No. of Printed Pages : 3

MCSE-011

07022

MCA (Revised)

Term-End Examination

June, 2011

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question number **1** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) Explain the basic concepts of dataflow computing and describe various applications of parallel computing. 8

   (b) Explain PRAM Model with its components. 8

   (c) Explain Hypercube Network with properties. 8

   (d) Explain Bernstein conditions for detection of parallelism. 8

   (e) Explain the Amdahl's law for measuring speed up performance with the help of an example. 8

2. (a) Flynn's classification is based on multiplicity of instruction stream and data stream observed by CPU during program execution. Explain in detail. **10**

(b) Discuss the following with respect to a parallel virtual machine. **10**

(i) Compiling and running of a PVM program.

(ii) Creating and managing Dynamic process group.

3. (a) Explain the concept of multithreading and its use in parallel computer architecture. **10**

(b) Give the classification of vector instruction. Explain each. **10**

4. (a) Define array processing. Why are array processors called as SIMD Array computers ? With the help of a Block diagram. Explain the architecture of an SIMD array processor. **10**

(b) With the help of a diagram illustrate the concept of sorting using comparators for the unsorted list having the elements value as **10**

(3, 5, 8, 9, 10, 12, 14, 20, 95, 90, 60, 35, 23, 18, 0)

5. (a) A three stage Network is set so that. **10**

$P(S_1)$ = (0 1 2 3 4 5 6 7)

(2 5 3 7 0 4 6 1)

$P(S_2)$ = (0 1 2 3 4 5 6 7)

(1 7 0 2 4 6 5 3)

$P(S_3)$ = (0 1 2 3 4 5 6 7)

(7 5 3 6 4 2 0 1)

with permutation realised by Network.

(b) Define Cluster computing. Explain the memory organisation in a cluster computing. Give details of any of the important project based on cluster computing. **10**

No. of Printed Pages : 3

MCSE-011

10181

MCA (Revised)

Term-End Examination

December, 2011

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

*Note : Question number 1 is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) Explain the following inter connection networks. 8

   (i) Systolic Array

   (ii) Hyper Cube

   (b) Explain various visualisation tools employed in performance Analysis 8

   (c) Explain the pipeline processing and describe pipeline processing architecture. 8

   (d) Explain two types of combinational comparators. 8

   (e) Explain the concepts of message passing programming. 8

2. (a) Explain three work sharing constructs of open Mp. **10**

(b) Explain the Gustaf sons's law for measuring speed up performance with the help of an example. **10**

3. (a) Discuss relative merits and demerits of various laws for measuring speed up performance vis-a-vis to a parallel computer algorithm system. **10**

(b) Define structural classification based on different computer organisation. **10**

4. (a) Write short notes on the following : **10**

(i) Spin lock mechanism for synchoronisation.

(ii) Synchronous and Asynchronous message passing.

(b) Explain the concept of permutation Network with an example. **10**

Discces perfect shuffle permutation and Butterfly permutation.

5. (a) What are the problems faced by super scalar architecture ? How are these problems removed in VLIW architecture ? **10**

(b) Explain Bens Network. Show the inter connections of Bens Network for the following permutations. **10**

$$P = \begin{bmatrix} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 2 & 3 & 4 & 0 & 1 & 6 & 7 & 5 \end{bmatrix}$$

No. of Printed Pages : **2**

MCSE-011

02540

MCA (Revised)

Term-End Examination

June, 2012

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question number **1** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) Describe different architectures for shared memory multiprocessing along with their advantage and disadvantages. **10**

(b) What is meant by Temporal Parallelism and Data Parallelism ? Explain with the help an example for each. **10**

(c) Explain Bens's Network as a Non blocking network. Show the interconnection of Ben's Network for the following permutations : **10**

$$P=\begin{pmatrix} 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 2 & 6 & 0 & 4 & 7 & 3 & 5 & 1 \end{pmatrix}$$

(d) Compare and contrast between the Flynn's classification and structural classification. **10**

2. (a) Explain the applicability and the restriction involved in using the Amdhal's Law, Guestafson's Law and Sun and Ni's Law to estimate the speed up performance of h processor system compared with that of a single processor system. **10**

(b) When an algorithm is said to be asymptotically time optimal ? Mention a problem for which we have a time optimal algorithm and justify your answer. **10**

3. (a) Explain pipeline processing using an example and explain the architecture of pipeline processing. **10**

