3.1 Text and images

Candidates should be able to:

3.1.1   import text into a document from another document

3.1.2   use fanciful text and font to improve the look of a document (e.g. WordArt and Drop Cap)

3.1.3   change the size of graphics (e.g. resize or crop)

3.1.4   make the graphics into a watermark

3.1.5   use the zoom feature to view a document

3.1.6   insert auto shape

3.1.7   enter text in auto shape

3.1.8   embed a chart (with or without data table) from spreadsheet.

3.2 Page properties

Candidates should be able to:

3.2.1   understand what each type of page orientation is used for

3.2.2   show that the positions of elements should be consistent (e.g. page numbers, letterheads and logos)

3.2.3   use margin settings effectively for page layout

3.2.4   understand that text boxes and tables may be used to lay out a document

3.2.5   understand when to use layout with 2–3 columns

3.2.6   create a multi-column (2–3) document using tables, text boxes and built-in columns

3.2.7   add page border

3.2.8   understand the purpose of headers and footers

3.2.9   insert footnotes.

3.2.10 understand the reason for using a different start number for a page

3.2.11 insert/remove page break.

3.3 Text formatting

Candidates should be able to:

3.3.1   understand the purpose for using each type of alignment: centralised, left justified, right justified and fully justified

3.3.2   set line spacing to desired width

3.3.3   understand the concept of word wrap

3.3.4   wrap text around a graphic

3.3.5   use tab stops and indentations for paragraphs

3.3.6   import text into text box (frame)

3.3.7   understand that text can flow from one text box (frame) to another

3.3.8   control the flow of text from one text box (frame) to another

3.3.9   add, remove or modify borders of a text box

3.3.10 import graphics into text box (frame)

3.3.11 wrap text around a text box (frame).

3.4 Tables

Candidates should be able to:

3.4.1   format and shade cells

3.4.2   merge the cells of a table

3.4.3   add or remove borders to cells of a table

3.4.4   align table left, right or centre

3.4.5   import text and graphics into the cells of a table

3.4.6   align text and graphics in cells of a table

3.4.7   understand the concept of mail merge

3.4.8   use the mail merge feature for documents with data from table in word processor

3.4.9   use the mail merge feature for documents with data from table in spreadsheet

3.4.10 use the mail merge feature for documents with data from spreadsheet using conditional commands.

Module 4 – Spreadsheets (SST)

Units of study

4.1   Data display

4.2   Data values

4.3   Data analysis

4.4   Program elements

4.1   Data display

Candidates should be able to:

4.1.1   format numeric data in currency format with required number of decimal places

4.1.2   wrap and align text (top, centre, bottom) in cell

4.1.3   format numeric data in percentage format

4.1.4   understand the format of date data

4.1.5   format (either through shading the cell or changing the font colour of contents) by setting criteria for the data value or formula in the cell

4.1.6   state the purpose of each type of chart (bar, pie and line)

4.1.7   create bar, pie and line charts

4.1.8   understand the changes made to a chart when its data table is modified

4.1.9   create bar and line charts for data not in adjacent columns

4.1.10   create combination charts

4.1.11   understand and state the purpose of a combination chart

4.1.12   print a selected range of cells

4.1.13   print formula view of a worksheet.

4.2   Data values

Candidates should be able to:

4.2.1   restrict cursor movement to input cells

4.2.2   check and allow valid input data

4.2.3   state why data needs to be validated prior to processing

4.2.4   compute the total for columns and rows

4.2.5   use mathematical operators (+ – * /) in worksheet calculations

4.2.6   use functions to find min and max values, sum and average

4.2.7   understand the purpose of absolute and relative cell referencing

4.2.8   use absolute and relative cell referencing

4.2.9   understand the automatic recalculation feature of a spreadsheet

4.2.10 calculate the total number of data values

4.2.11 understand that values that can be calculated should not be input

4.2.12 display appropriate text message in place of error displays.

4.3 Data analysis

Candidates should be able to:

4.3.1   sort a data table in ascending order of a particular data item

4.3.2   sort a data table in descending order of a particular data item

4.3.3   understand how changes in one or more data items can affect other related data items

4.3.4   use the spreadsheet to perform data analysis due to changes in data values.

