

**PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)**

**BSc DEGREE EXAMINATION DECEMBER 2024
(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 **EQUAL** marks

(10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Find the binary representation of the octal number 345. a) 001101100101 b) 011100110101 c) 011001101101 d) 010110110110	K1	CO1
	2	Choose the Boolean operator representing logical OR a) + b) - c)* d) /	K2	CO1
2	3	Find the advantage of using POS expression over SOP expression in digital circuit design. a) POS expressions are easier to understand. b) POS expressions require fewer logic gates. c) SOP expressions are always faster. d) They are equivalent.	K1	CO2
	4	In a 4-to-1 multiplexer, how many control lines are required to select one of the four data inputs? a) 1 b) 2 c) 3 d) 4	K2	CO2
3	5	Mention role of a "control unit" play in RTL-based design a) It manages the physical connections between registers. b) It specifies the logical operations performed by the system. c) It defines the timing requirements of the system. d) It generates control signals to coordinate data transfers and operations.	K1	CO3
	6	Find the logic micro operation equivalent to the logical OR operation. a) COMPLEMENT b) AND c) OR d) XOR	K2	CO3
4	7	Identify the registers in a CPU which is responsible for storing the address of the next instruction to be executed a) Program Counter (PC) b) Memory Address Register (MAR) c) Instruction Register (IR) d) Accumulator (A)	K1	CO4
	8	Predict the result of "shift left" operation on a binary number. a) It decreases by 1. b) It decreases by a factor of 2. c) It increases by 1. d) It increases by a factor of 2.	K2	CO4
5	9	Choose the characteristic of asynchronous data transfer a) Data is transferred in continuous streams. b) A common clock signal synchronizes sender and receiver. c) Start and stop bits are used for timing and framing. d) It is typically used in high-speed communication links.	K1	CO5
	10	In the memory hierarchy, which level of memory typically has the fastest access time? a) Cache memory b) Main memory (RAM) c) Secondary storage (Hard Drive) d) Tertiary storage (Tape Drive)	K2	CO5

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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.	Inspect the working of various binary storage and registers in digital systems.	K4	CO1
	(OR)			
	11.b.	Analyze the five Postulates/Laws of Boolean Algebra.		
2	12.a.	Convert the SOP and POS form into standard SOP and POS form. a. $F = AB + A C + B C$ b. $F = (p' + q + r) * (q' + r + s') * (p + q' + r' + s)$	K4	CO2
	(OR)			
	12.b.	Construct truth table for an octal to binary encoder which takes 8 input lines and generates 3 output lines.		
3	13.a.	List the various logic micro operations performed in registers.	K3	CO3
	(OR)			
	13.b.	Experiment with the memory transfer operations and their standard notations.		
4	14.a.	Explain in detail about the features of a General Register based CPU organization	K4	CO4
	(OR)			
	14.b.	Analyze logical and bit manipulation instructions in computer organization.		
5	15.a.	List the three modes of data transfer in DMA.	K4	CO5
	(OR)			
	15.b.	Categorize the two types of associate memory and explain 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	Determine the basic theory and properties of boolean algebra.	K4	CO1
2	17	Design JK flip flop with Clock (CLK), Clear (CLR), and Preset (PR).	K6	CO2
3	18	With an example, examine the 14 operations performed by the Arithmetic Logic Shift Unit.	K4	CO3
4	19	Explain in detail about the various types of program control instructions.	K4	CO4
5	20	Compare different methods of asynchronous data transfer with a diagram.	K5	CO5

Z-Z-Z

END