(b) Write and explain the algorithm for solving the matrix multiplication problem using the parallel model. **10**

4. (a) What is meant by vector processing ? Write at least four differences between vector processing and scalar processing. Also, explain various vector instructions along with their function mappings. **10**

(b) What is the meaning of scalability of parallel algorithms ? Write the characteristics of parallel algorithm written for PRAM machine. **10**

5. Write a short notes on the following : **5x4=20**

(a) Array Processing

(b) Hyperthread Processor

(c) Cluster Computing

(d) Parallel Virtual Machine

No. of Printed Pages : 2

MCSE-011

MCA (Revised)

Term-End Examination

June, 2013

MCSE-011 : PARALLEL COMPUTING

01578

Time : 3 hours *Maximum Marks : 100*

Note : *Question number **1** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) Explain the various levels of parallel processing. 8

   (b) Explain granularity of a parallel system. 8

   (c) Differentiate between UMA, NUMA and COMA. 8

   (d) What is the significance of : 8
   (i) Bisection bandwidth
   (ii) Network Diameter

   (e) Differentiate between Instruction pipeline and arithmatic pipeline. 8

2. (a) Identify the types of following vector processing instructions. 2.5x4=10
   (i) C(I) = A(I) AND B(I)
   (ii) C(I) = MAX (A(I), B(I))
   (iii) B(I) = A(I)/S (S = scalar items)
   (iv) B(I) = SIN (A(I))

   (b) Explain in a VLIW architecture. 10

3. (a) Explain the various criteria for classification of parallel computer. Explain Flynn's classification in detail. **10**

(b) What are the various types of parallel programming ? Explain, **10**

4. (a) Discuss the sorting using interconnection network. Illustrate an example to understand the algorithm. **10**

(b) Name and Explain any five platforms which can participate in grid computing. **10**

5. (a) Explain the various laws for measuring speed up performance. **10**

(b) Discuss the following interconnection networks. **10**

(i) FAT tree

(ii) Hyper cube

No. of Printed Pages : **2**

MCSE-011

MCA (Revised)

Term-End Examination

December, 2013

MCSE-011 : PARALLEL COMPUTING

10852

Time : 3 hours *Maximum Marks : **100***

Note : *Question number **1** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) List the applications of parallel processing. 8

   (b) Give the full form of each of the abbreviation and state whether True or False for the following. 2x4=8

   (i) SISD can be characterised as $I_s > 1$ & $D_s > 1$.

   (ii) SIMD can be characterised as $I_s > 1$ & $D_s = 1$

   (iii) MISD can be characterised as $I_s = 1$ & $D_s = 1$

   (iv) MIMD can be characterised as $I_s > 1$ & $D_s > 1$

   (c) Differentiate between scalar & Vector processing. 8

   (d) Explain various visualisation tools employed in performance analysis. 8

   (e) Explain the concept of sorting in the combinational circuits. 8

2. (a) Discuss Handler's classification. Explain with an example. **10**

(b) Use Bernstein's conditions for determining parallelism in the following segments. **10**

S_1: $X = Y + Z$

S_2: $Z = U + V$

S_3: $R = S + V$

S_4: $Z = X + R$

S_5: $Q = M + Z$

3. (a) Explain the following : **5x2=10**

(i) Hyper threading

(ii) Architecture of IA 64

(b) Discuss and explain arithmetic pipeline for multiplication of two 8-digit fixed numbers. **10**

4. (a) Explain the data structures used for parallel algorithms. **10**

(b) Discuss the various message passing programming systems. Explain the commands to compile & running PVM programs. **10**

5. (a) Explain the spin-lock & binary spin lock mechanism for synchronisation among concurrent processes. **10**

(b) Discuss the various kinds of metrices involved for analysing the performance of parallel computers. **10**

No. of Printed Pages : 2

MCSE-011

MCA (Revised)

Term-End Examination

June, 2014

MCSE-011 : PARALLEL COMPUTING

07958

Time : 3 hours *Maximum Marks : **100***

Note : *Question number **1** is **compulsory**. Attempt **any three** questions from the rest.*

1. (a) What are Parallel Random Access Machines ? List the steps followed by PRAM model in executing an algorithm. 8

   (b) Compare the Flynn's classification and structural classification, on relevant attributes. 8

