Resources to support the Higher Computing Science course

This document maps past paper questions against the course content listed in the course specification.

You can find these in the 'Past Papers and Marking Instructions' dropdown on the Higher subject page.

Software design and development

Phase	Skills, knowledge and understanding	Past paper questions
Development methodologies	Describe and compare the development methodologies: ♦ iterative development process ♦ agile methodologies	2024 Q2 SQP Q4 2023 Q2 2019 Q5
Analysis	Identify the: ♦ purpose ♦ scope ♦ boundaries ♦ functional requirements of a problem that relates to the design and implementation at this level, in terms of: ♦ inputs ♦ processes ♦ outputs	2024 Q8(a) SQP Q8(a) 2023 Q10(a) 2022 Q7(a) 2022 Q8(a) 2019 Q11(a)

Phase	Skills, knowledge and understanding	Past paper questions
Design	Identify the data types and structures required for a problem that relates to the implementation at this level. Read and understand designs of solutions to problems at this level, using the following design techniques: ♦ structure diagrams ♦ pseudocode Exemplify and implement efficient design solutions to a problem, using a recognised design technique, showing: ♦ top level design ♦ the data flow ♦ refinements Describe, exemplify, and implement user-interface design, in terms of input and output, using a wireframe.	2024 Q4 2024 Q9(a)(c) SQP Q5 SQP Q6(b) SQP Q7(a) SQP Q8(b) 2023 Q10(b) 2023 Q11(b) 2022 Q7(b)(c) 2022 Q8(b) 2019 Q11(c) 2019 Q14(a)(b)
Implementation (data types and structures)	Describe, exemplify and implement appropriately the following structures: ♦ parallel 1-D arrays ♦ records ♦ arrays of records	2024 Q7(a)(b) SQP Q6(a)(i)(ii) 2023 Q11(a)(i)(ii)(c) 2022 Q6(b)(i)(ii) 2019 Q11(b) 2019 Q15(a) 2018 Q12(b)(i)(ii)

Phase	Skills, knowledge and understanding	Past paper questions
Implementation (computational constructs)	Describe, exemplify, and implement the appropriate constructs in a procedural high-level (textual) language: ♦ parameter passing (formal and actual) ♦ the scope of local and global variables ♦ sub-programs/routines, defined by their name and arguments (inputs and outputs): — functions — procedures ♦ pre-defined functions (with parameters): — to create substrings — to convert from character to ASCII and vice versa — to convert floating-point numbers to integers — modulus ♦ file handling — sequential CSV and txt files (open, create, read, write, close) Read and explain code that makes use of the above constructs.	2024 Q6(a)(b) 2024 Q8(d) 2024 Q9(b) 2024 10(d) SQP Q7(b)(c)(d)(i)(ii) 2023 Q7(a)(b) 2023 Q9(a)(ii)(b)(c)(d) 2023 Q10(c) 2022 Q5(b) 2022 Q6(d) 2022 Q7(d)(ii)(e) 2022 Q8(c)(i)(ii) 2019 Q2 2019 Q18(a)(b)(c)(ii) 2018 Q15(b)(c)(f)
Implementation (algorithm specification)	Describe, exemplify, and implement standard algorithms using 1D arrays or arrays of records: ♦ linear search ♦ find minimum and maximum ♦ count occurrences	SQP Q6(c) SQP Q8(d) 2023 Q9(e) 2023 Q11(c) 2022 Q6(c) 2022 Q8(d) 2019 Q10(a)(b)(c)(i) 2019 Q15(b) 2018 Q7 2018 Q12(c) 2018 Q15(a)

Phase	Skills, knowledge and understanding	Past paper questions
Testing	Describe, exemplify and implement a comprehensive final test plan to show that the functional requirements are met. Identify syntax, execution, and logic errors at this level. Describe and exemplify de-bugging techniques: ♦ dry runs ♦ trace tables/tools ♦ breakpoints ♦ watchpoints	2024 Q8(b) 2024 Q10(a)(b)(c) SQP Q7(d)(iii) SQP Q8(c)(i)(ii) 2023 Q8 2023 Q9(a)(i) 2022 Q5(a) 2022 Q6(e) 2022 Q7(d)(i) 2019 Q10(c)(ii) 2019 Q18(c)(i) 2018 Q15(d)(e)
Evaluation	Describe, identify, and exemplify the evaluation of a solution in terms of: ♦ fitness for purpose ♦ efficient use of coding constructs ♦ usability ♦ maintainability ♦ robustness	2024 Q8(c) 2024 Q10(e) SQP Q8(c)(iii) 2022 Q6(a)

