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

*(An Autonomous Institution affiliated to VTU, Belagavi)*

**Seventh Semester, B.E. - Computer Science and Engineering**

**Semester End Examination; Dec. - 2019**

**Multicore Architecture and Parallel Programming**

*Time: 3 hrs* *Max. Marks: 100*

***Note:** Answer **FIVE** full questions, selecting **ONE** full question from each unit.*

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## UNIT - I

| | | | |
|---|---|---|---|
| 1 | a. | Describe ILP. | 6 |
| | b. | Explain Amdahl's law applied to HT technology. | 7 |
| | c. | Why concurrency in software is important? Give reasons. | 7 |
| 2 | a. | Explain briefly about parallel computing in microprocessors. | 6 |
| | b. | With the neat diagram, describe the relationships among processors, processes and thread. | 6 |
| | c. | Discuss the four types of problems to be addressed, when multithreading is used in programs? | 8 |

## UNIT - II

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|---|---|---|---|
| 3 | a. | Discuss the basic working steps of Floyd and Steinberg's algorithm and give the C language implementation. | 7 |
| | b. | Explain the challenges faced by managing multiple threads and their communication. | 4 |
| | c. | How to transfer the basic error diffusion algorithm into an approach that is more conducive to a parallel solution? | 5 |
| | d. | Define the common parallel programming patterns. | 4 |
| 4 | a. | With a neat diagram, describe deadlock scenario in a state transition for a thread. | 7 |
| | b. | Write the generic form of message passing communication. | 4 |
| | c. | Write a short note on implementation-dependent threading features. | 5 |
| | d. | Discuss the various lock types. | 4 |

## UNIT - III

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|---|---|---|---|
| 5 | a. | How does AfxbeginThread( ) differs from CreateThread( )? | 5 |
| | b. | Explain user-level threading package offered by windows called fibers. | 5 |
| | c. | Why should developers be careful when calling SuspendThread( )? How to safely suspend thread? | 5 |
| | d. | Explain the concept of thread pool with an example in .NET. | 5 |
| 6 | a. | List five levels of thread priority of .NET framework. | 5 |
| | b. | Giving the prototype of each, describe the following Pthread APIs :<br>i) Pthread_create( ) ii) Pthread_detach( ) iii) Pthread_join( ) | 9 |
| | c. | How does program status is indicated using a Pthread semaphore? | 6 |

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**UNIT - IV**

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| 7 | a. | List the factors that threaded application performance with OpenMP is largely depended upon. | 4 |
| | b. | In OpenMP, What are the different ways the memory can be declared as private? | 4 |
| | c. | With a neat diagram, explain task queuing execution model. | 6 |
| | d. | Write a note on performance oriented programming. | 6 |
| 8 | a. | State the different guidelines for debugging OpenMP programs. | 6 |
| | b. | Describe the various compiler switches for OpenMP. | 8 |
| | c. | Explain the four most heavily used OpenMP library functions. | 6 |

**UNIT - V**

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|---|---|---|---|
| 9 | a. | Discuss the different MPI features. | 5 |
| | b. | State the various minimal set of MPI routines. | 5 |
| | c. | Explain the advantages and disadvantages of Message-Passing programming. | 10 |
| 10 | a. | Write a short note on the following : | |
| | | i) Overlapping communication with computation | 8 |
| | | ii) Collective communication and Computation operations | |
| | b. | Discuss blocking message passing operations with a neat diagram. | 8 |
| | c. | Write MPI program that prints out a “Hello world” message. | 4 |

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