   (c) Why do we use MPI ? Discuss two features each of MPI - I and MPI - II. 8

   (d) Elaborate two features of Unix as a multi-processor system, with suitable example. 8

   (e) Illustrate the multi-statement FORALL. Construct with a suitable example. 8

2. (a) Discuss the Amdahl's law for measuring the speed-up performance. 15

   (b) How is the performance judged on the basis of run-time behaviour ? 5

3. (a) What is grain size ? What are the different categories of grain size ? How do we classify Parallelism on the basis of grain size ? **15**

(b) Describe the advantages of parallel processing over sequential computations. **5**

4. What is OpenMP and its application in Parallel Computing ? Discuss the different work sharing constructs defined in OpenMP with suitable program examples. **20**

5. (a) What are the different steps to write a general parallel program ? **5**

(b) What are the advantages of threads over processes ? **5**

(c) Discuss two applications of parallel computing, with appropriate illustrations. **10**

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No. of Printed Pages : 2

MCSE-011

MCA (Revised)

05994

Term-End Examination

December, 2014

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question Number **1** is **compulsory**. Attempt any **three** questions from the rest.*

1. (a) What do you understand by a thread ? Discuss the different methods for creation and termination of threads. *8*

(b) Elaborate the Bernstein conditions for detection of parallelism, with a suitable example. *8*

(c) Discuss the classification of pipeline processors. *8*

(d) Write a FORALL statement to set lower triangle of a matrix X to zero. *8*

(e) List two differences and similarities each between 'Cluster' and 'Grid' computing. *8*

2. (a) What is the role of visualisation tools in performance analysis ? Discuss the different visualisation tools employed in performance analysis. *15*

(b) What do you understand by time optimal algorithm ? Illustrate with an example. *5*

3. (a) What is hyper-threading ? Discuss the primary functionality of a hyper-thread processor. *10*

(b) What is meant by vector processing ? How is it different from scalar processing ? Explain the various vector instructions with their function mapping. *10*

4. (a) Illustrate the exchange-cum-comparison mechanism in interconnection networks with a suitable example. *10*

(b) What is System Deadlock and under what conditions does the deadlock occur ? Discuss the strategies for deadlock avoidance. *10*

5. Write short notes on any ***four*** of the following :

(a) Cluster Computing *5*

(b) Shared Memory Approach *5*

(c) Life Cycle of a Process *5*

(d) Design issues of interconnection networks *5*

(e) Wait Protocol *5*

No. of Printed Pages : 2

MCSE-011

MCA (Revised)
Term-End Examination
June, 2015

06553

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question Number **1** is **compulsory**. Attempt any **three** questions from the rest.*

1. (a) Explain dataflow computation model with an example. *10*

(b) Discuss and explain Handler's classification. *10*

(c) Explain the steps for compiling and running the PVM program. *10*

(d) What are intrinsic functions ? Name any two of them. *10*

2. (a) Explain Bernstein's condition and determine the parallelism in the following segment : *10*

$S_1 : X = Y + Z$

$S_2 : Z = U + V$

$S_3 : R = S + V$

(b) Define any ***two*** of the following terms : *10*

(i) Node degree

(ii) Network diameter

(iii) Static interconnection network

3. (a) What is the condition for compacting the instructions in a VLIW instruction word ? *10*

(b) List the various visualization tools employed in performance analysis. *10*

4. (a) Discuss the differences between Grid computing and Cluster computing. *10*

(b) Discuss and explain the metrics for performance evaluations. *10*

5. Write short notes on the following : *5×4=20*

(a) Amdahl's Law

(b) IA-64 Architecture

(c) Hyper Threading

(d) Benz Network

01454

No. of Printed Pages : 3

MCSE-011

MCA (Revised)
Term-End Examination
December, 2015

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Explain the various levels of parallel processing. *10*

(b) Determine the dependency relations among the following instructions : *10*

$I_1 \Rightarrow a = b + c$

$I_2 \Rightarrow b = a + d$

$I_3 \Rightarrow c = a/f$

(c) List the differences between Clos network and Benz network. *10*

(d) Identify the factors due to which the speed of the pipelining is limited. *10*

2. (a) Identify the types of the following vector processing instructions : *10*

(i) C(I) = A(I) and B(I)

(ii) C(I) = MAX (A(I), B(I))

(iii) B(I) = A(I)/S, where S is a scalar item

(vi) B(I) ← SIN (A(I))

