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10EC003

M.Tech. Degree Examination, December 2012
Advanced Computer Architecture

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions.*

a. Explain the following with respect to shared memory multiprocessor:
   i)   UMA model
   ii) NUMA model
   iii) COMA model. **(10 Marks)**

   b. Explain the Flynn's classification of computer architecture with block diagram. **(10 Marks)**

2 a. Explain the mismatch problem between software parallelism and hardware parallelism with an example and method to overcome the problem. **(10 Marks)**

   b. Define the following:
   i) Granularity; ii) Latency; iii) Grain packing; iv) Scheduling. **(02 Marks)**

   c. Explain Bernstein's conditions for parallelism. Detect the parallelism in the following code using Bernstein's condition:
   $P_1:C = D \times E$; $P_2:M = G + C$; $P_3:A = B + C$; $P_4:C = L + M$; $P_5:F = G \div E$. **(08 Marks)**

3 a. Derive the expression for average parallelism and for the Fig.Q.3(a) shown find the average parallelism. **(05 Marks)**
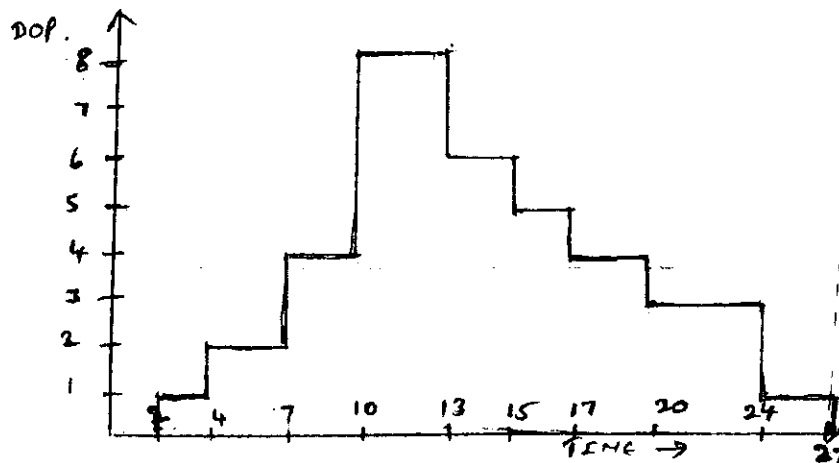

Fig.Q.3(a)

   b. Describe the important characteristics of parallel algorithm. **(06 Marks)**

   c. Describe the Gustafson's law for scaled problems. **(09 Marks)**

4 a. Differentiate between CISC and RISC processors. **(08 Marks)**

   b. Explain the features of superscalar and vector processors and explain the architecture of IDM RISC 6000 superscalar processor. **(12 Marks)**

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

5   a. Explain the mechanisms for instruction pipelining to smooth pipeline flow and remove bottleneck. **(10 Marks)**
    b. For a given reservation table calculate:
        i)   Forbidden latencies and permissible latencies.
        ii)   Draw state transition diagram.
        iii) List simple cycles and greedy cycles.
        iv)   MAL.
        v)   Calculate throughput if clock period $= Z = 20$ ns.

	1	2	3	4	5	6
S_1	X					X
S_2		X		X		
S_3			X			
S_4				X	X	

(10 Marks)

6   a. Explain the two models of linear pipeline units. **(05 Marks)**
    b. Explain Dynamics scheduling with different schemes. **(10 Marks)**
    c. What are the different branch prediction types and explain prediction scheme given by Lee and Smith. **(05 Marks)**

7   a. Explain various levels of memory hierarchy in detail. **(10 Marks)**
    b. Explain cache coherence problem and discuss snoopy bus protocol for data consistency. **(10 Marks)**

8   Write short notes on:
    a. Principles of multithreading
    b. Data flow architecture
    c. Arithmetic pipeline
    d. Dhrystone and whetstone. **(20 Marks)**

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M.Tech. Degree Examination, December 2012
Multimedia Communications

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Explain the different operational modes of a communication channel. **(06 Marks)**
   b. Describe the essential features of the network types initially designed to provide single type of services and discuss the technological development that has enabled them to provide additional services. **(14 Marks)**

2 a. Explain the key parameters associated with application QOS. Describe how the effects on a constant bit rate stream of packetization delay and jitter can be overcome. **(10 Marks)**
   b. What is the memory required per frame (bytes) to store the following images and also derive the time to transmit these images at both 64 kbps and 1.5 Mbps
      i)   a 640 × 480 × 8 VGA – compatible image
      ii) a 1024 × 768 × 24 SVGA – compatible image. **(06 Marks)**
   c. Assuming the Bandwidth of a speech signal is from 50 Hz through to 10kHz and that of a music signal is from 15 Hz through to 20 kHz, derive the bit rate that is generated by the digitization procedure in each case assuming Nyquist sampling rate is used with 12 bits per sample for the speech signal and 16 bits per sample for the music signal. Derive the memory required to store a 20 min passage of stereophonic music. **(04 Marks)**

3 a. Explain how a digital image is captured and stored within the memory of a computer and describe the different methods used to capture a color image within a camera. **(10 Marks)**
   b. A series of messages is to be transferred between computers over a PSTN. The messages comprise the characters A through E. Analysis has shown that the relative frequency of occurrence of each character is as follows A and B = 0.25, C = 0.2, D and E = 0.15.
      i)   Use Shannon's formula to derive the minimum average number of bits per character.
      ii) Use Huffman coding to derive a codeword set and prove this is the minimum set by constructing the corresponding Huffman code tree.
      iii) Derive the average number of bits per character for your codeword set and compare this with
           i)   Shannon's value.
           ii) Fixed-length binary code words.
           iii) 7-bit ASCII code words. **(10 Marks)**

4 a. Consider the transmission of a message comprising a string of characters with probabilities of e = 0.3, n = 0.3, t = 0.2, w = 0.1, • = 0.1.
      Derive the codeword value for the character string newt• using arithmetic coding. Assuming this is received by the destination, explain how the decoder determines the original string from the received codeword value. **(10 Marks)**
   b. With the aid of a block diagram, identify the main stages of JPEG encoder and give brief description of the role of image/block preparation. **(10 Marks)**

5 a. Explain why I-frames are inserted into the compressed output stream relatively frequently and explain the terms group of pictures and prediction span. **(10 Marks)**

   b. Explain how reversible variable-length code words (RVLCs) reduce the effect of transmission errors with an example. **(10 Marks)**

6 a. Discuss the significant features of JPEG 2000. **(10 Marks)**

   b. Explain the different profiles involved in MPEG-4. **(10 Marks)**

7 a. List and explain the 4 main functions performed by RTCP. **(08 Marks)**

   b. Explain the working of DVMRP protocol. **(08 Marks)**

   c. Mention and explain two types of messages used to reserve resources in RSVP. **(04 Marks)**

8 Write short notes on:

   a. Multimedia in mobile networks. **(07 Marks)**

   b. Error resilient coding. **(07 Marks)**

   c. Video transmission across IP networks. **(06 Marks)**

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