Roll No. .....

Z–2993

M. Phil. EXAMINATION, 2016

COMPUTER SCIENCE

Paper Second

(Parallel Computing)

Time : Three Hours] [*Maximum Marks : 100*

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What is transistor ? Describe various types of transistors.

   (b) Describe the working of transistor as a switch.

2. (a) Draw and explain briefly CB, CE and CC configurations of transistor. Describe CE amplifier.

   (b) Describe briefly the working of photodiode and light emitting diode.

3. (a) Pipelining employs which type of parallelism ? Describe various types of parallelism.

   (b) What are the techniques employed to increase the speed of a processor ? Describe Handler's classification of pipelining.

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4. (a) Consider the following pipeline reservation table :

	1	2	3	4
S_1	×			×
S_2		×		
S_3			×	

(i) What are forbidden latencies ?

(ii) Draw the state transition diagram.

(iii) List all simple cycles and greedy cycles.

(iv) Determine the optimal constant latency cycle and the minimal average latency.

(v) Let the pipeline clock period be $\tau = 20$ nS. Determine the throughput of this pipeline.

(b) Explain various types of dependencies with example.

5. (a) Why IBM 360/91 is taken as a learning example ? Draw and explain Functional segmentation of a typical storage-to-register floating point instruction in IBM 360/91.

(b) Calculate CPI, IPC, MIPS of 100 MHz processor using scalar, superscalar, superpipeline, under-pipeline, superscalar superpipeline.

6. (a) What is Pipeline Hazard ? Describe various types of pipeline hazards with examples.

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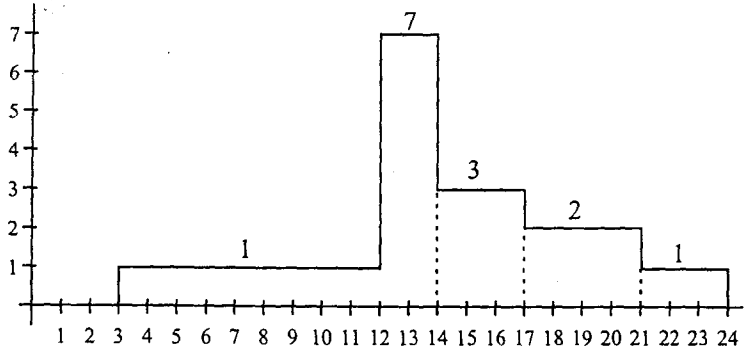
(b) Find Maximum DOP, Average DOP and utilization rate of the following parallelism profile :



7. (a) Multiply the following matrices with Hypercube structure :

$$\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \times \begin{bmatrix} -5 & -6 \\ 7 & 8 \end{bmatrix}$$

(b) Describe routing in Hypercube Interconnection Network.

8. (a) Sort the following numbers on Linear Array and write algorithm :

3, 2, 3, 8, 5, 6, 4, 1

(b) What do you understand by PRAM algorithm ? Write PRAM algorithm for adding :

4, 3, 8, 2, 9, 1, 0, 5, 6, 3

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