(b) What are the differences between scalar processing and superscalar processing ? What is the condition for compacting the instruction in a VLIW instruction word ? *10*

3. (a) Explain the concept of analysis of parallel algorithms. *10*

(b) Explain the algorithm for Matrix Multiplication, using (i) CRCW, (ii) CREW. *10*

4. (a) What are intrinsic functions ? Name any five of them. *10*

(b) Explain in detail the various generations of message passing multi-computers. *10*

5. Write short notes on the following : *4×5=20*

(a) IA-64 Architecture

(b) Asymptotic Notations

(c) PRAM

(d) Flynn's Classification

No. of Printed Pages : 4

MCSE-011

MCA (Revised)
Term-End Examination
June, 2016

03006

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Perform data dependency analysis on the following program : 6

S1 : A = C + E

S2 : B = A × 4

S3 : A = A + B

S4 : D = A / 7

(b) Specify a pipeline configuration to carry out the following task with a stream of numbers :

$$(A_i * B_i) + (C_i * D_i)$$

List the contents of all registers in the pipeline for i = 1 through 6. 6

(c) Make a dataflow graph of the following expression : 4

$$F = (a + b) * (a - c) / (d - e)$$

(d) What are the parameters used for analysing a combinational circuit ? Explain through an example. 6

(e) How do you obtain Perfect Shuffle and Butterfly Permutations ? Illustrate through an example for each. 8

(f) Discuss the following with respect to the recent trends in parallel computing : 10

- Hyper-threading
- Shared memory model
- Message passing model
- Grid computing

2. (a) Explain the concept of speed up by applying Amdahl's law. What is speed up if no part of the code can be parallelized ? What is speed up if 50% of the code can be parallelized ? 7

(b) How will you define speed up if a number of processors is added to perform fraction of work in parallel ? *4*

(c) Explain the following in the context of message passing programming paradigm : *9*

- How is the message communicated from one machine to another machine (process) in a distributed environment ?
- Merits and demerits of message passing paradigm.
- Describe some important features of data parallel programming model.

3. (a) Discuss the properties associated with interconnection networks with the help of examples. *10*

(b) Why do you require synchronization ? How is low level synchronization implemented ? *4*

(c) How is synchronization achieved through wait protocol and sole access protocol ? Discuss. *6*

4. (a) Suppose you are given two sorted sequences A and B of length four as :

A = (5, 10, 15, 20)

B = (4, 8, 12, 16)

Draw the circuit of merging the two sequences as given above and explain the process. *10*

(b) State Sun and Ni's law for measuring speed up performance. *4*

(c) What are the factors causing the presence of overheads in parallel computers ? Elaborate. *6*

5. Define the following concepts through examples : *20*

(a) Shared memory model

(b) Granularity

(c) Asymptotic notations

(d) MIMD model

(e) Associative memory

No. of Printed Pages : 4

MCSE-011

MCA (Revised)
Term-End Examination
December, 2016

00425

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question number 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) State the Bernstein's Parallelism condition and apply it to detect the parallelism in the following instructions of a program : *10*

$S_1 : C = D \times E$

$S_2 : M = G + C$

$S_3 : A = B + C$

$S_4 : C = L - M$

$S_5 : F = G \div E$

(b) Consider an unsorted list having the element values as

(3, 6, 9, 12, 15, 18, 21, 40, 35, 30, 25, 20, 17, 11, 7, 2).

Illustrate the concept of sorting the above numbers using the comparators and explain. *10*

(c) Show the relationships diagrammatically between the following and explain : *6*

- Number of Processors vs Execution time
- Number of Processors vs Speed-up
- Number of Processors vs Efficiency

(d) What are the problems encountered in superscalar architecture ? Discuss. *4*

(e) What is the major shortcoming identified in Amdahl's law ? Explain. *4*

(f) What is a non-blocking network ? Draw the organisation of CIOS network and describe its architecture. *6*

2. (a) Discuss the three types of dependency conditions among instructions in a program. What types of dependency relationships exist among the following instructions ? *10*

$A = B + C + D$

$B = C + E$

$X = B/G$

(b) Explain the algorithm for matrix multiplication for parallel computational model. What is its complexity ? *10*

3. (a) Discuss the following issues in the design of an interconnection network : 6

- Dimension and size of the network
- Symmetry of the network
- Data transfer time

(b) Draw the following interconnection networks and describe their properties : 4

