

COMPUTING 50 THINGS..

Unit 1

Systems Architecture

- I. Describe the purpose of the CPU
- II. Know the role of the components of Von Neumann architecture: MAR, MDR, PC and Accumulator
- III. Be able to recommend common characteristics of CPUs that affect their performance: clock speed, cache size, number of cores

Memory

- IV. Be able to explain the difference between RAM and ROM
- V. Describe the need for virtual memory and its effects on performance
- VI. Be able to recommend suitable storage devices and storage media for a given application
- VII. The role and methods of backup: full incremental

Networking

- VIII. Distinguish between the 2 main types of networks: LAN (Local Area Network) and WAN (Wide Area Network)
- IX. Give the different roles of computers in a client-server and a peer-to-peer network
- X. Recognise the hardware needed to connect stand-alone computers into a Local Area Network: wireless access points, routers/switches, NIC (Network Interface Controller/Card), transmission media
- XI. Be able to draw a diagram for Star and mesh network topologies
- XII. Know the advantages and disadvantages of star and mesh topologies
- XIII. Explain using diagrams packet switching
- XIV. Identify the layers used during data transmission
- XV. Identify the protocols used for emails.
- XVI. Recognise 3 threats posed to networks and possible ways of preventing them

Software

- XVII. Describe 2 utility system software from encryption software, defragmentation, data compression
- XVIII. Open source vs proprietary software- give arguments for and against each

Legislation

- XIX. Recognise and be able to suggest methods to reduce the environmental impact of Computer Science
- XX. The Data Protection Act 1998- what is its purpose?
- XXI. Copyright Designs and Patents Act 1988 – what does it protect? How can it be avoided?
- XXII. Give arguments for and against-“Changes in memory technologies are leading to innovative computer designs”

Hardware

- XXIII. Identify 3 input devices
- XXIV. Give an example of a device that enables someone with a disability to use a computer
- XXV. Name and describe a device that produces hard copies.

Unit 2

Algorithms

- i. Explain how the computational thinking methods of abstraction and decomposition help problem solving
- ii. Be able to apply standard searching algorithm: binary search to data
- iii. Be able to apply standard searching algorithm: linear search to data
- iv. Be able to apply Bubble sorting algorithms to data
- v. Be able to apply merge sorting algorithms to data
- vi. Be able to apply insertion sorting algorithms to data
- vii. Know flowchart symbols
- viii. Be able to follow a section of pseudocode

Programming techniques

- ix. Know the use of the three basic programming constructs used to control the flow of a program: sequence, selection, iteration (count and condition controlled loops)
- x. Be able to identify the data types: integer, real, Boolean, character and string
- xi. Explain the use for maintainability techniques such as comments, indentation

Producing robust programs

- xii. Justify the purpose of testing
- xiii. Identify syntax and logic errors
- xiv. Select and use suitable test data, normal, boundary and extreme Computational Logic
- xv. Draw and interpret simple logic diagrams using the operations AND, OR and NOT
- xvi. Combine Boolean operators using AND, OR and NOT to two levels
- xvii. Be able to apply computing-related mathematics: +, -, /, *
- xviii. Be able to apply computing-related mathematics Exponentiation (^), MOD, DIV

Data representation

- xix. Be able to rank the following units: bit, nibble, byte, kilobyte, megabyte, gigabyte, terabyte, petabyte
- xx. Be able to convert positive denary whole numbers (0–255) into 8 bit binary numbers
- xxi. Be able to add two 8 bit binary integers and explain overflow errors which may occur
- xxii. Be able to convert from binary to hexadecimal equivalents and vice versa
- xxiii. Understand the term 'character-set'
- xxiv. Know the effect of colour depth and resolution on the size of an image file
- xxv. Recognise the similarities and differences between the types of compression: lossy and lossless