# G. H. Raisoni College of Engineering, Nagpur

(An Autonomous Institution)

**Sixth Semester B. E.** (Computer Science & Engineering / Information Technology)

End Semester Examination Summer - 2016

## Language Processors

Time: 3 hrs.] [Max. Marks: 60

**Instructions to Candidate:**
1) All questions carry marks as indicated.
2) Assume suitable data wherever necessary.
3) Illustrate your answer wherever necessary with the help of neat sketches.

1. (a) List phases of the compiler. 2

   (b) What is LEX? Give the spécifications of LEX. 2

   (c) Define Cross Compiler and Bootstrapping. 2

   (d) Explain Loop Unrolling 2

   (e) Which of the following conflicts cannot arise in LR parsing & why? 2
   
      i) shift-reduce     ii) reduce-reduce
   
      iii) shift-shift     iv) none of the above

   (f) A Left Recursive grammar: 2
   
      i) cannot be LL(1)     ii) cannot be LR(1)
   
      iii) is an ambiguous grammar     iv) none of the above

2. (a) Parse the input string id+id*id by using LL(1) Parser. Show the each status of the stack and look 8 ahead symbol at the time of parsing input string id+id*id for the following grammer:
   
      $E \rightarrow E+T/T$
   
      $T \rightarrow T*F/F$
   
      $F \rightarrow id/(E)$

   (b) Explain the significance of FIRST( ) and FOLLOW( ) with respect · top down parsing. 2

3. (a) Create SDTS to count no. of 1's in a given input binary string by using following grammar: 5
   
      $N \rightarrow L$
   
      $L \rightarrow LB/B$
   
      $B \rightarrow 1/0$
   
      Input binary String: 10101
   
      Output: 3

   (b) Describe the different implementation of Three Address Code: Quadruples, Triples and Indirect 3 Triples. Represent the following statement in the form of three address code statement quadruples, triples and indirect triple.
   
      $-(a+b)*(c+d)+(a+b+c)$

4. Solve **Any Two**

   (a) Explain static allocation scheme 5

   (b) Discuss various types of errors encountered by lexical and syntactic phase of compiler and their 5 recovery.

   (c) Explain Activation record in Detail. 5

5. (a) Write short notes on Frequency Reduction in loop optimization. 5

   (b) What is DAG? Explain how common sub expressions can be eliminated using DAG. 5

6. Solve **Any Two**

   (a) Explain Peephole Optimization in Detail. 5

   (b) Discuss various issues in the design of a code generator. 5

   (c) Explain one of the recent trends in Language processor. 5

BECL410

# Embedded Systems

Time: 3 hrs.]                                                                                    [Max. Marks: 60

**Instructions to Candidates:**
  1) All questions carry marks as indicated.
  2) All questions are compulsory.

Attempt following

(a)  Explain PSW of 8051                                                                          2

(b)  What is necessity to use data and program memory separate in microcontroller

(c)  List & draw format of SFR'S related to timers in 8051?

(d)  How to configure ports of 8051 as input port

(e)  What is level of pipeline in ARM 7 processor architecture.

(f)  List conditional branching instruction of 8051                                               2

(g)  Which register/ flag is responsible for doubling of baud rate of 8051                        2

(a)  Draw and Explain architecture of 8051.                                                       8

(b)  Write a program to transfer data of 10 memory location from memory location stating          2
     from 50h to targeted location of 70h

(a)  Draw interfacing diagram of 8051 microcontroller with eight LED on port 2. Write a
     program to glow it serially continuously with a delay of 1 sec?
                                        **OR**
(a)  Explain memory structure of 8051 microcontroller.

(b)  Write a program to receive data serially with baud rate of 9600 using 8051
     microcontroller. If XTAL=11.0592MHz

4.  (a)  Draw register model of ARM 7: and explain.