- Crossbar network
- Ring network

(c) Explain Gustafson's law. How is it different from the other two laws, Amdahl's law and Sun-Ni's law ? 10

4. (a) Draw an arithmetic pipeline for floating point addition of two numbers and explain the process. 6+1=7

(b) What are the factors which limits the speed-up in the pipeline ? 3

(c) Discuss the following parallel programming models : 6

- Shared memory model
- Threads model
- Message passing model

(d) Elaborate on the following performance analysis tools : *4*

(i) Visualization

(ii) Communication matrix

5. Explain the following terms : *20*

(a) Cluster Computing

(b) Master Slave Kernel

(c) System Deadlock

(d) Parallel Random Access Machine

(e) Instruction Level and Loop Level Parallelism

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No. of Printed Pages : 2

MCSE-011

MCA (Revised)
Term-End Examination

05992 **June, 2017**

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Explain the various classifications of parallel computers in detail. *10*

(b) Discuss the design issues of interconnection network in detail. *10*

(c) Discuss the performance and issues factor in pipelining. *10*

(d) Define MPI. Discuss the features of MPI-1 and MPI-2. *10*

2. (a) Discuss the various parallel programming models in detail. *10*

(b) Discuss the following : *10*

(i) Amdahl's Law

(ii) Gustafson's Law

3. (a) Solve the matrix multiplication problem using the parallel models. *10*

(b) Explain odd-even transposition sorting method. Provide an example to understand the concept. *10*

4. (a) Define granularity. How is parallelism achieved using grain size concept ? Explain in detail. *10*

(b) Define scalar and vector processing. Discuss the merits and demerits of scalar and vector processing. *10*

5. (a) Compute the Network diameter, Bisection width and Node degree of the following networks : *10*

(i) Linear Array

(ii) Ring Network

(iii) Torus Network

(b) Define 8 × 8 Benz network of 4 stage in detail. *10*

No. of Printed Pages : 2

MCSE-011

MCA (Revised)
Term-End Examination
December, 2017

03410

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question no. **1** is **compulsory**. Attempt any **three** questions from the rest.*

1. (a) Classify the pipeline processors. *10*

(b) Discuss cube and Hyper-cube interconnection networks with their node addresses. *10*

(c) Discuss the augmenting features of High Performance Fortran (HPF). *10*

(d) Explain Gustafson's Law in detail. *10*

2. (a) Discuss the various kinds of metrices involved for analysing the performance of parallel algorithms for a parallel computer. *10*

(b) Why are performance metrics not able to achieve a linear curve in parallel computers ? Discuss the well-known services of overheads in a parallel computer. *10*

3. (a) List and explain the 'ten' library routines/functions in PVM programming. *10*

(b) With an example, explain combinational circuit method for sorting. *10*

4. (a) Discuss the various parameters for analysing parallel algorithms. *10*

(b) Explain superscalar processors in detail. *10*

5. (a) Discuss and explain the organisation of Clos network. *10*

(b) Classify pipeline processors. Explain each classification in detail with an example. *10*

No. of Printed Pages : 2

MCSE-011

MCA (Revised)

Term-End Examination

04245

June, 2018

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question no. **1** is **compulsory**. Attempt any **three** questions from the rest.*

1. (a) What are the problems faced in Superscalar architecture ? Explain how these problems were addressed and resolved in VLIW architecture. *10*

(b) Define permutation network using an example. Also discuss Perfect Shuffle permutation and Butterfly permutation. *10*

(c) What is a Parallel Virtual Machine ? Discuss its features and advantages. *10*

(d) Differentiate between Threads and Processes. Explain the concept of Thread with basic methods in concurrent programming languages for creation and termination of threads. *10*

2. (a) Discuss the PRAM model. Which PRAM model can be used to execute any other PRAM algorithm and how can it be used ? *10*

(b) Explain at least two techniques used for optimization of a parallel code. *10*

3. (a) Why are Array processors called as SIMD array computers ? Explain the architecture of SIMD array processer using a block diagram. *10*

(b) What is meant by Cluster Computing ? Explain the memory organisation in cluster computing. *10*

4. (a) What are the different models of distributed systems ? Also discuss various advantages of distributed systems. *10*

(b) Illustrate Flynn's classification of parallel computer systems. Also list the features of all categories of parallel systems. *10*

