University of Colombo, Sri Lanka

University of Colombo School of Computing

DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY (EXTERNAL)

Academic Year 2023— 1^{st} Year Examination — Semester 1

IT1206 — Computer Systems

Multiple Choice Question Paper

(2 Hours)

Important Instructions

- The duration of the paper is **2 Hours**.
- The medium of instructions and questions is English.
- This paper has **40 questions** on **11 pages**. Answer **all** questions.
- All questions are of the **MCQ** (Multiple Choice Questions) type.
- Each question will have **5 (five)** choices with **ONE OR MORE** correct answers.
- This paper consists of 100 marks and all the questions will carry equal marks.
- There will be a penalty for incorrect responses to discourage guessing.
- The mark given for a question will vary from -1 (All the incorrect choices are marked & no correct choices are marked) to +1 (All the correct choices are marked & no incorrect choices are marked). However, **the minimum mark per question would be zero**.
- Answers should be marked on the **special answer sheet** provided.
- Note that questions appear on both sides of the paper. If a page or part of a page is not printed, please inform the supervisor/invigilator immediately.
- Mark the correct choices on the question paper first and then transfer them to the given answer sheet which will be machine marked. **Please completely read and follow the instructions given on the other side of the answer sheet before you shade your correct choices.**
- Any electronic device capable of storing and retrieving text, including electronic dictionaries, smartwatches, and mobile phones, is not allowed.
- Calculators are **not** allowed.
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1) What fundamental principle did *John von Neumann* introduce with his stored program concept?

(a) Separation of data and control units
(b) Integration of ALU and CPU
(c) Exclusive use of punch cards for program storage
(d) Utilization of vacuum tubes for memory
(e) Implementation of parallel processing in computers

2) What is the decimal value of the two's complement 8-bit binary number **`1111 1101`**?

(a) -125	(b) -253	(c) -3
(d) -61	(e) -127	

3) What is the equivalent decimal value of the binary number **`101.101`**?

(a) 5.625	(b) 3.75	(c) 3.625
(d) 3.375	(e) 5.75	

4) Which of the following devices of a computer is/are **NOT** regarded as (an) input device/s?

(a) Keyboard	(b) Touchpad	(c) Display Monitor
(d) Printer	(e) Mouse	

5) Which of the following is/are designed for long-term archival storage and provides high durability?

(a) Magnetic Tape	(b) External Hard Drive	(c) CD or DVD
(d) USB Flash Drive	(e) Floppy Disk	

6) Which of the following is/are not (a) magnetic-based storage medium?

(a) Hard Disk Drive	(b) Floppy Disk	(c) Magnetic Tape
(d) USB Flash Drive	(e) CD ROM	

7) Which of the following is/are **NOT** (a) component of a typical computer motherboard?

(a) Chipset	(b) RAM Memory Sockets	(c) CPU Slot
(d) Fire-wire Slot	(e) BIOS Chip	

8) Which of the following is/are (a) primary function(s) of a BIOS of a computer?

(a) Managing file systems on the hard drive
(b) Controlling input and output devices
(c) Orchestrating all input and output devices while operating system is running
(d) Loading the operating system into memory during startup
(e) Connecting all input and output devices to the computer through a common interface

9) Which of the following is/are (a) purpose/ purposes of cache memory in a computer system?

(a) To permanently store large files and applications.
(b) To manage and coordinate virtual memory operations.
(c) To speed up the program execution by storing frequently used instructions and data.
(d) To regulate the memory consumption and access by different programs.
(e) To protect unauthorized memory access by providing a secured layer of storage.

10) What is the clock frequency of a CPU that is having a clock cycle time of 4 *nano seconds* in a 500MHz frequency?

(a) 250MHz	(b) 500MHz	(c) 0.25MHz
(d) 0.5MHz	(e) 2.5MHz	

11) What was the primary purpose of the ENIAC computer, unveiled in 1946?

(a) Cryptanalysis during World War II
(b) Weather forecasting
(c) Atomic energy calculations
(d) Stock trading data processing using statistical analysis
(e) Space exploration simulations

12) Which of the following statement(s) is/are **TRUE** about display monitors in computers?