    (b)  What is Thumb mode? Also list features of ARM7.                                           5

5.  (a)  Draw & explain 16 PIC system architecture.                                                5
                                        **OR**
    (a)  WAP to generate square wave on port Po of 50% duty cycle for 8051                         5

    (b)  Explain addressing modes of PIC controller with example.                                 5

6.       Write short note on followings (**Any Two**)                                              8
             i).  RS232 Bus
             ii). Interrupt of 8051
             iii). PCI Bus

# G. H. Raisoni College of Engineering, Nagpur

(An Autonomous Institution)

Sixth Semester B. E.    (Computer Science & Engineering)

End Semester Examination Summer - 2016

# Parallel and Distributed Computing

Time: 3 hrs.]                                                                                    [Max. Marks: 60

**Instructions to Candidatess:**

1) All questions carry marks as indicated.
2) Assume suitable data wherever necessary.
3) Due credit will be given to neatness and adequate dimensions.

i.   Choose appropriate option for the following questions:

(a) The Total Computational Time T=_____
   i) CP x Ic x t        ii) CPI x Ic x t          iii) CPI/Ic x t        iv) CPI x Ic/t

(b) The method for updating the main memory as soon as a word is removed from the Cache is called_____.
   i) Write-through        ii) Protected write        iii) Write-back        iv) Cache-write

(c) Which of the following is not the modes for read and write operations in a PRAM?
   i) Exclusive Read (ER)            ii) Exclusive Write (EW)
   iii) Write-Invalidate(WI)          iv) Concurrent Write (CW)

(d) Cache coherence schemes can be categorized into _____and _____Protocol categories.
   i) Superscallar,Snooping            ii) Snooping, Directory based
   iii) Both (i) and (ii)                 iv) None of these

(e) In super-scalar processors, _____ mode of execution is used.
   i) Out of order      ii) Post order      iii) In-order      iv) None of the mentioned

(f) The following instruction is allowed in VLIW:
   f12 = f0 * f4, f8 = f8 + f12, f0 = dm(i0, m3), f4 = pm(i8, m9);
   i) TRUE                ii) FALSE

(g) Which routing technique is used in distributed system?
   i) fixed routing      ii) virtual routing    iii) dynamic routing    iv) all of the mentioned

(h) Directory-based cache coherence protocols for distributed memory systems: Which information must the directory of each processor contain?
   i) Only status information on its cache data            ii) Only locations of copies
   iii) Status information on its cache data + locations of copies    iv) None of the above

(i) Basic Features of Uniform Memory Access (UMA) includes:
   i) represented by Symmetric Multiprocessor machines        ii) Identical processors
   iii) Processors have equal access times to memory location    iv) All of these

(j) _____ is a common issue when using multiple levels of memory.
   i) Memory Latency    ii) read-update        iii) Cache coherency    iv) All of these

(k) The technique, for sharing the time of a computer among several jobs, which switches jobs so rapidly such that each job appears to have the computer to itself, is called _____.
   i) time Sharing        ii) time out          iii) time domain        iv) multitasking

(l) Snooping cache protocol, write-back caches: What is an immediate effect of writing to shared data in the cache of one processor?
   i) Updating main memory
   ii) Invalidating copies in the caches of other processors
   iii) Marking copies in the caches of other processors as modified
   iv) Updating copies in the caches of other processors

2. Solve **Any Two**

(a) Contemplate the advantages and disadvantages of message passing architectures and compare them with those found in shared memory architectures.  5

(b) Discuss the Scheduling and Task Allocation problem for distributed system.  5

(c) Give a design of crossbar switch and the multiport memory organization. Write a note on each.  5

(a) Analyze the data dependence among the following statements in the given program (apply Bernstein rules):  6

| | |
|---|---|
| S1: | Load R1, 1024 |
| S2: | Load R2, M(10) |
| S3: | Add R1, R2 |
| S4: | Store M(1024), R1 |
| S5: | Store M((R2)), 1024 |

Where (Ri) means the content of register Ri and Memory (10) contains 64 initially.
a) Draw the dependence graph (show your work).
b) Is there any resource dependence between any pair of instruction

(b) Define following terms related to parallelism and dependence relations  6
  (a) Computational granularity
  (b) Flow dependence
  (c) Bernstein's Condition

Solve **Any Two**

(a) How to simulate multiple accesses on an EREW PRAM Model? Explain with example.  7

(b) Simulate the following functions using other MPI functions:  7
MPI_Allreduce(), MPI_Bcast(), MPI_Scatter(), MPI_Gather().

