PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc (SS) DEGREE EXAMINATION MAY 2025
(First Semester)

Branch - **SOFTWARE SYSTEMS (Five Years Integrated)**

COMPUTER ORGANIZATION AND ARCHITECTURE

Time: Three Hours   Maximum: 75 Marks

SECTION-A (10 Marks)
Answer ALL questions

ALL questions carry EQUAL marks   (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	What are the entities whose values can be changed called? a) Constants b) Variables c) Modules d) Tokens	K1	CO2
	2	Which of the following is the primary function of the Arithmetic Logic Unit (ALU) in a computer system? a) Memory management b) Data storage c) Perform arithmetic and logical operations d) Control data flow between components	K2	CO2
2	3	Which register is used to store the address of the next instruction to be fetched? a) Program Counter (PC) b) Memory Address Register (MAR) c) Instruction Register (IR) d) Accumulator	K1	CO2
	4	How many bits are required to represent a single character in the ASCII encoding scheme? a) 4 bits b) 8 bits c) 16 bits d) 32 bits	K2	CO2
3	5	What is the primary function of the Arithmetic Logic Unit (ALU) in a computer? a) Control the flow of data between CPU and memory b) Perform arithmetic and logical operations c) Manage interrupts and I/O devices d) Fetch instructions from memory	K1	CO2
	6	What is the basic design unit of an ALU that handles binary addition? a) Multiplexer b) Adder c) Shifter d) Decoder	K2	CO2
4	7	In a CPU, which register is responsible for holding the address of the next instruction to be fetched? a) Program Counter (PC) b) Instruction Register (IR) c) Memory Address Register (MAR) d) Stack Pointer (SP)	K1	CO2
	8	Which of the following is the main difference between RISC and CISC processors? a) RISC uses fewer and simpler instructions; CISC uses complex instructions. b) RISC processors are slower than CISC processors. c) CISC processors do not use a control unit. d) RISC processors use variable-length instructions, while CISC uses fixed-length instructions.	K2	CO2
5	9	What is the main purpose of interfacing a peripheral device with a computer? a) To process instructions b) To enable communication between the CPU and external devices c) To store data permanently d) To control the clock speed of the CPU	K1	CO2
	10	Which of the following is a characteristic of USB (Universal Serial Bus) communication? a) It uses a parallel communication system. b) It allows for faster data transfer rates compared to serial communication. c) It requires a dedicated device driver for each peripheral. d) It allows for the connection of multiple devices in a single bus.	K2	CO2

SECTION - B (35 Marks)
Answer ALL questions
ALL questions carry EQUAL Marks $\quad$ (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Explain the different number systems used in digital computers. Provide examples for each system.	K4,K3	CO2
		(OR)		
	11.b.	Describe how the binary fractions are represented and perform the conversion of a decimal fraction (e.g., 0.625) into its binary equivalent.		
2	12.a.	Explain the operation of AND, OR, and NOT gates with truth tables. Illustrate their use with examples.	K4,K2	CO3
		(OR)		
	12.b.	Describe the operation of an SR Flip-Flop. Draw its circuit diagram and truth table. What are the limitations of an SR Flip-Flop?		
3	13.a.	Describe the design and working of a 4-bit ALU. How is it capable of performing various operations like addition, subtraction, AND, OR, etc.?	K2,K4	CO3
		(OR)		
	13.b.	Explain the structure and functioning of a basic computer system. Discuss the role of the various components.		
4	14.a.	Describe the fetch-decode-execute cycle in the CPU. How does the Control Unit (CU) manage these operations?	K4,K4	CO4
		(OR)		
	14.b.	Discuss the different types of memory modules used in memory interfacing. Explain the features and advantages of each type.		
5	15.a.	Discuss the methods of interfacing peripheral devices to the computer. What are the key differences between programmed I/O, interrupt-driven I/O, and Direct Memory Access (DMA)?	K4,K4	CO4
		(OR)		
	15.b.	What is the role of interconnection networks in multiprocessor systems? Explain the different types of interconnection networks used in multiprocessors.		

SECTION -C (30 Marks)
Answer ANY THREE questions
ALL questions carry EQUAL Marks $\quad$ (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Discuss the concept of signed number representation. Explain how signed numbers are represented in binary using methods such as Sign Magnitude, 1's Complement, and 2's Complement. Compare these methods.	K4	CO2
2	17	Explain the design of a D Flip-Flop and its applications in digital circuits.	K4	CO3
3	18	Design a 4-bit ALU that can perform addition, subtraction, AND, OR, and XOR operations. Explain the design process and the logic behind it.	K4	CO4
4	19	Explain the concept of direct memory access (DMA) and how it is used in memory interfacing to improve the performance of a computer system.	K4	CO4
5	20	Explain the architecture and working of a Symmetric Multiprocessing (SMP) system. What are the advantages and disadvantages of SMP?	K4	CO4