MCA
(SEM IV) THEORY EXAMINATION 2017-18
ADVANCED COMPUTER ARCHITECTURE

Time: 3 Hours   *Total Marks: 70*

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   2 x 7 = 14

   a.   What do you mean by parallel computing?
   b.   Define response time and throughput.
   c.   Explain the concept of pipelining.
   d.   What are pipeline hazards?
   e.   What do you mean by vector processors?
   f.   What do you mean by prefix sums?
   g.   Define post synchronization.

SECTION B

2.   **Attempt any *three* of the following:**   7 x 3 = 21

   a.   Explain Flynn's classification of computer architecture and how it is different from Feng's classification?
   b.   What are the hazards that occurs in pipelining in your opinion? Explain.
   c.   Discuss the functional architecture of SIMD multi-processor systems.
   d.   Give the PRAM algorithm for solving a first order linear recurrence :
   $x_i = a_i x_{i-1} + d_i$ for $i = 1, 2, \ldots n$, where the value of $x_0, a_1, a_2, \ldots a_n$ and $d_1, d_2, \ldots d_n$ are given. Assume $x_0 = 0$ and $a_1 = 0$.
   e.   Explain lock mechanisms for pre-synchronization to achieve sole access to a critical section associated with fast and efficient synchronization schemes on a shared memory multiprocessor.

SECTION C

3.   **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   Explain the types of system performance factors in a parallel architecture.
   (b)   How POSIX threats are creating and exiting? Explain.

4.   **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   Explain linear and Non-linear pipeline processors.
   (b)   Discuss memory hierarchy technology. Explain inclusion, coherence and locality properties.

5.   **Attempt any *one* part of the following:**   7 x 1 = 7

   (a)   Explain multi-processing in MIMD mode related to shared variable programming on multi-processors.
   (b)   What are the properties of vector processors? Explain each component of vector-register processors with diagram.

6.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

   (a)   Explain the Bidirectional Gaussian elimination for solving a set of linear algebraic equation.

   (b)   Devise a PRAM algorithm to sort a given array of an element using bubble sort.

7.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

   (a)   Explain parallel execution environment routines.

   (b)   Explain master and synchronization constructs.