(c) Consider a bus-based shared memory system consisting of three processors. The shared memory is divided into four blocks x, y, z, w. Each processor has a cache that can fit only one block at any given time. Each block can be in one of two states: valid (V) or invalid (I). Assume that caches are initially flushed (empty) and that the contents of the memory are as follows:  7

| Memory block | x | y | z | w |
|---|---|---|---|---|
| Contents | 10 | 30 | 80 | 20 |

Consider, the following sequence of memory access events given in order:
1) P1: Read(x), 2) P2: Read(x), 3) P3: Read(x),
4) P1: x ¼ x þ 25, 5) P1: Read(z), 6) P2: Read(x),
7) P3: x ¼ 15, 8) P1: z ¼ z þ 1
Show the contents of the caches and memory and the state of cache blocks after each of the above operations in the following cases: (1) write-through and write-invalidate.

(a) Differentiate between the Blocking versus non-blocking communication in MPI. How non-blocking communication can be used to improve performance?  6

(b) Give Syntax and example of any three directives in OpenMP.  6

# G. H. Raisoni College of Engineering, Nagpur

(An Autonomous Institution)

Sixth Semester B. E.    (Computer Science and Engineering / Electronics Engineering /
Electronics & Telecommunication Engineering)

End Semester Examination Summer - 2016

## Computer Graphics and Visualization   (Elective-I)

Time: 3 hrs.]                                                                                                    [Max. Marks: 60

**Instructions to Candidates:**

1) All questions carry marks as indicated.
2) Assume suitable data wherever necessary.
3) Due credit will be given to neatness and adequate dimensions.
4) Illustrate your answer wherever necessary with the help of neat sketches.

1.  (a) Outline antialising techniques in detail.                                                                     4

    (b) Digitize a line from (5, 5) and (13, 9) on a raster screen using Bresenham's straight line        6
        algorithm.

2.  (a) Discuss Cyrus Beck Line Clipping Algorithm with the help of suitable example.                    10

                                        **OR**

    (a) Fill a polygon having co-ordinates A(1,1) B(7,1) C(7,6) D(5,4) E(3,4) F(1,6) using  Edge fill    10
        algorithm and fence fill algorithm.

3.  (a) A polygon is defined by vertices A(1,1) B(3,2) and C(4,1). Scaled the above polygon by 2         7
        times in x-direction and 3 times in y-direction and rotate by $45°$ in clockwise direction. Find
        the resultant vertices.

    (b) Find inverse transformation which converts fig. A defined by co-ordinates P(3,2) Q(2,1)          3
        R(4,1) in to fig. B having co-ordinates $P^1$(-3,-1) $Q^1$(-4,-2) $R^1$(-2,-2)

4.  (a) What is the significance of projection? Describe perspective projection of an object to the      5
        view plane.

    (b) Discuss Z buffer Algorithm for hidden surface elimination with its advantages and               5
        disadvantages in detail.

5.  (a) Window is defined by co-ordinates FROM (0,0) to (40,40). Clip a line segment with end           5
        points A(-10,20) and B(50,10) using Sutherland Cohen algorithm.

    (b) What do you mean by Interpolation? Explain B-spline curve in detail.                              5

6.  (a) Discuss various shading algorithm used in computer graphics.                                     7

    (b) How much time is spent scanning across each row of pixels during screen refresh on raster        3
        system with Resolution of 1280 by 1024 and refresh rate 60 frames per second?

# G. H. Raisoni College of Engineering, Nagpur

(An Autonomous Institution)

Sixth Semester B.E.    (Master of Technology Management 5½ Years Course)

End Semester Examination Summer - 2016

## Creativity & Innovation

Time: 3 hrs.]                                                                                      [Max. Marks: 60

**Instructions to Candidates:**

1) All questions carry marks as indicated.
2) All questions are compulsory.
3) Due credit will be given to neatness and adequate dimensions.
4) Illustrate your answer wherever necessary with the help of neat sketches.

