Mawlana Bhashani Science and Technology University

Department of Information and Communication Technology

3rd year 2nd Semester B.Sc. (Engg.) Final Examination, 2023

Course Title: Computer Peripheral and Interfacing Course Code: ICT-3205

Time: 3 hours Full Marks: 70

[Answer Any Five Questions]

1.	(a)	Differentiate computer peripherals and Interfacing with proper examples.	4
	(b)	Describe the categories of computer peripherals based on their relationship with computers	4
	(c)	Write four individual examples for impact and non-impact printers.	2
	(d)	Evaluate the future of peripherals in a world moving towards virtual and cloud-based computing. Will physical peripherals become obsolete? Justify your answer in short.	4
2.	(a)	Define a parallel interface. Describe the key differences between impact and non-impact printers. Provide examples of each type.	5
	(b)	How does a barcode scanner read information from the barcode symbol? Describe with the appropriate figure.	5
	(c)	The EAN-13 is a standard of the barcode. Let the encoded data for this standard be [2, 3, 0, 1, 4, 5, 2, 6, 7, 1, 0, 8, x], where x represents the check digit of EAN-13. Calculate this value.	4
3.	(a)	What is Hall-Effect switching? Write down the working principle of the Hall effect keyboard switch.	6
	(b)	What is RAID (Redundant Array of Independent Disks)? What is the role of RS-232 and RS-485 standards in serial communication?	4
	(c)	Consider a disk pack with the following specifications - 16 surfaces, 256 tracks per surface, 512 sectors per track, and 1024 bytes per sector. Calculate - i. Capacity of disk pack. ii. If the format overhead is 16 bytes per sector. What is the formatted disk space? iii. If the disk is rotating at 3600 RPM, what is the data transfer rate?	4
4.	(a)	What is a unified modeling language? How do advancements in machine learning and AI impact the future development of OMR, OCR, and bar code systems?	4
	(b)	What algorithms are used to detect marked responses in OMR systems? Discuss error-handling techniques.	4
	(c)	Write down the addressing technique of READ and WRITE operations of the 8255A programmable peripheral interface (PPI).	3
	(d)	Describe the function of the important registers available in 8259A.	3

5. (a) What is a microcontroller? Write at least four names of the microcontroller. 3

(b) Describe the pins of intel-8255A with an appropriate pin diagram. 5

(c) For programmable peripheral interface there are some specifications- 3

Port A as mode 0 output
Port B as mode 1 input
Port C (lower) as input
Port C (upper) as output

Construct the mode set control word format for the data bus.

(d) Why is programmable peripheral interfacing necessary? 3

6. (a) How does Intel-8259 handle interrupt requests, explain step by step according to the connection between Intel-8086 and the following interfacing device. 5

(b) What is the priority of interrupting? How does the 8259A handle interrupt priorities? 5

(c) What are the advantages and limitations of using open-source HDL tools in professional design workflows? 4

7. (a) What is memory interface? Differentiate between memory-mapped I/O and port-mapped I/O. 5

(b) How does the I/O interface facilitate communication between the CPU and external devices? 5

(c) Briefly explain the role of page tables in virtual memory management. 4

8. (a) Define Embedded system. Explain the embedded design life cycle. 5

(b) Draw a DFG for the following scenario. 5

Sensors: A temperature sensor continuously measures the room temperature. Data Node: Raw temperature data (e.g., 25°C).

Processing 1: The microcontroller reads the sensor data and compares it with the desired temperature set by the user. peration Node: Compare the current temperature with the setpoint.

Processing 2: If the temperature is higher than desired, the microcontroller activates a fan or air conditioner. Data Node: Fan/AC control signal (e.g., ON/OFF).

Processing 3: The system provides feedback to the user via an LCD or smartphone app. Data Node: Displayed data (e.g., "Current Temp: 25°C, Fan: ON").

Output: The fan/AC adjusts the room temperature accordingly.

(c) What are the emerging trends in the integration of AI, HDLs, and ASICs for future embedded systems? 4