Year 13 SL Study Guide for Half-Yearly

Number Representation: Binary and hex numbers. Conversions. Fractions. Conversions (with fractions) from binary and hex to decimal. Unsigned and two's complement numbers. Subtraction in two's complement.

Programming & Java: algorithm, flowchart (program flowchart and system flowchart – with symbols), pseudocode. Source code, object code, compiler, interpreter, bytecode, BlueJ. What we mean by OOL language. Header, String, comment, variables, types, declarations, assignment statement. Loops. Call by value and by reference. Features of OOP: encapsulation, inheritance, polymorphism. Constructors, parameters. **this** keyword. Abstract classes. Debugging (trace table, breakpoints, stepping through the code, inspecting variables). Termination conditions for a loop. Access modifiers: private, public. Getters and setters. Classes and objects. Static and non-static variables. Reference. Class attributes and methods. UML class diagram.

Algorithms: serial search, binary search, bubble sort. Big-O notation. Selection sort.

Computer Organisation (topic 2). Software, hardware, input, process, storage, output, input devices, output devices, data and information. CPU, microprocessor, ALU, CU, cache, registers (accumulator, CIR, PC, MAR, MDR), buses (data, address, control). Read and write operations.

Operating Systems: Functions of an operating system (programs control, memory management, protection and security, user interface, file management).Virtual memory.

Computer Logic: Truth table, logic gate and Venn diagram of AND, OR, NOT, NAND, NOR, XOR. Circuit diagrams and their corresponding truth tables. Priority rules. Boolean algebra.

Systems Development Life Cycle: waterfall method, prototyping.

Files: master file, sequential file. Batch processing. Text file.

Networks: Topology (bus, ring, star). LAN, MAN, WAN, WLAN, VLAN, SAN, intranet, Internet, IoT, extranet, VPN (secure VPN, trusted VPN, hybrid VPN; site-to-site VPN, remote-access VPN), PAN, P2P. Cable: twisted pair (unshielded, shielded), coaxial, fibre. Wireless communication (microwave, satellites, infrared, RFID, Bluetooth, Free Space Optics). Microwave transmission, packet, packet switching, protocol (data integrity, checksum, source integrity, flow control, congestion management, deadlock prevention, error checking, error correction). Data integrity, parity bit. Check digit, check sum. Gateway, hub, modem, switch, router. Handshaking. OSI model, TCP/IP, ISDN, client-server (file server, print server, web server, database server). Compression (lossy, lossless).