Computer systems

Phase	Skills, knowledge and understanding	Past paper questions
Data representation	Describe and exemplify the use of binary to represent positive and negative integers using two's complement, including the range of numbers that can be represented using a fixed number of bits. Conversion of two's complement numbers from binary to denary and vice versa. Describe and exemplify floating-point representation of positive and negative real numbers, using the terms mantissa and exponent. Describe the relationship between the number of bits assigned to the mantissa/exponent, and the range and precision of floating-point numbers. Describe Unicode used to represent characters and its advantage over extended ASCII code (8-bit) in terms of numbers of characters. Describe the relative advantages and disadvantages of bit-mapped graphics versus vector graphics.	2024 Q1(a)(b) 2024 Q3(a)(b) SQP Q1 2023 Q1 2023 Q3 2022 Q1 2022 Q2 2022 Q3 2019 Q1 2019 Q4 2018 Q1 2018 Q5 2018 Q11(d)(i)
Computer structure	Describe the concept of the fetch-execute cycle. Describe the factors affecting computer system performance: ♦ number of processors (cores) ♦ width of data bus ♦ cache memory ♦ clock speed	2024 Q5 SQP Q2 2023 Q5 2022 Q4 2019 Q3 2018 Q8 2018 Q9
Environmental impact	Describe the environmental impact of intelligent systems: ♦ heating systems ♦ traffic control ♦ car management systems	SQP Q3 2019 Q16(e)

Phase	Skills, knowledge and understanding	Past paper questions
Security risks and precautions	Describe and identify the implications for individuals and businesses of the Computer Misuse Act 1990: ♦ unauthorised access to computer material ♦ unauthorised access with intent to commit a further offence ♦ unauthorised modification of programs or data on a computer Describe and identify the security risks: ♦ tracking cookies ♦ DOS (Denial of Service) attacks: — symptoms ○ slow performance, inability to access — effects ○ disruption to users and business — costs ○ lost revenue, labour in rectifying fault — type of fault ○ bandwidth consumption, resource starvation, Domain Name Service (DNS) — reasons ○ financial, political, personal Describe how encryption is used to secure transmission of data: ♦ use of public and private keys ♦ digital certificates ♦ digital signatures	2024 Q9(d)(i)(ii) SQP Q6(d) SQP Q7(e) 2023 Q4 2023 Q6 2019 Q13(e) 2019 Q18(d) 2018 Q2

Database design and development

Phase	Skills, knowledge and understanding	Past paper questions
Analysis	Identify the end-user and functional requirements of a database problem that relates to the implementation at this level.	2024 Q11(a) 2022 Q9(a) 2019 Q13(a)
Design	Describe and exemplify entity-relationship diagrams with three or more entities, indicating: ♦ entity name ♦ attributes ♦ name of relationship ♦ cardinality of relationship (one-to-one, one-to-many, many-to-many) Describe and exemplify an instance using an entity-occurrence diagram. Describe and exemplify a compound key. Describe and exemplify a data dictionary with three or more entities: ♦ entity name ♦ attribute name ♦ primary and foreign key ♦ attribute type: — text — number — date — time — Boolean ♦ attribute size ♦ validation: — presence check — restricted choice — field length — range	2024 Q11(b) 2024 Q13(c) SQP Q9 SQP Q11(a) SQP Q12(a)(b) 2023 Q12 2023 Q14(a)(b) 2023 Q15(a) 2022 Q9(b) 2022 Q11(a) 2022 Q12(a)(b) 2019 Q7 2019 Q13(b) 2019 Q17(a)(d) 2018 Q14(a)(b)(d)