(a) CRT monitors are generally energy-efficient compared to display technologies like LCD or LED monitors.
(b) CRT monitors produce better quality images with high resolution than LCD or LED monitors.
(c) CRT monitors are lightweight and easy to carry.
(d) CRT stands for Crystal Record Technology in CRT monitors.
(e) CRT monitors work by directing electron beams onto a phosphor-coated screen to generate the pixels that form images.

13) There is a three (03)-input truth table, and a user wants to activate a distinct circuit unit for each *minterm* in the truth table. What is/are the ideal circuit unit(s) that can be employed to achieve the user's objective given those three inputs as the input to the selected circuit unit?

(a) 3-to-8 decoder
(b) 3-to-1 decoder
(c) 3-to-8 multiplexer
(d) 3-to-1 multiplexer
(e) 3 input XOR gate

14) Which of the following is/are considered as a responsibility of ***Program Counter*** in the CPU?

(a) Coordinates and manages the execution of instructions, control data flow between different CPU components, and ensures the proper sequencing of operations in accordance with the program's instructions.

(b) Holds the current instruction being executed, allowing the CPU to decode and execute it.

(c) Performs arithmetic operations and logical operations on data, enabling the CPU to carry out mathematical calculations and make logical decisions.

(d) Provides high-speed access to frequently used data and instructions, reducing the time it takes to fetch data from main memory.

(e) Keeps track of the memory address of the next instruction to be fetched and executed, ensuring the sequential execution of program instructions.

15) Which of the following statement(s) is/are **TRUE** about Gesture Recognition systems?

(a) Gesture recognition systems solely rely on touchscreens for capturing and interpreting gestures.

(b) Gesture recognition systems are exclusively used for gaming applications and have limited use in other fields.

(c) Gesture recognition systems often use sensors, cameras, or depth-sensing devices to capture and interpret gestures.

(d) Gesture recognition systems always require users to wear specialized devices or gloves for accurate gesture detection.

(e) Gesture recognition systems can only interpret basic hand movements and are incapable of recognizing complex gestures.

16) Which computer system was a part of the *first generation of computers* and was known for its role in the development of stored-program concept, later leading to the creation of UNIVAC?

(a) ENIAC	(b) EDVAC	(c) UNIX
(d) EDSAC	(e) IBM 701	

17) Which of the following statement(s) accurately describe(s) an aspect of optical storage devices?

(a) CD-ROMs are typically rewritable and commonly used for frequent data backups.

(b) DVD+RW allows for permanent data storage and is not subject to data corruption or modification over time.

(c) CD-RW discs can only be written to once and are not erasable.

(d) Blu-ray Discs (BD-R) are commonly having higher storage capacity than ordinary double layer DVD.

(e) DVD-RAM is a read-only format commonly used for distributing software.

18) Which of the following activities can be considered as *Active Preventive Maintenance*?

(a) Regularly updating antivirus software on all computers.
(b) Conducting routine disk cleanup and defragmentation.
(c) Installing security patches and updates promptly.
(d) Performing periodic hardware inspections and cleaning.
(e) Implementing redundant power supplies for critical systems.

19) When troubleshooting computer systems, what is the primary purpose of isolating the issue?

(a) To permanently fix the problem.
(b) To identify the root cause of the issue.
(c) To escalate the problem to higher-level support.
(d) To ignore the issue and move on to other tasks.
(e) To estimate the actual cost due to the issue.

20) Which of the following printer technology use(s) liquid ink cartridges and is known for its capability to produce quality photo prints?

(a) Dot Matrix Printer	(b) Laser Printer	(c) Inkjet Printer
(d) Thermal Printer	(e) 3D Printer	

21) What is the equivalent **binary** representation of the **decimal** number 11.6875?

(a) 1011.1010	(b) 1010.1001	(c) 1101. 0101
(d) 1101.1011	(e) 1011.1011	

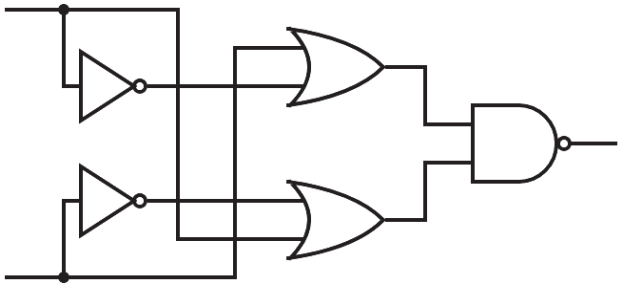
22) Which of the following is/are **TRUE** about PCI, ISA, and AGP slots in a computer motherboard?

