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

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Electronics and Communication Engineering

Semester End Examination; February / March - 2022

DSP Processor and Application

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:

CO1: Distinguish between the DSP Processor and general purpose processor.

CO2: Analyze the architecture features of Digital signal processor using basic digital circuit knowledge.

CO3: Develop programs for digital filters using DSP processor for various situations and demonstrate utility of DSP processor in various signal processing applications.

CO4: Apply the logical and signal processing concepts to develop algorithms for DSP processor.

CO5: Design the interface to connect specified memory and signal converters.

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**			
I	a.	Draw and explain decimation process.	2	L2	CO3	PO4
	b.	Identify the addressing modes of the operands in each of the following instruction and their operation: i) ADD B ii) ADD #1234 H	2	L3	CO4	PO1
	c.	Draw the block diagram of DSP system with interfacing.	2	L2	CO2	PO2
	d.	Determine the content of the TMS320C54XX addressing mode, assuming AR4 to be 200h and content of AR0 as 20h. i) *AR4 + 0 ii) *AR4 – 0	2	L3	CO4	PO1
	e.	Determine the following for a 256 point FFT computation: i) Number of stages ii) Number of butterflies in each stage	2	L3	CO3	PO4
		II : PART - B	**90**			
		UNIT - I	**18**			
1	a.	Explain the following addressing modes: i) Circular addressing mode ii) Indirect addressing mode	9	L2	CO1	PO1
	b.	Design a 4×4 Braun multiplier. Explain in detail with relevant equations and comment on bus width.	9	L2	CO1	PO1
	c.	Explain MAC unit with a neat block diagram, discuss in detail, the methods to avoid overflow / underflow conditions.	9	L2	CO1	PO1
		UNIT - II	**18**			
2	a.	With a neat block diagram, explain Barrel shifter of TMS320C54XX DSP processor.	9	L2	CO2	PO2

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b.	Explain the 6-stage pipeline of TMS320C54XX processor execution.	9	L3	CO2	PO2
c.	Describe the operation of the following instructions: i) MPY *AR2−, *AR4+0, B ii) MAS *AR3−, *AR4+B, A iii) RPT #2	9	L3	CO4	PO1
	UNIT - III	**18**			
3 a.	Write a TMS320C54XX program that illustrates the implementation of an FIR filter.	9	L3	CO4	PO1
b.	Determine the value of each of the following 16-bit numbers represented using the given 2 notation: i) 4400h as Q_0 ii) 0.3125 as Q_{15} iii) FEA0h as Q_7	9	L3	CO4	PO1
c.	Derive an optimum scaling factor for DIT-FFT butterfly and explain the butterfly computation in DIT-FFT.	9	L3	CO4	PO1
	UNIT - IV	**18**			
4 a.	Design a circuit to interface an 8k × 16 program ROM to TMS320C5416 DSP in the address range 7FE000h - 7FFFFFh.	9	L5	CO5	PO3
b.	Differentiate between normal and DMA data transfer. List the different parameters to be initialize in DMA operation and explain register sub addressing technique of configuring DMA.	9	L3	CO4	PO1
c.	Explain in brief, how interrupt handling is done in TMS320C54XX device with a flow chart?	9	L3	CO4	PO1
	UNIT - V	**18**			
5 a.	Draw and explain JPEG encoder and decoder.	9	L4	CO3	PO4
b.	Draw and explain a DSP based biotelemetry receiver implementation.	9	L4	CO3	PO4
c.	Draw and explain TMS320C6713 architecture.	9	L2	CO2	PO2

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