23ITU314N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch – **INFORMATION TECHNOLOGY**

FUNDAMENTALS OF DIGITAL COMPUTERS

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 is the base of a binary number system? A) 2 B) 8 C) 10 D) 16	K1	CO1
	2	The 1's complement of binary number 1011001 is: A) 0100110 B) 1011000 C) 1111111 D) 1000000	K2	CO1
2	3	The basic operations of Boolean algebra are: A) Addition, Subtraction, Multiplication B) AND, OR, NOT C) NAND, NOR, XOR D) Ex-OR, Ex-NOR	K1	CO1
	4	The dual of the Boolean expression A+0=A is: A) $A \cdot 1 = A$ B) A+1=A C) $A \cdot 0 = 0$ D) A+A= 1	K2	CO2
3	5	A multiplexer is also known as: A) Data distributor B) Data selector C) Data decoder D) Data inverter	K1	CO1
	6	A decoder with n inputs can have how many outputs? A) n B) 2^n C) n^2 D) n/2	K2	CO2
4	7	A flip-flop is a _____ device. A) Combinational B) Sequential C) Arithmetic D) Storage-less	K1	CO1
	8	Select the main difference between synchronous and ripple counters is that: A) Ripple counters are faster B) Synchronous counters are slower C) Synchronous counters have all flip-flops triggered simultaneously D) Ripple counters trigger all flip-flops at the same time	K2	CO1
5	9	The main advantage of Direct Memory Access (DMA) is that it: A) Uses the CPU for every data transfer B) Transfers data faster by bypassing the CPU C) Transfers data slower than programmed I/O D) Requires no control logic	K1	CO1
	10	Which memory allows data to be accessed by content rather than by address? A) Cache memory B) Virtual memory C) Associative memory D) Main memory	K2	CO1

Cont...

SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Demonstrate number base conversion with examples.	K2	CO2
		(OR)		
	11.b.	Illustrate binary storage and registers in digital systems.		
2	12.a.	Construct the basic laws of Boolean Algebra used for simplification of logic circuits with examples.	K3	CO5
		(OR)		
	12.b.	Develop canonical and standard forms of Boolean functions with examples.		
3	13.a.	Outline the design procedure for a combinational logic circuit.	K3	CO3
		(OR)		
	13.b.	Organize the operation of a binary adder and subtractor circuit.		
4	14.a.	Simplify triggering of flip-flops. What are the different types?	K4	CO4
		(OR)		
	14.b.	Analyze the operation and applications of shift registers.		
5	15.a.	Contrast asynchronous data transfer and its methods.	K4	CO4
		(OR)		
	15.b.	Inspect and explain the concept of Direct Memory Access (DMA) and its working.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain in detail the concepts of binary systems and their role in digital computers. Discuss binary numbers, number base conversions, complements, binary codes, and binary logic with suitable examples.	K4	CO4
2	17	Analyze the Karnaugh Map (K-Map) method of simplification for Boolean functions. Illustrate with an example (up to 4 variables).	K4	CO5
3	18	Distinguish combinational logic circuits – Decoders, Encoders, Multiplexers, and Demultiplexers – with diagrams and functions.	K4	CO3
4	19	Analyze the design and working of counters. Differentiate between ripple counters and synchronous counters with examples.	K4	CO5
5	20	Categorize different types of computer memory and discuss cache, and virtual memory in detail.	K4	CO3

Z-Z-Z END