(a) ISA slots are obsolete and have replaced PCI slots in contemporary motherboards.
(b) PCI Express (PCIe) has largely replaced AGP.
(c) AGP slots are primarily used for connecting graphics cards.
(d) ISA slots are the latest standard for high-speed data transfer.
(e) An expansion card designed for PCI slot is not physically compatible with ISA slot.

23) Which of the following interfaces are commonly used on a computer motherboard for connecting storage devices, graphics processors, and external peripherals respectively?

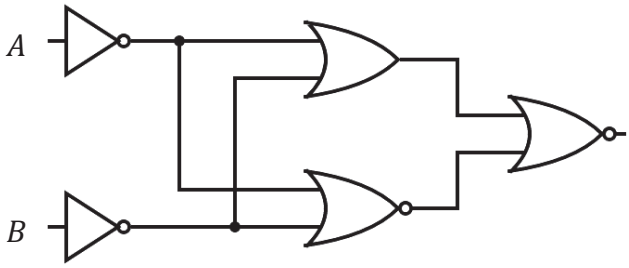
(a) HDMI, Thunderbolt, and Bluetooth
(b) SATA, PCI Express, and USB
(c) VGA, FireWire, and NFC
(d) IDE, Parallel Port, and AGP
(e) DVI, eSATA, and Ethernet

24) What is/are the equivalent logic gate(s) for the following logic circuit?



(a) AND gate	(b) OR gate	(c) XOR gate
(d) NAND	(e) NOR Gate	

25) What is/ are the possible output(s) of the following circuit given the inputs A and B as in the following diagram?



(a) A	(b) B	(c) $(A+B)'$
(d) 0	(e) 1	

26) The following is the incomplete truth table of the **Half Subtractor**. What are the appropriate truth values for A, B, C, and D in the truth table?

Input 1	Input 2	Difference	Borrow
0	0	0	0
0	1	A	B
1	0	C	D
1	1	0	0

(a) A=0, B=1, C=1, D=0.
(b) A=1, B=0, C=1, D=0.
(c) A=1, B=1, C=1, D=0.
(d) A=1, B=1, C=0, D=1.
(e) A=0, B=1, C=1, D=1.

27) Which of the following can be regarded as System Software?

(a) Word Processor
(b) Operating System
(c) Antivirus Software
(d) Device Drivers
(e) Media Player

28) Which of the following is/are primary purpose of utility software in a computer system?

(a) New application software development.
(b) Network monitoring and packet tracing.
(c) Enhancing the performance and efficiency of the system.
(d) Supporting multimedia content, graphics design and image editing.
(e) Web browsing and internet connectivity.

29) Which of the following statements describes a responsibility of the **Fetch phase** of the *Fetch-Decode-Execute cycle* within a program's execution?

(a) Determines the operands involved in the instruction, including their locations and addressing modes.
(b) Go to the main memory and bring the instruction found at the address in the *Memory Address Register*, placing this instruction in the *Instruction Register*.
(c) Performs the actual operation specified by the OPCODE of the instruction.
(d) Control signals are generated based on the opcode and operands, preparing the CPU for the execution phase.
(e) Copy the contents of the *Program Counter* to the *Memory Address Register*.

30) The following machine instruction is expected to subtract the numeric values in register **R2** from register **R3** and place the results in register **R1**. Which of the following **addressing modes** is/are involved with the instruction when it is in execution?

```
SUB R1, R2, R3
```

(a) Immediate addressing and Register addressing
(b) Relative addressing and Register addressing
(c) Direct addressing and Register addressing
(d) Register addressing and Immediate addressing
(e) Register addressing only

31) Which of the following is/are **TRUE** about *Real-Time Operating Systems* (RTOS)?

(a) RTOS aims to minimize the latency between the occurrence of an event and the system's response.

(b) Predictability and meeting deadlines are critical aspects of an RTOS.

(c) Examples of RTOS include Windows and MacOS.

(d) RTOS is specialized for applications where precise timing and reliability are essential.

(e) RTOS assigns uniform priority levels to all tasks and considers all tasks are equally important.

32) Which of the following wired media is/are suitable for long-distance communication and immune to electromagnetic interference in computer networking?

