

Code No: D3810, D0609, D7010, D6805, D5705**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012****DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES****(COMMON TO DIGITAL ELECTRONICS & COMMUNICATION SYSTEMS, DIGITAL SYSTEMS & COMPUTER ELECTRONICS, ELECTRONICS & COMMUNICATION****ENGINEERING, VLSI & EMBEDDED SYSTEMS, VLSI SYSTEM DESIGN)****Time: 3hours****Max. Marks: 60****Answer any five questions****All questions carry equal marks**

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- 1.a) Explain how to design a bandpass filter using filter design and analysis tool with the following specifications:
Sampling frequency=300 KHz; Stop band frequency of 540-960 KHz; pass band frequency range of 600 – 900 KHz; attenuation on both sides of the pass band is 54db and pass band ripple of 1dB.
- b) For the FIR filter described by the equation $y(n) = 0.5*x(n) + 0.5*x(n-1)$. Find the unit sample response, frequency response, magnitude and phase response of the given system. Also find the group delay.
- 2.a) Compute the dynamic range and percentage resolution for a block floating point format with 4-bit exponent used in a 16-bit fixed point processor.
- b) Compare the Microprocessor, Microcontroller and DSP processor with respect to all the features and explain how DSP processor is superior to them.
- 3.a) What is zero over head looping? How this feature is advantageous in DSP processor? Explain with an example.
- b) Explain the following concepts of DSP processor
 - i) Interlocking
 - ii) Branching effects
 - iii) Interrupt effects
- 4.a) Explain which instruction is useful for repeating a set of instruction in a loop with an example program.
- b) Explain the following on chip peripherals of the DSP processor.
 - i) Hardware timer
 - ii) Host port interface.
 - iii) Clock generator
 - iv) Serial I/O ports.
- 5.a) Explain the memory space organization of TMS320C54XX processor.
- b) Explain how the signal spectrum is computed. Write a subroutine program that computes the spectrum using the FFT result.

6. Compare the following I/O interfacing methods
 - a) Programmed I/O with respect to DSP processor
 - b) Interrupt I/O
 - c) DMA.

- 7.a) Draw the block diagram of MCBSP of C54XX and also write a program that configures MCBSP to work with serial 20-bit input data and 20-bit output data.
- b) Explain how PCM3002 provides 16-bit synchronous serial ADC and DAC.

8. Write short notes on any TWO
 - a) Decimation Filter
 - b) Implementation of PID Controller on TMS320C54XX
 - c) Q-notation and precautionary measures to be taken while using Q-notation in multiplication process