1.   Objective type questions

 (a)  We have now put a bit of flesh on the bones of the idea that creative production is based on _____ thinking.                                                                        2

 (b)  The term Lateral thinking was coined in 1967 by _____                          2

 (c)  Usage of images, symbols, codes, and dimensions throughout is a part of _____.    2

 (d)  The technique use for developing groups in order to make better decisions is _____.  2

 (e)  Measuring innovation is a combination of _____ and science.                    2

 (f)  The four Ps of creativity are product, process, people and _____.              2

2.   You are driving down the road in your car on a wild, stormy night, when you pass by a bus stop    8
     and you see three people waiting for the bus:

          1. An old lady who looks as if she is about to die.
          2. An old friend who once saved your life.
          3. The perfect partner you have been dreaming about.

     Knowing that there can only be one passenger in your car, whom would you choose? Why?

3.   A school teacher has given a project to students to create models with theme as "Traditional    9
     snacks of India. In all there are 38 children of which we have to make 6 Teams. As a consultant
     you are required to provide creativity in the theme. Please present it using individual and group
     techniques for creativity.

4.   A leading management institute of Maharashtra is designing their vision, mission, Program    8
     educational objectives, program specific objectives and program outcome to be implemented from
     the academic year 2016 – 2017. As a consultant, using Brain storming techniques design it.

                                            **OR**

     Design the best vision & mission using brain storming technique for an enterprise manufacturing    8
     laptops for school children.

5.   A leading car manufacturers is facing severe problem in his unit due to lack of creativity in    8
     automobile Sector in order to enhance the productivity and subsequently enhancing branding. As a
     creator please design a model for solving the present and surviving the future.

6.   Design a business in which trading is done of products for infants and children below three. The    7
     business is located in 10 branches in India. You are going to become the Branch no. 11. The
     design must contain right from the layout to the place of location and financial details

7.   A common man have always been facing routine problems like electric problems, Pipe leakage,    5
     grocery requirement, vegetable requirement etc. Design a service Agency wherein all these
     problems can have appropriate solution along with the financial investment and earnings.

## G. H. Raisoni College of Engineering, Nagpur
(An Autonomous Institution)
### Sixth Semester B. E. (Computer Science & Engineering)
End Semester Examination Summer - 2016
## Design and Analysis of Algorithm

Time: 3 hrs.]                                                    [Max. Marks: 60

**Instructions to Candidates:**
1) All questions carry marks as indicated.
2) Assume suitable data wherever necessary.
3) Due credit will be given to neatness and adequate dimensions.
4) Illustrate your answer wherever necessary with the help of neat sketches.

1. Answer the following questions:
   (a) Write whether following algorithm is correct or not. Justify your answer.    2

   Algorithm Max (A. n)          // A is an array of size n.

   {

   Result:=A[1];

   for i:=2 to n do

   if A[i]>Result  then Result:=A[i];

   return Result;

   }

   (b) Consider two strings $S_1$ = "LMMLNM" & S2 = "LMNLMN". How many longest    2
   common subsequences can be formed between $S_1$ & $S_2$?

   (c) Calculate time complexity of following algorithm:    2
   Algorithm fun(n)
   t=1
   if n=0 or n = 1
     return 1;
   else t = n * fun(n-1);

   (d) What will be the space complexity of the following algorithm?    2

   Algorithm Rsum (a,n)

   {

   if (n≤0)

   then return 0.0;

   else

   return Rsum (a,n-1) +a[n];

   }

   (e) Calculate the time complexity of the following algorithm:    2
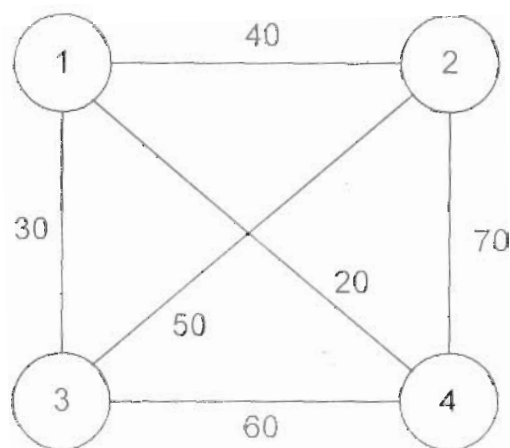   $T(n) = 16n^3 + 10n^2 - 2n + 5$