4.4 Program elements

Candidates should be able to:

4.4.1   generate random numbers below a specified value

4.4.2   round (up or down) numeric data values

4.4.3   express numeric data values as whole numbers

4.4.4   find the remainder when one number is divided by another

4.4.5   extract the day, month and year components from a date

4.4.6   extract a word from a line of text

4.4.7   understand and use conditional statements

4.4.8   understand and use relational operators to compare data values

4.4.9   look up data in tables or lists

4.4.10 express problem solutions using flowcharts

4.4.11 describe problem solutions in short sentences.

Module 5 – Multimedia Communication (MMC)

Units of study

5.1   Multimedia

5.2   Storyboarding

5.3   Navigation

5.1   Multimedia

Candidates should be able to:

5.1.1   understand that text, graphics, animation, sound and video are media elements

5.1.2   identify media elements in an application

5.1.3   give examples of common multimedia applications

5.1.4   use media elements in presentations

5.1.5   use media elements for internet-based documents (e.g. blog and web pages).

5.2   Storyboarding

Candidates should be able to:

5.2.1   understand that a storyboard shows the sequence or flow of content and layout of the media elements

5.2.2   lay out media elements effectively so as to put the message across

5.2.3   plan a storyboard for a slide presentation

5.2.4   produce a slide presentation based on a storyboard

5.2.5   plan a storyboard for an internet-based document (e.g. blog and web pages)

5.2.6   produce an internet-based document based on a storyboard

5.2.7   understand that the relative sizes of media elements (e.g. text and pictures), together with white space enhance the visual appeal of a presentation or internet-based document (e.g. web pages and slides)

5.2.8   use appropriate fonts and colours for readability

5.2.9   use appropriate font type and size to distinguish between headings and body text

5.2.10 understand the purpose of using a mix of uppercase and lowercase letters for text

5.2.11 put repeated media element in the same position on different screens

5.2.12 use appropriate background for a slide presentation so that media elements are visible

5.2.13 use appropriate background for an internet-based document so that media elements are visible.

5.3 Navigation

Candidates should be able to:

5.3.1   create buttons to move to the next and previous screens of a presentation

5.3.2   control the flow between and within a presentation through buttons and links

5.3.3   understand the difference between external and internal links

5.3.4   understand the concept of a menu as a user interface

5.3.5   create a simple menu-controlled presentation

5.3.6   create an internet-based document (e.g. web pages).

Module 6 – Media Computing (MEC)

Units of study

6.1 Animation

6.2 Storytelling

6.3 Scripting

6.4 Interaction

6.5 Game development

6.1 Animation

Candidates should be able to:

6.1.1   understand the purpose of each character or object

6.1.2   understand the need/purpose to switch between characters or objects

6.1.3   understand that a character or object can have an action

6.1.4   understand that scripts are instructions to a character or object for action

6.1.5   select and use suitable digitised pictures for backgrounds

6.1.6   understand the need/purpose to switch between backgrounds

6.1.7   understand that the background is an object.

6.2 Storytelling

Candidates should be able to:

6.2.1   understand and use flowchart symbols for start/end, input/output, process and decision

6.2.2   express the behaviour of a character or object through a flow chart

6.2.3   describe in short paragraphs what the animation is about

6.2.4   explain the sequence of events in the animation.

6.3 Scripting

Candidates should be able to:

6.3.1   output typed text

6.3.2   output sound

6.3.3   switch between characters or objects

6.3.4   move each character or object in the desired direction

6.3.5   position each character or object at the desired location

6.3.6   start and stop the running/execution of instructions.

6.3.7   determine the duration (in seconds) of an instruction

6.3.8   understand and use a conditional statement, limited to the use of one condition per statement

6.3.9   understand and use a conditional loop.

6.4 Interaction

Candidates should be able to:

6.4.1   understand and use mathematical operators, limited to '+', '–', '*' and '/' operators

6.4.2   understand and use relational operators

6.4.3   understand and use random number generator

6.4.4   read a key press

6.4.5   read a response from the mouse

6.4.6   understand use of a variable

6.4.7   change the value of a variable

6.4.8   output the value of a variable.

6.5 Game development

Candidates should be able to:

6.5.1   describe in short paragraphs what the game is about

6.5.2   determine the characters or objects for the game

6.5.3   create the scripts for the game

6.5.4   explain how the game is played

6.5.5   draw flowchart for the game algorithm.