22CMU102N/22CMU102/19CMU02/22DAU102N/ 22DAU102

PSG COLLEGE OF ARTS & SCIENCE

(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2023

(First Semester)

Common to Branches - COMPUTER SCIENCE & COMPUTER SCIENCE WITH DATA ANALYTICS

FUNDAMENTALS OF DIGITAL COMPUTERS

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer ALL questions

ALL questions carry EOUAL marks

 $(10 \times 1 = 10)$

		ALL questions carry EQUAL marks (10	$\times 1 = 1$	0)
Module No.	Question No.	Question	K Level	СО
1	1	Find the hexadecimal representation of the binary number 1100110. a) CD b) 6D c) 33 d) A5	K1	CO1
	2	Choose the identity element for the AND operation. a) 0 b) X c) 1 d) -1	K2	CO1
2	3	Choose the Boolean expression representing a Sum of Products (SOP). a) (A+B)*(C+D) b) A*B+C*D c) A+B+C+D d) (A*B)*(C*D)	K1	CO2
	4	Identify the flip-flop that has two stable states and is often used for storing a single bit of data. a) D flip-flop b) T flip-flop c) SR flip-flop d) JK flip-flop	K2	CO2
3	5	Mention the RTL statement used to transfer data from one register to another a) AND operation b) ADD operation c) LOAD operation d) SHIFT operation	K1	CO3
	6	In a microprocessor, the component that generates the control signals for logic micro operations is a) Arithmetic Logic Unit (ALU) b) Memory Unit c) Input/Output Unit (I/O) d) Clock Generator	K2	CO3
4	7	The register used to temporarily store data during arithmetic and logical operations in the CPU is a) Program Counter (PC) b) Memory Address Register (MAR) c) Instruction Register (IR) d) Accumulator (A)	K1	CO4
	8	When "Bitwise AND" operation is applied to two binary numbers, predict the result. a) Sets each bit to 0 if at least one corresponding bit is 0. b) Sets each bit to 0 only if both corresponding bits are 1. c) Sets each bit to 1 if at least one corresponding bit is 1. d) Inverts all the bits in both numbers.	K2	CO4
5	9	In asynchronous communication, the start bit is used to a) Indicate the beginning of a character b) Check for errors in the data c) Provide additional data bits d) Signal the end of a character	K1	CO5
	10	Choose the role of cache memory in the memory hierarchy. a) To provide long-term storage for data b) To serve as the main memory of the computer c) To temporarily store frequently accessed data d) To store data in a non-volatile form	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

		Answer ALL questions ALL questions carry EQUAL Marks $(5 \times 7 = 35)$		
Module	Question	ALL questions carry 220	K Level	СО
No.	No.	Convert the given numbers to their respective decimal and octal	K4	
	11.a.	base. a. 123D ₁₆ b. 1010101 ₂ c. 140 ₈ to decimal alone.		CO1
1		(OR)		
	11.b.	Simplify the following Boolean expression: a. $xy + (xy)^2z$ b. $wx + xy^2 + yz + xz^2$ c. $(x + y + w)(w + x^2 + y)(y^2 + z)(w + z)$		
2	12.a.	Minimize the following Boolean expression using K-map F(A,B,C)=A'BC+A'BC'+AB'C'+AB'C	K5	CO2
		(OR)		CO2
	12.b.	Determine the sum of two numbers 5 and 9 with BCD adder. Construct a truth table for the same.		
	13.a.	List the various arithmetic micro operations performed in registers.	K3	CO3
3	-	(OR)		COS
3	13.b.	Experiment with the register transfer operations on the data stored in the registers.		
4	14.a.	Analyze the concepts of stack organizations.	K4	CO4
		(OR)	1 14	
	14.b.	Explain in detail about various instruction formats.		
5	15.a.	Categorize the four popular types of Direct Memory Access (DMA) with respect to read and write operations.		CO5
		(OR)	K4	COS
	15.b.	List the three different types of mapping used for the purpose of		

SECTION -C (30 Marks)

cache memory.

Answer ANY THREE questions

ALL questions carry EQUAL Marks $(3 \times 10 = 30)$

Module	Question	Question	K Level	СО
No.	No.	Analyze the canonical and standard form of Boolean Function.	K4	CO1
1	16	Compare the working of multiplexer and demultiplexer in	Tre	CO2
2	17	1' '4-1 -lasteonics	K5	CO2
		With an example, interpret the various methods and symbols of	K5	CO3
3	18	DTI		001
4	19	Explain in detail about the various types of addressing mode in	K4	CO4
		computer organization. Examine memory hierarchy design and characteristics with a	K4	COS
5	20	block diagram.	I Ret	