(a) Twisted Pair Cable

(b) Coaxial Cable

(c) Fiber Optic Cable

(d) Ethernet Cable

(e) Fire-wire

33) Which of the following is/are the responsibility/responsibilities of a network router?

(a) Filtering and forwarding data packets between different networks.

(b) Assigning IP addresses to devices on the local network.

(c) Providing a physical connection for devices within the same local network.

(d) Configuring connections over Wi-Fi network.

(e) Analyzing the content of data packets and making decisions based on the application layer.

34) Which of the following is/are the simplified expression(s) that can be derived from the Boolean algebraic expression $\overline{(\overline{D}.C)}.\overline{(D.\overline{B})}$ using ***De Morgan's theorem***?

(a) $(\overline{D}+C).B$

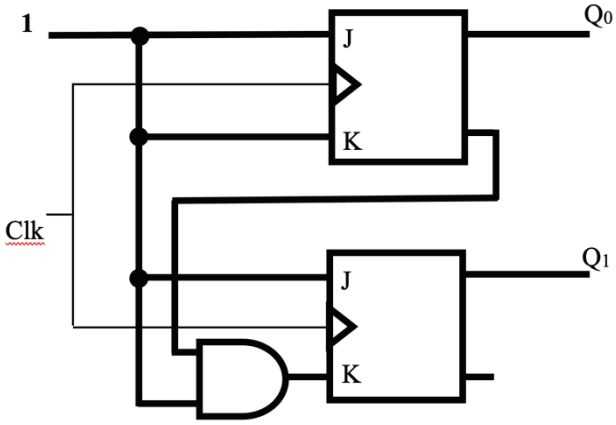
(b) $(D+B).\overline{C}$

(c) $D.(B+\overline{C})$

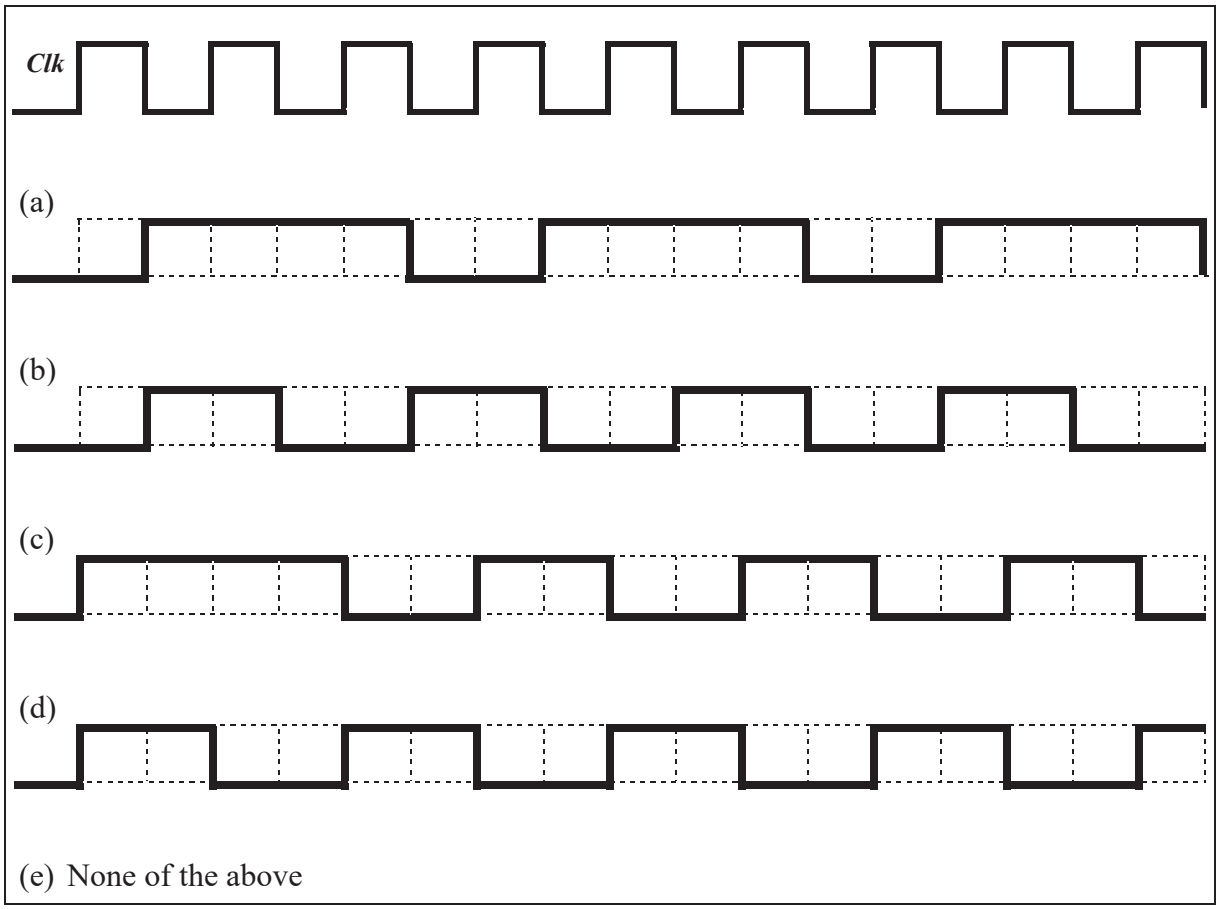
(d) $D.(\overline{B}+C)$

(e) $DB+\overline{D}.\overline{C}$

35) Consider the sequential logic circuit given below, which consist of a ***negative edge triggered*** J-K Flip Flop, a **positive edge triggered** J-K Flip Flop, and an AND gate. The clock input is given as '**Clk**' in the diagram.



Assuming both Q_0 and Q_1 are logic value zero (0) at the beginning, which of the following time diagram depicts the behaviour of Q_1 correctly for the given Clock (*Clk*) sequence?



(e) None of the above

36) What is the corresponding decimal value of **IEEE 754 single precision** floating point number **11000001100010110000000000000000**?

(a) -8.875	(b) -16.875	(c) -15.5
(d) -42.25	(e) -17.375	

37) Assume the **binary number `10.0101`** is represented in a **normalized** floating-point representation with a *sign bit*, a 3-bits excess-3 represented *exponent*, and a 4-bits *significand* (*mantissa*). What is the **decimal amount** of the Rounding-off/ Representation error that would occur due to this representation?