5. Write short notes on the following : *4×5=20*

(a) Grid Computing

(b) Handler's Classification

(c) Hyperthreading Technology

(d) Bitonic Sorting Algorithm

No. of Printed Pages : 2

MCSE-011

MCA (Revised)

Term-End Examination

04983

December, 2018

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question no. **1** is **compulsory**. Attempt any **three** questions from the rest.*

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1. (a) What is meant by scalability of parallel algorithms ? Write the characteristics of parallel algorithm written for PRAM machine. *10*

(b) Using Bernstein's conditions, detect maximum parallelism between the instructions of the following code : *10*

P1 : A = B * C

P2 : P = Q + A

P3 : R = T + A

P4 : A = S + P

P5 : V = Q ÷ C

(c) Explain Gustafson's law with an example. *10*

(d) Discuss the features of the parallel computer series PARAM and MARK developed by India. *10*

2. (a) Explain the parameters used to analyse genetic algorithms. Write a parallel algorithm to rank the elements of a linearly linked list in terms of distance from each node to the last element of the list. *10*

(b) Discuss Handler's classification based on three distinct levels of computers. *10*

3. (a) Explain the architecture of pipeline processing. *10*

(b) Differentiate between Control flow computing and Data-flow computing. Also give example for each. *10*

4. (a) With the help of a diagram, illustrate the concept of sorting using comparators for the unsorted list having the following elements : *10*

4, 5, 9, 11, 95, 7, 23, 46, 39, 12, 6, 18

(b) What is Synchronization Latency Problem in multithreaded processors ? *10*

5. Write short notes on the following : *4×5=20*

(a) Fat Tree

(b) Asymptotic Notation

(c) Cluster Computing

(d) OpenMP

4832

No. of Printed Pages : 3 **MCSE-011**

MCA (Revised)

Term-End Examination, 2019

MCSE-011 : Parallel Computing

Time : Three Hours] **[Maximum Marks : 100**

Note : Question No. 1 is **Compulsory**. Attempt **any three** questions from the rest.

1. (a) Describe the concept of permutation network with an example. Also, explain perfect shuffle permutation and Butterfly permutation. [10]

(b) Illustrate Flynn's classification of parallel computer systems ? List salient features of all categories. [10]

(c) Explain the algorithm for odd-even transposition using a suitable example. [10]

(d) Discuss the concepts of multitreading and its uses in parallel computer architecture. Give suitable example of multitreading. [10]

2. (a) List and explain various search based tools used in performance analysis. [10]

(b) Explain the life cycle of a process in detail. What are the four actions for process creation ? Explain each. [10]

3. (a) What is meant by Bernstein conditions ? Find out Bernstein Condition in the following example : [10]

A=B×C

C=D÷E

C=A+B

E=F-D

H=I+J

(b) Explain VLIW Architecture. What is the condition for compacting the instruction in a VLIW instruction word. [10]

4. (a) State and explain the law which uses the notion of constant execution time. Explain with the help of an example. [10]

(b) Differentiate between control flow computing and data flow computing. Also, give an example for each. [10]

5. Write short notes on the following : [5×4=20]

(a) Grid computing

(b) Hyper threating

(c) Parallel virtual machine

(d) Array Processing

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4394

No. of Printed Pages : 3

MCSE-011

MCA (Revised)

Term-End Examination, 2019

MCSE-011 : PARALLEL COMPUTING

Time : 3 Hours

Maximum Marks : 100

Note : Question **no. 1** is **compulsory**. Attempt **any three** questions from the rest.

1. (a) List and explain various search based tools and visualisation tools used in performance analysis. [10]

(b) Explain two types of combinational comparators. [10]

(c) Discuss Hyper Threading Technology with its features and functionality. [10]

(d) What is Bitonic Sequence ? Explain Bitonic sorting algorithm and sort the following sequence : [10]

18, 20, 15, 21, 17, 13, 19, 34, 4, 57, 32

2. (a) Explain the problems faced by super-scale architecture. How are these problems resolved in VLIW architecture ? [10]

(b) Differentiate between tightly-coupled and loosely-coupled multiprocessor system. Give characteristics of each. [10]

3. (a) Explain the Gustafson's Law for measuring speed up performance using a suitable example. [10]

(b) List the various parallel programming models. Discuss each model briefly. [10]

4. (a) Discuss Handler's Classification based on three distinct levels of computer. [10]

(b) What is Open MP ? Explain three work sharing constructs of Open MP. [10]

5. Write the short notes on the following : [5×4=20]

(a) Spin lock mechanism

(b) Asymptotic Notation

(c) Bernstein Conditions

(d) Permutation Network

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No. of Printed Pages : 4

MCSE-011

MCA (Revised)

Term-End Examination

MCSE-011 : PARALLEL COMPUTING

Time : 3 Hours] *[Maximum : Marks : 100*

Note: Question number 1 is compulsory. Answer any three questions from the rest.

