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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Third Semester, B.E. - Information Science and Engineering

Semester End Examination; March - 2021

Computer Organization and Architecture

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:
CO1: Analyze program execution.
CO2: Explain the basic input/output operations.
CO3: Develop the control sequence for a given instruction.
CO4: Design the memory system using various techniques.
CO5: Analyze different algorithms for performing arithmetic operations and understand need for multithread.

Note: *I) **PART - A** is compulsory. **Two** marks for each question.*
*II) **PART - B**: Answer any **Two** sub questions (from a, b, c) for Maximum of **18 marks** from each unit.*

Q. No.	Questions	Marks	BLs	COs	POs
	I: PART - A	**10**			
1 a.	Solve for total execution time required for the machine, with S = 1.25, N = 200 and clock rate = 500 MHz.	2	L3	CO1	PO2
b.	Define Exception.	2	L1	CO2	PO1
c.	List the means of generating the control signals needed.	2	L1	CO3	PO1
d.	Define memory latency.	2	L1	CO4	PO1
e.	What is the formula used to find speedup of the program in Amdahl's law?	2	L1	CO5	PO1
	II: PART - B	**90**			
	UNIT - I	**18**			
1 a.	Identify the steps needed to execute the machine instruction; *Add R1, R2, R3* Assume that the instruction itself stored in the memory at location INSTR and this address is initially in register PC. The first step might be expressed as, * Transfer the contents of register PC to register MAR Remember to include the steps needed to update the contents of PC from INSTR to INSTR + 1 so that next instruction is fetched.	9	L3	CO1	PO2
b.	List the different addressing modes and explain any four addressing modes with example.	9	L2	CO1	PO1
c.	Define Overflow. Solve the following numbers in 6-bit binary form and perform the operation and check whether there is overflow or not. i) (+26) – (–30) ii) (–31) – (+29) iii) (–9) + (–7) iv) (+25) + (+16)	9	L3	CO1	PO2

Contd… 2

	UNIT - II	**18**			
2 a.	Identify the value of register *R0* after executing the instructions given below with carry flag given the initial value of $C = 1$ and *R0* =10011110 i) LshiftL #3, *R0* ii) LshiftR #3, *R0* iii) RotateL # 3, *R0* iv) RotateLC #3, *R0* v) RotateR # 3, *R0* vi) RotateRC #3, *R0*	9	L3	CO2	PO2
b.	Define bus arbitration. Explain any one bus arbitration in detail.	9	L2	CO2	PO1
c.	Define Interrupts. Explain enabling and disabling of Interrupts.	9	L2	CO2	PO1
	UNIT - III	**18**			
3 a.	Develop the sequence of control steps required to perform the operation of adding the contents of memory location NUM to register *R1* and store the result in *R1*.	9	L3	CO3	PO2
b.	Explain the organization of micro programmed control unit. Define the following terms: Microinstruction, Micro Routine, Control Word and Control Store.	9	L2	CO3	PO1
c.	Develop and explain the sequence of control steps required to perform conditional branch instruction branch < 0.	9	L3	CO3	PO2
	UNIT - IV	**18**			
4 a.	Define static memories. Explain how static memory is implemented with read and write operation?	9	L2	CO4	PO1
b.	With a timing diagram, explain a typical burst read of length four in SDRAMs.	9	L2	CO4	PO1
c.	Explain different mapping functions used in cache.	9	L2	CO4	PO1
	UNIT - V	**18**			
5 a.	Apply bit-pair recoding of multipliers to perform the following: i) -20×30 ii) -20×-30	9	L3	CO5	PO2
b.	Apply restoring algorithm to perform the operation 32/4.	9	L3	CO5	PO2
c.	Explain Flynn's taxonomy classification system.	9	L2	CO5	PO1

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