

**B.Tech. – VIEP – COMPUTER SCIENCE AND
ENGINEERING (BTCSVI)**

Term-End Examination

December, 2016

BICS-022 : COMPUTER ARCHITECTURE

Time : 3 hours

Maximum Marks : 70

Note : Attempt any seven questions. All questions carry equal marks.

1. State and discuss the significance of Amdahl's law. What is the major shortcoming in applying Amdahl's law ? 10

2. (a) Define the following performance metrics : 5
 - (i) Clock rate
 - (ii) Clock cycle
 - (iii) Throughput
 - (iv) Response time
 - (v) MIPS

- (b) If machine A runs a program in 10 seconds and machine B runs the same in 15 seconds, how much faster is A than B ? 5

3. (a) What are the factors which must be considered for selecting instruction length ? 6
- (b) What is VLIW architecture ? Explain. 4

4. Write an assembly language notation to evaluate the following expression : 10

$$A = \frac{B - C * D + E}{F}$$

- (a) using a general register computer with two address instructions.
- (b) using an accumulator based computer with one address instruction.
- (c) using a stack organized computer with zero address instruction.
5. Derive a formula for speedup factor of a k-stage pipeline over an equivalent non-pipelined processor. How can the efficiency of this pipeline be evaluated ? Why cannot the pipeline operate at the maximum theoretical rate ? Explain. 10

6. Draw a pipeline configuration to perform the following arithmetic operation.

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

- List the contents of all registers in the pipeline for $i = 1$ through 6. 10

7. Analyze the data dependence of the statements of the following program :

S1 : LOAD RA, M[100] // RA \leftarrow M[100]

S2 : LOAD RB, M[125]

S3 : MULT RA, 3 // RA \leftarrow RA * 3

S4 : STORE M[120], RA // M[120] \leftarrow RA

Also, draw the dependence graph for the same. 10

8. What is scoreboarding technique in a dynamically scheduled pipeline ? Explain. 10

9. Discuss Flynn's taxonomy of parallel computer architecture. Also, discuss the relevance of each type. 10