Phase	Skills, knowledge and understanding	Past paper questions
Design (continued)	Exemplify a design of a solution to a query: ♦ tables and queries ♦ fields ♦ search criteria ♦ sort order ♦ calculations ♦ grouping	
Implementation	Describe, exemplify and use SQL operations for pre-populated relational databases, with three or more linked tables: ♦ UPDATE, SELECT, DELETE, INSERT statements making use of: — wildcards — aggregate functions (MIN, MAX, AVG, SUM, COUNT) — computed values, alias — GROUP BY — ORDER BY — WHERE Read and explain code that makes use of the above SQL.	2024 Q12 2024 Q13(a)(b) 2024 Q14(a)(b)(i)(ii)(c) SQP Q10 SQP Q11(b)(d) SQP Q12(c) 2023 Q13 2023 Q14(c) 2023 Q15(b)(c) 2022 Q11(b)(i)(ii) 2022 Q12(c)(d) 2019 Q6 2019 Q13(c) 2019 Q17(b)(c)
Testing	Describe and exemplify testing: ♦ SQL operations work correctly at this level	2024 Q14(d) SQP Q11(c) 2023 Q14(d) 2022 Q10 2019 Q13(d)
Evaluation	Evaluate solution in terms of: ♦ fitness for purpose ♦ accuracy of output	2023 Q15(d)

Web design and development

Phase	Skills, knowledge and understanding	Past paper questions
Analysis	Identify the end-user and functional requirements of a website problem that relates to the design and implementation at this level.	2023 Q17(a) 2022 Q15(a)
Design	Describe and exemplify the website structure of a multi-level website with a home page and two additional levels, with no more than four pages per level. Describe, exemplify and implement, taking into account end-user requirements and device type, an effective user-interface design (visual layout and readability) using wire-framing: ♦ horizontal navigational bar ♦ relative horizontal and vertical positioning of the media ♦ form inputs ♦ file formats of the media (text, graphics, video, and audio) Describe, exemplify and implement prototyping (low-fidelity) from wireframe design at this level.	2024 Q17(a)(i) 2024 Q18(b)(i) SQP Q16(b)(c) 2023 Q17(b) 2023 Q19(a) 2022 Q14 2019 Q8(a) 2019 Q12(b) 2019 Q16(a)

Phase	Skills, knowledge and understanding	Past paper questions
Implementation (CSS)	Describe, exemplify and implement efficient inline, internal and external Cascading Style Sheets (CSS) using grouping and descendant selectors to: ♦ control appearance and positioning: — display (block, inline, none) — float (left, right) — clear (both) — margins/padding — sizes (height, width) ♦ create horizontal navigation bars: — list-style-type:none — hover Read and explain code that makes use of the above CSS.	2024 Q15 2024 Q17(a)(ii) 2024 Q18(a)(c) SQP Q14 SQP Q15(d) SQP Q16(a)(d)(i)(ii) 2023 Q18(a)(b)(c)(i) 2023 Q19(b) 2022 Q15(c)(d) 2022 Q16(a)(b)(c) 2019 Q12(a) 2019 Q16(b)(c) 2018 Q13(b)

Phase	Skills, knowledge and understanding	Past paper questions
Implementation (HTML)	Describe, exemplify and implement HTML code: ♦ nav ♦ header ♦ footer ♦ section ♦ main ♦ form ♦ id attribute Describe, exemplify and implement form elements: ♦ form element: input — text — number — textarea — radio — submit ♦ form element: select Describe, exemplify and implement form data validation: ♦ length ♦ presence ♦ range Read and explain code that makes use of the above HTML.	2024 Q18(b)(ii) SQP Q15(a)(i)(ii)(b)(i)(ii) 2023 Q18(c)(iii)(d)(i)(ii) 2022 Q13 2022 Q16(e) 2019 Q9 2019 Q12(c)(d)
Implementation (JavaScript)	Describe, exemplify and implement coding of JavaScript functions related to mouse events: ♦ onmouseover ♦ onmouseout ♦ onclick	2024 Q17(b)(i)(ii) SQP Q13(a)(b) 2023 Q18(c)(ii) 2022 Q16(d)(i)(ii) 2019 Q16(d) 2018 Q13(c)

Phase	Skills, knowledge and understanding	Past paper questions
Testing	Describe, exemplify and implement usability testing using personas, test cases and scenarios based on low-fidelity prototypes. Describe and exemplify testing: ♦ input validation ♦ navigational bar works ♦ media content displays correctly Describe and exemplify compatibility testing: ♦ device type: — tablet, smart phone, desktop ♦ browser	2024 Q16(a)(b) 2024 Q18(d) SQP Q15(c) 2023 Q19(c) 2022 Q15(b)(e) 2019 Q8(b) 2019 Q12(f)
Evaluation	Evaluate solution at this level in terms of ♦ fitness for purpose ♦ usability	2023 Q16 2019 Q12(e)