(a) 0.125	(b) 0.0625	(c) 0.03125
(d) 0.0001	(e) 0.0325	

38) A truth table is given in ***Product of Maxterms*** expression form below.

$$(x' + y' + z').(x' + y' + z).(x' + y + z).(x + y' + z').(x + y + z).(x + y + z)$$

What is/are the Boolean algebraic statement(s) that represent the same truth table in ***Sum of Minterms*** form?

(a) $(x'.y.z') + (x.y.z)$	(b) $(x'.y.z') + (x.y'.z)$	(c) $(x.y'.z) + (x'.y.z')$
(d) $(x.y'.z) + (x'.y.z)$	(e) $(x'.y'.z) + (x'.y.z')$	

39) When the following machine instruction code is executed in a computer, what is/are the corresponding values stored in registers `R1` and `R2` in a sequence at the time of the final instruction is being executed?
Note: Interpretations of the machine instructions are as given here. All the numbers given in the machine code are in decimal representation.

- **`LI R, A`** Load the register `R` with value `A`.
- **`SUB R1, R2, R3`** Subtract the numeric values in `R2` from `R3` and place the results in `R1`.
- **`DEC R`** Decreases the value of register `R` by one.
- **`JMP L, R`** Jump to the label `L` if the bit pattern in `R` is none zero.
- **`LABEL:`** Used as a jump target in the instruction which refers to a location in the assembly code.

```
LI  R2, 5
LI  R3, 10
LABEL:
SUB R1, R2, R3
DEC R2
JMP LABEL, R2
LI  R3, 35
```

(a) 9, 0	(b) 10, 0	(c) 5, 0
(d) 6, 0	(e) 4, 0	

40) Which of the following is/are appropriate Karnaugh Map layout arrangement(s) of a Boolean logic expression?

(a)

		A.B			
		00	01	10	11
C.D	00				
	01				
	10				
	11				

(b)

		A.B			
		00	01	11	10
C.D	00				
	01				
	10				
	11				

(c)

		A.B			
		00	01	11	10
C.D	00				
	01				
	11				
	10				

(d)

		A.B			
		11	10	00	01
C.D	11				
	10				
	00				
	01				

(e)

		A.B			
		01	00	10	11
C.D	01				
	00				
	10				
	11				

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