UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Computer Organization & Architecture (CSEG2014)   **Semester: III**
Programme: BCA

Time: 03 hrs.   **Max. Marks: 100**

Instructions: All sections are compulsory. Sections B and C have an internal choice.

SECTION A

S. No.		Marks	CO
Q 1	What is an interrupt? Explain different types of interrupts in computer system.	4	CO4
Q 2	Define the following: (a) microoperalion; (b) microinstruction; (c) micro program; (d) microcode.	4	CO4
Q 3	What is instruction cycle? Define each step in detail.	4	CO2
Q 4	Define Virtual memory? Describe the principle with the help of a block diagram.	4	CO5
Q 5	How many 128 x 8 memory chips are needed to provide a memory capacity of 4096 x 16? Show with the help of block diagram.	4	CO5

SECTION B

Q 1	Simplify the following Boolean function in sum-of-products form by means of a four-variable map. Draw the logic diagram with (a) AND-OR gates; (b) NAND gates. $F(A , B, C, D) = \sum (0, 2, 8, 9, 10, 11, 14 , 15)$	10	CO2
Q 2	What are the basic advantage of using interrupt-initiated data transfer over transfer under program control without an interrupt?	10	CO1
Q 3	Discuss the process of Mapping from instruction code to microinstruction address with the help of a block diagram.	10	CO4

Q 4	A computer uses a memory unit with 256 K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part.
	    a. How many bits are there in the operation code, the register code part, and the address part?
	    b. Draw the instruction word format and indicate the number of bits in each part.
	    c. How many bits are there in the data and address inputs oi the memory?
	
	OR
		10	CO5, CO2

	Design a 4-bit bidirectional shift register with parallel load with the help of D flip-flops. Explain the block diagram in detail.		
	SECTION-C		
Q 1	(a) Give five examples of external interrupts and five examples of internal interrupts. What is the difference between a software interrupt and a subroutine call? (b) What is cache mapping? Describe each mapping scheme in detail with block diagrams.	**20 (10+10)**	**CO5**
Q 2	Given the Boolean function: F = xy'z + z'y'z + xyz a. List the truth table of the function. b. Draw the logic diagram using the original Boolean expression. c. Simplify the algebraic expression using Boolean algebra. d. List the truth table of the function from the simplified expression and show that it is the same as the truth table in part (a). e. Draw the logic diagram from the simplified expression and compare the total number of gates with the diagram of part (b). **OR** (a) What are different modes of transfer data between the central computer and I/O devices? Also, describe Direct Memory Access (DMA) in detail. (b) What is micro-programmed control organization? Define in detail with the help of the block diagram.	**20**	**CO3, CO4**

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Name of the School (Please tick, symbol is given)	:	SOE		SOCS	⊞	SOP	
Programme	:	BCA					
Semester	:	III					
Name of the Course	:	Computer Organization & Architecture					
Course Code	:	CSEG2014					
Name of Question Paper Setter	:	Pradeep Kumar					
Employee Code	:	40001801					
Mobile & Extension	:	9015885639					

Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE":

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Time of Examination	:	
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Name: Enrolment No:	UPES

Course: Computer Organization & Architecture (CSEG2014)   **Semester:** III
Programme: BCA
Time: 03 hrs.   **Max. Marks: 100**
Instructions: All sections are compulsory. Sections B and C have an internal choice.

SECTION A

S. No.		Marks	CO
Q 1	What is Von Neumann architecture? Explain in detail.	**4**	**CO4**
Q 2	What is the difference between microprogrammed and hardwired control unit?	**4**	**CO4**
Q 3	What is the difference between associative and set-associative cache mapping? Explain with the help of an example.	**4**	**CO2**
Q 4	Define Virtual memory. Describe the principle with the help of a block diagram.	**4**	**CO5**
Q 5	How many 128 x 8-memory chips are needed to provide a memory capacity of 4096 x 16? Show with the help of block diagram.	**4**	**CO5**

SECTION B

Q 1	Simplify the following Boolean functions using four-variable maps. a. $F(A, B, C, D) = \sum (4, 6, 7, 15)$ b. $F(A, B. C, D) = \sum (3, 7, 11, 13, 14, 15)$	**10**	**CO2**
Q 2	Discuss the process of Mapping from instruction code to microinstruction address with the help of a block diagram.	**10**	**CO1**
Q 3	Construct a 5-to-32-line decoder with four 3-to-8-line decoders with enable and one 2-to-4 line decoder.	**10**	**CO4**
Q 4	A computer uses a memory unit with 256 K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part. a. How many bits are there in the operation code, the register code part, and the address part? b. Draw the instruction word format and indicate the number of bits in each part. c. How many bits are there in the data and address inputs oi the memory? **OR** Design a 4-bit bidirectional shift register with parallel load with the help of D flip-flops. Explain the block diagram in detail.	**10**	**CO5, CO2**

SECTION-C

Q 1	(c) Give five examples of external interrupts and five examples of internal interrupts. What is the difference between a software interrupt and a subroutine call?	**20 (10+10)**	**CO5**

	(d) Demonstrate the process of direct and indirect address schemes with the help of block diagrams.		

Q 2	Given the Boolean function:
	F = xy'z + z'y'z + xyz
	a. List the truth table of the function.
	b. Draw the logic diagram using the original Boolean expression.
	c. Simplify the algebraic expression using Boolean algebra.
	d. List the truth table of the function from the simplified expression and show that it is the same as the truth table in part (a).
	e. Draw the logic diagram from the simplified expression and compare the total number of gates with the diagram of part (b).
	OR
	    (c) What are different modes of transfer data between the central computer and I/O devices? Also, describe Direct Memory Access (DMA) in detail.
	    (d) What is mapping of an instruction code to a micro-instruction address? Explain the mapping in detail for a 4-bit opcode to a 7-bit microinstruction address.
		20	CO3, CO4

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Name of Examination (Please tick, symbol is given)	:	MID		END	⊔	SUPPLE	
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Semester	:	III					
Name of the Course	:	Computer Organization & Architecture					
Course Code	:	CSEG2014					
Name of Question Paper Setter	:	Pradeep Kumar					
Employee Code	:	40001801					
Mobile & Extension	:	9015885639					

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End Semester Examination, December 2018

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SECTION B

Q 1	Simplify the following Boolean functions using four-variable maps. a. $F(A, B, C, D) = \sum (4, 6, 7, 15)$ b. $F(A, B. C, D) = \sum (3, 7, 11, 13, 14, 15)$	10	CO2
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Q 4	A computer uses a memory unit with 256 K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers, and an address part.
	
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	OR
	
	Design a 4-bit bidirectional shift register with parallel load with the help of D flip-flops. Explain the block diagram in detail.
		10	CO5, CO2

SECTION-C

Q 1	(a) Give five examples of external interrupts and five examples of internal interrupts. What is the difference between a software interrupt and a subroutine call?	20 (10+10)	CO5

	(b) Demonstrate the process of direct and indirect address schemes with the help of block diagrams.		

Q 2	Given the Boolean function:
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	  (a) What are different modes of transfer data between the central computer and I/O devices? Also, describe Direct Memory Access (DMA) in detail.
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		20	**CO3, CO4**