

**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  $i=1,2,\dots,n$ , where the value of  $x_0, a_1, a_2, \dots, a_n$  and  $d_1, d_2, \dots, d_n$  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 threads 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.

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