(f) Whether following algorithm is correct or not? If not, re-write the corrected algorithm     2

    Algorithm TowerOfHanoi(n,x,y,z)

                    //move the top n disks from tower x to tower y.

```
    ⋮
  if(n≥1) then
  {
     TowerOfHanoi (n+1,x,z,y);
     write("move top disk from tower " ,x," to top of tower ",y );
     TowerOfHanoi (n+1,x,y,x);
  }
}
```

2. (a) Explain travelling sales man problem for example below     6



(b) Comment on P=NP,     3

(c) Explain 3SAT problem with example     3

3. (a) Explain in brief:     6
        1)Fibonacci heap
        2) Binomial heap

(b) Explain Divide and Conquer strategy with suitable example? And give its recurrence     6
equation.

4. (a) What do you mean by minimum cost spanning tree? Give any one algorithm to construct     7
minimum cost spanning tree for a graph.

(b) Write and explain algorithm for 8 Queens problem.     5

5. (a) What is dynamic programming? Write an algorithm for Least Common Subsequence     8
using Dynamic Programming approach.

(b) Differentiate between BFS and DFS.     4

**OR**

(b) What do you mean by NP-Complete and NP-Hard problem? Explain in brief     4

# G. H. Raisoni College of Engineering, Nagpur

(An Autonomous Institution)
Sixth Semester B. E. (Computer Science & Engineering)
Vacation Examination Summer - 2016

# Design and Analysis of Algorithm

Time: 3 hrs.]                                                                              [ Max. Marks: 60

**Instructions to Candidates:**

1) All questions carry marks as indicated.
2) Assume suitable data wherever necessary.
3) Due credit will be given to neatness and adequate dimensions.
4) Illustrate your answer wherever necessary with the help of neat sketches.

I    Answer the following questions.

(a)  An algorithm has two phases. The 1st phase, initialization, takes time $O(n^2)$. The second    2
     phase, which is the main computation, takes time $O(n \log n)$. What is the most accurate
     description of complexity of the overall algorithm?
        i) $O(n \log n)$     ii) $O(n^2)$     iii) $O(n^2 \log n)$     iv) $O(n^2 + \log n)$

(b)  Time complexity of following function is _____                                          2
```
for (int i = 0; i < N; i++)
{
if (arr[i] != invalidChar)
{
arr[ptr] = arr[i];
ptr++; }
}
```

   ) $O(n^2)$     ii) $O(n)$     iii) $O(n+1)$     iv) $O(n-1)$

(c)  Quick sort algorithm exploits ..................... design technique.                   2
     i) Greedy     ii) dynamic Programming     iii) Divide & conquer     iv) Backtracking

(d)  Which of the following algorithm solves the single source shortest path problem on a    2
     weighted directed graph in which edge weights may be negative.
        i) The Bellman-Ford Algorithm              ii) Dijkstra's Algorithm
        iii) Floyd-Warshall Algorithm              iv) Ford-Fulkerson Algorithm

(e)  Given two matrices. A[10][15], B[15][20]. Number of scalar multiplications required for  2
     multiplying two matrices are _____

   i) 225     ii) 150     iii) 300     iv) 3000

(f)  Which of the following is not a limitation of binary search algorithm?                  2
     i. must use a sorted array
     ii. requirement of sorted array is expensive when a lot of insertion and deletions are needed
     iii. there must be a mechanism to access middle element directly
     iv. binary search algorithm is not efficient when the data elements are more than 1000.