1. (a) Explain the life cycle of process. What are the advantages of threads over processes. 5

(b) Briefly discuss the classification of parallel computers on the instruction and data streams. 5

(c) List the parameters on the basis of which, the performance of interconnection networks are measured. 5

(d) Differentiate between Instruction pipelines and Arithmatic pipelines. 5

(e) Briefly discuss the concurrently read Concurrently Write model of computation. What is the advantage of this model? 5

(f) Desribe the Message passing model for parallel programming. Give suitable example in support of your description. 5

(g) Write Amdahl's law. Mention the major shortcoming identified in Amdahl's law. 5

(h) What is Hyper-Threading Technology (HTT)? Write salient features of HTT. 5

2. (a) Compare concurrent environment with Parallel environment. 5

(b) Discuss the concept of Temporal parallelism with suitable example. 5

(c) Write Bernstein conditions for delection of parallelism. 5

(d) List the issues which should be considered while designing an interconnection network 5

3. (a) Briefly, discuss the combinational circuit for sorting the strings. Write the algorithm to sort the bitonic sequence, and analyse the complexity of this algorithm.

(b) Explain the following data structures for parallel algorithms: 10

(i) Linked List

(ii) Hypercube Networks

4. (a) What is sole access protocol? Briefly discuss the methods used for synchronization in this protocol. 5

(b) Discuss the following metrics, involved for the analysis of the performance of parallel algorithms for parallel computers. 10

(i) Running time

(ii) Efficiency

your discussion should include relevant diagram, graph and methematical expressions.

(c) What is Grid computing? How it is different from cluster computing? 5

5. Write short notes on the following: 4×5=20

(a) Gustafson's law

(b) Merge sort circuit

(c) Associative Array processing

(d) Handler's classification

—x—

No. of Printed Pages : 3

MCSE-011

MCA (Revised)

Term-End Examination

February, 2021

MCSE-011 : PARALLEL COMPUTING

Time : 3 hours *Maximum Marks : 100*

Note : *Question no.* ***1*** *is* ***compulsory****. Attempt any* ***three*** *questions from the rest.*

1. (a) Differentiate between Concurrent and Parallel executions. What do you understand by the granularity of a parallel system ? *5*

(b) Briefly discuss the classification of parallel computers on the basis of the structure of the computers. *5*

(c) What do you understand by Permutation Networks in parallel computing ? *5*

(d) Compare Vector processing and Array processing. *5*

(e) What is Bitonic sequence ? Write an algorithm for sorting the bitonic sequence. *5*

(f) Discuss the shared memory model for parallel programming. *5*

(g) What are the sources of overheads in parallel computers ? Briefly discuss them. *5*

(h) Explain the term Parallel Virtual Machine (PVM). *5*

2. (a) Discuss the concept of Data parallelism with suitable example. *5*

(b) What are the primary attributes used to measure the performance of a computer system ? *5*

(c) Compare Tightly coupled systems with Loosely coupled systems. *5*

(d) What is Pipeline Processing ? What is the purpose of using latches in the pipelined processor ? *5*

3. (a) Draw a block diagram of PRAM model. Discuss the components of PRAM model. Write the steps followed by PRAM model while executing an algorithm. *10*

(b) Briefly discuss the shared memory model for parallel programming. Write a shared memory program to process marks of students. Your program should take the roll number and the marks of the student in four subjects as input, and find the grade of the student. *10*

4. (a) What is Wait protocol for synchronization ? Compare Busy-wait and Sleep-wait protocols. *5*

(b) Write Gustafson's law. Discuss in detail Gustafson's law. Your discussion should include relevant diagram, graphs and mathematical expression. *10*

(c) Briefly discuss the Intel Architecture-64 (IA-64). *5*

5. Write short notes on the following : *4×5=20*

(a) Flynn's classification

(b) Superscalar processors

(c) VLIW Architecture

(d) Data flow computing