2. (a) Solve the following recurrences. **(Any One)**                                          4
        i) $T(n)=9T(n/3)+n$        ii) $T(n)=2T(n/4)+\sqrt{n}$

   (b) Explain the bitonic sorter with example.                                        4

3. (a) Write an algorithm to delete a node from Red-Black Tree.                      5

   (b) Illustrate the operation of quick sort on an array.   A={3, 41, 52, 26, 38, 57, 9, 49}   5

4. (a) Compare and contrast between minimum cost and minimum path tree.        3

   (b) Determine the LCS of X=<A,B,C,B,D,A,B> and Y=<B,D,C,A,B,A>         7

5. (a) Find BFS for the following Graph.                                               5
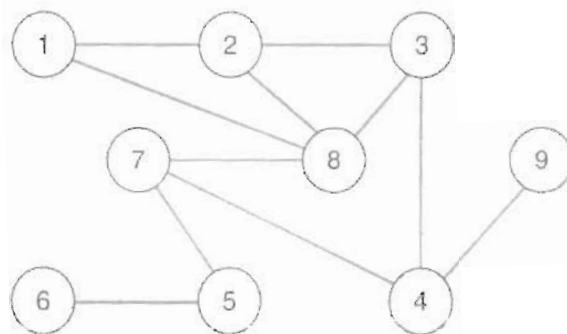


   (b) Explain 4-Queen's Problem with possible solutions.                           3

6. (a) Explain approximation algorithm for set cover problem.                       4

   (b) Define following terms:                                                       6
        i)       Deterministic and non-deterministic
        ii)      Decision Problem and Optimization Problem
        iii)     Verifiability

**OR**

   (b) Explain the terms: CLIQUE, INDEPENDENT SET, SAT and 3SAT.             6

# G. H. Raisoni College of Engineering, Nagpur
(An Autonomous Institution)

Sixth Semester B. E. (Computer Science & Engineering / Information Technology)

Vacation Examination Summer – 2016

## Language Processors

Time: 3 hrs.]                                                                 [Max. Marks: 60

**Instructions to Candidates:**
1) All questions carry marks as indicated.
2) Assume suitable data wherever necessary.
3) Due credit will be given to neatness and adequate dimensions.
4) Illustrate your answer wherever necessary with the help of neat sketches.

1  (a) "A multipass compiler can be made to use less space than single pass compiler." Comment.  2

   (b) List various compiler construction tools.  2

   (c) List different code optimization techniques.  2

   (d) What is a crosscomplier. explain  2

   (e) What is syntax-directed definition?  2

   (f) What do mean by predictive parsing?  2

2. (a) What is Bootstrapping? How it can be achieved?  2

   (b) Verify whether the following grammar is LL(1)  8
   $$E \rightarrow E + T/T$$
   $$T \rightarrow T * F/F$$
   $$F \rightarrow (E) / id$$

3.     Answer the following Questions.  10

   (a) Write a Lex program to count number of words, characters, lines in a file supplied at command prompt. (Do not write 'C' program).

   (b) $S \rightarrow CC$, $C \rightarrow cC$ ld check whether the given grammar is CLR (1) or not?

4.     Answer the following Questions. (Solve Any Two)  10

   (a) Discuss various data structures for implementation of symbol tables.

   (b) Consider the Syntax Directed Translated Scheme
   $$E \rightarrow E + E \{print '+'\}$$
   $$E \rightarrow E * E \{print '*'\}$$
   $$E \rightarrow id \{print id, name\}$$
   $$E \rightarrow (E)$$
   An LR-parser executes the actions associated with the productions immediately after a reduction by the corresponding production. Draw the parse tree and write the translation for the sentence $(a+b)*(c+d)$

   (c) Write and explain SDTS for Switch-Case statement.

5.     Answer the following Questions.  10

   (a) Discuss the different storage allocation techniques.

   (b) How the errors are handled in LR parsing.

6.     Write short notes on following (Solve Any Two)  8

   (a) Explain in brief peephole optimization.

   (b) Explain about loop unrolling and loop jamming.

   (c) What is DAG and how it is constructed? Also give its application.

# G. H. Raisoni College of Engineering, Nagpur
(An Autonomous Institution)
Sixth Semester B. E.     (Computer Science & Engineering)
Vacation Examination Summer – 2016

## Embedded System

Time: 3 hrs.]                                                                        [Max. Marks: 60

**Instructions to Candidates:**
1) All questions carry marks as indicated.
2) All questions are compulsory.

1. (a) What would happen if address data and control buses were not buffered?

   (b) What is the role of clock in Microprocessor?                                2

   (c) Define opcode and operand.                                                  2

   (d) Differentiate RISC & CISC                                                   2

   (e) Find the period of the machine cycle for 11.0592 MHz crystal frequency & for     2
   22MHz crystal frequency

   (f) For 8051 system of 11.0592 MHz, find how long it takes to execute each instruction.     2
   (a) MOV R3,#55  (b) DEC R3

2. (a) Draw and explain the architecture of 8051 microcontroller.                  6

   (b) Draw and explain the format of TMOD. Also indicate which mode and which timer     6
   is selected for following.
   i) MOV TMOD, #01H     ii)  MOV TMOD, #22H

3. (a) Explain I2C BUS in detail                                                    6

   (b) Explain the different addressing modes of 8051 microcontroller.             6

4. (a) Find the no of ones at memory location 40H, store it at 30H.                 ;

   (b) Assume XTAL = 11.0592 MHz, write a program to generate a square wave of 2 kHz     6
   frequency on pin P2.3. using timer 1 of 8051.

5. (a) Explain the different processor modes of ARM7 microcontroller.              :

   (b) Explain the THUMB state register set.                                       6
   OR
5. (a) Explain the peripheral features of PIC microcontroller with detailed block diagram.     6

   (b) Explain the various serial and parallel bus communication protocol.         6

# G. H. Raisoni College of Engineering, Nagpur
(An Autonomous Institution)
### Sixth Semester B. E. (Computer Science and Engineering)
Vacation Examination Summer – 2016
## PARALLEL AND DISTRIBUTED COMPUTING

Time: 3 hrs.] [Max. Marks: 60
**Instructions to Candidates:**
1) All questions are compulsory & carry marks as indicated
2) Assume suitable data wherever necessary.
3) Due credit will be given to neatness and adequate dimensions.

1. Choose appropriate option for each question and justify your answers with proper reason:

(a) In _____ the processors can write to a common memory address in the same step, as long 2
as they are all writing the same value.
a) EREW PRAM b) CRCW PRAM
c) ERCW PRAM d) CREW PRAM

(b) The parallel execution of operations in VLIW is done according to the schedule determined by 2
a) Task scheduler b) Interpreter
c) Compiler d) Encoder

(c) Snooping cache protocol: In which case the main memory is not up-to-date? 2
a) Write-through caches: After writing to shared data
b) Write-back caches: Cache data marked as exclusive
c) Write-back caches: Cache data marked as modified
d) Write-back caches: Cache data marked as shared

(d) In a single Cache System Coherence between memory and cache is maintained using following 2
two policies
a) write-update and write-through b) write-through and write-back
c) write-update and write-back d) write-invalidate and write-back

(e) If two identical processors are used to execute different threads of the same process, it is called 2
a) Multi-processing b) Multi-programming
c) SMP d) Multi-core

(f) The ratio of some performance metric (like latency) obtained using a single processor with that 2
obtained using a set of parallel processors is _____ obtained by parallelism.
a) Task-throughput b) Speed-up
c) Task-latency d) Parallel efficiency

2. Solve any **TWO**

(a) Consider the execution of the sequential code segment
S1: $X = (B - A)(A + C)$
S2: $Y = 2D(D + C)$
S3: $Z = Z(X + Y)$
S4: $C = E(F - E)$
S5: $Y = Z + 2F - B$
S6: $A = C + B/(X + 1)$
(i) Draw the dependence graph (Apply Bernstein's Condition).
(ii) Is there any resource dependence between any pair of instruction?

(b) A 40 MHz processor was supposed to execute 200000 instructions with following instruction mix 6
and CPI needed for each instruction.

| Instruction type | CPI | Instruction count |
|---|---|---|
| Integer arithmetic | 2 | 60% |
| Data transfer | 4 | 18% |
| Floating point | 6 | 12% |
| Control transfer | 5 | 10% |

Determine the effective **CPI, MIPS** rate and execution time (**T**).

(c) Explain any one Switching Mechanisms in Message Passing Architecture. 6

(a) List types of shared memory multiprocessors models. Give and explain architecture of NUMA. 6

(b) What is significance of node duplication? Demonstrate concept of node duplication with suitable 6
example.

4. Solve any **TWO**

(a) Give Directory Structure and with the help of it explain load with sharers Directory
Operation. /

(b) Define snooping protocol. With suitable example explain Write-Invalidate and Write-
Back Protocol. 7

(c) What is Gang Scheduling? Write Gang Scheduling algorithm and explain it with
example. /

(a) Discuss general code structure of OpenMP and write an OpenMP program which shows 5
the use of any one Work-sharing Construct.

(b) How non-blocking communication can be used to improve performance in MPI. Explain. 5

## G. H. Raisoni College of Engineering, Nagpur
(An Autonomous Institution)

Sixth Semester B.E. (Electronics Engineering / Electronics & Telecommunication Engineering / Computer Science & Engineering)

Vacation Examination Summer – 2016

# Computer Graphics & Visualization (Elective-I)

Time: 3 hrs.]                                                                     [Max. Marks: 60

**Instructions to Candidates:**

1) All questions carry marks as indicated.

1 (a) Enlist the difference between vector scan display and raster scan display

(b) How much time is spent scanning across each row of pixels during screen refresh on a raster system with resolution of 1280 by 1024 and a refresh rate of 60 frames per second?

(c) A triangle is defined by the vertices A(2,2) B(4,2) and C(4,4). Find the transformed coordinates after the 90 degree rotation about the origin in clockwise direction?

(d) Derive the transformation matrix for perspective projection.                              2

(e) Enlist the properties of Bezier Curve                                                     2

(f) Specify the classification of fractals with suitable description                          2

2. Answer **Any Two** questions

(a) Rasterize a line from (2,2) to (-6,-4) using Bresenham's Line Generation Algorithm         5

(b) Rasterize a line from (2,-3) to (-7,3) using DDA Line Generation Algorithm                  5

(c) Consider a non-interlaced raster monitor with a resolution of n by m, a refresh rate of a r frames   5
per second, a horizontal retrace time of $t_h$ and a vertical retrace time of $t_v$. What is the fraction
of the total m refresh time per frame spent in retrace of the electron beam?

Answer **Any Two** questions

(a) Fill the polygon defined by the vertices A(1,1), B(3,3), C(5,3), D(7,1), E(7,7), F(5,5), G(3,5), H(1,7) using Fence fill algorithm.

(b) Fill the polygon defined by the vertices A(1,1), B(4,4), C(4,1), D(8,5), E(1,5) using Edge fill algorithm.

(c) Illustrate the concept of 'Cell Encoding' with suitable example.

4 (a) Translate the square ABCD whose co-ordinate are A(0,0) B(3,0) C(3,3) and D(0,3) by 2 units in   5
both directions and then scale it by 1.5 units in x-direction and 0.5 units in y-direction.

(b) The reflection along the line y = x is equivalent to the reflection along the x-axis followed by   5
counter clockwise rotation by θ degrees. Find the value of θ.

(a) Given a clipping window A(20,20) B(60,20) C(60,40) D(20,40). Using Sutherland Cohen   5
algorithm find the visible portion of line segment joining the points P(40,80) and Q(120,30).

(b) The pyramid defined by the co-ordinate A(0,0,0) B(1,0,0) C(0,1,0) and D(0,0,1) is rotated 45   5
degree about line L that has the direction V = j + k and passing through the point C(0,1,0). Find
the co-ordinate of the rotated figure.

6. (a) Specify the algorithm for parallel projection. Derive the transformation matrix for homogeneous
co-ordinate.

(b) A Bezier curve is to be drawn given the control points A(40,40) B(10,40) C(60,60) D(60,0).
Calculate the coordinates of the points on the curve corresponding to the parameter t = 0.2, 0.4,
0.6. Draw the rough sketch of the curve and show the coordinates of various points on it.