



**Sardar Patel Institute of Technology**  
Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India  
(Autonomous College Affiliated to University of Mumbai)

**End Semester Examination**

April / May 2018

Max. Marks: 100

Class: S.E.

Course Code: CE44 / IT42

Name of the Course: Computer Organization and Architecture

Duration: 180 Min

Semester: IV

Branch: Computer / IT

**Instruction:**

- (1) All questions are compulsory
- (2) Draw neat diagrams
- (3) Assume suitable data if necessary

**Synoptic**

Q No.		Max. Marks	CO
Q.1 ( a)	Differentiate between Computer Organization and Computer Architecture. <b>Synoptic:</b> Any Five differences = 5 Marks	05	CO1
Q.1 ( b)	Compare Programmed I/O and Interrupt-driven I/O. <b>Synoptic:</b> Any Five differences = 5 Marks	05	CO5
Q.1 ( c)	What are the types of ROM? Write each in brief. <b>Synoptic:</b> Five types of ROM = 5 x 1 Mark = 5 Marks 1. ROM 2. PROM 3. EPROM 4. EEPROM 5. Flash	05	CO4
Q.1 ( d)	Differentiate Harvard model and Von Neumann model. <b>Synoptic:</b> Any Five differences = 5 Marks	05	CO1
Q.2 ( a)	Solve following using Recoded Multiplier Method. i) (+14) X (-5) <b>Synoptic:</b> 1. Multiplicand = +14 = 0 1 1 1 0 = 1 Mark 2. Multiplier = -5 = 1 1 0 1 1 = 1 Mark 3. Recoded Multiplier = 0 -1 1 0 -1 = 1 Mark 4. Final Answer = -70 = 1 1 1 0 1 1 1 0 1 0 = 2 Marks ii) (-13) X (-20) <b>Synoptic:</b> 1. Multiplicand = -13 = 1 1 0 0 1 1 = 1 Mark 2. Multiplier = -20 = 1 0 1 1 0 0 = 1 Mark 3. Recoded Multiplier = -1 1 0 -1 0 0 = 1 Mark 4. Final Answer = 260 = 0 0 0 1 0 0 0 0 0 1 0 0 = 2 Marks	10	CO2

	<p style="text-align: center;"><b>OR</b></p> <p>Draw the flowchart and Perform <math>25 \times (-16)</math> using Booth's multiplication algorithm.</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Flowchart of Booth's Multiplication = 3 Marks</li> <li>2. Multiplier = <math>-16 = 110000 = 1</math> Mark</li> <li>3. Multiplicand = <math>25 = 011001 = 1</math> Mark</li> <li>4. Final Answer using Booths Algorithm = <math>-400 = 111001110000 = 5</math> Marks</li> </ol>	10	CO2
Q.2 ( b )	<p>Draw the flowchart of Non-Restoring Division method. Solve following example with using non-restoring method. Dividend = 23 Divisor = -5</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Flowchart of Non-Restoring Division = 3 Marks</li> <li>2. Dividend = <math>23 = 010111 = 1</math> Mark</li> <li>3. Divisor = <math>-5 = 1011 = 1</math> Mark</li> <li>4. Final Answer using Non-Restoring - Quotient = <math>-4 = 1100</math> Remainder = <math>3 = 0011 = 5</math> Marks</li> </ol>	10	CO2
Q.3 ( a )	<p>What are the different design methods for Hardwired Control Units? Explain any one method in detail.</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Diagram of Typical Hardwired Control Unit = 2 Mark</li> <li>2. Enlist - = 2 Marks               <ol style="list-style-type: none"> <li>i) State-table method</li> <li>ii) Delay Element method</li> <li>iii) Sequence-Counter method</li> <li>iv) PLA method</li> </ol> </li> <li>3. Explanation of any one method = 6 Marks</li> </ol> <p style="text-align: center;"><b>OR</b></p> <p>How is the Wilkes microprogrammed control unit works? Write advantages and disadvantages of it.</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Diagram = 2 Marks</li> <li>2. Explanation = 4 Marks</li> <li>3. Advantages and disadvantages = 4 Marks</li> </ol>	10	CO3
Q.3 ( b )	<p>What are the features of RISC and CISC processors?</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Features of RISC = 5 marks</li> <li>2. Features of CISC = 5 marks</li> </ol>	10	CO3
Q.4 ( a )	<p>What are the different cache memory mapping techniques? Consider a cache consisting of 256 line of 16 words each, for a total of 4096 words and assume that the main memory is addressable by 16-bit address and it consists of 4 blocks. How many bits are there in each of the Tag, Line/Set and Word field of different cache memory mapping techniques? (Assume 2 way Set - Associative)</p>	10	CO4



	<p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Enlist 3 mapping techniques = 1 Mark</li> <li>2. Direct Memory Access = Tag - 4 bits, Line - 8 bits, Word - 4 bits (3 Marks)</li> <li>3. Associative = Tag - 12 bits, Word - 4 bits (3 Marks)</li> <li>4. Set Associative = Tag - 5 bits, Line - 7 bits, Word - 4 bits (3 Marks)</li> </ol> <p style="text-align: center;"><b>OR</b></p> <p>Find miss ratio and hit ratio using LRU and FIFO page replacement policy for the following referencing stream - 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1 . Consider i) Frame size = 3 ii) Frame size = 4</p> <p><b>Synoptic:</b></p> <p><b>FIFO :</b></p> <ol style="list-style-type: none"> <li>1. Frame size = 3 : Miss ratio = 15 / 20, Hit Ratio = 5 / 20 (2.5 Marks)</li> <li>2. Frame size = 4 : Miss ratio = 12 / 20, Hit Ratio = 8 / 20 (2.5 Marks)</li> </ol> <p><b>LRU :</b></p> <ol style="list-style-type: none"> <li>1. Frame size = 3 : Miss ratio = 12 / 20, Hit Ratio = 8 / 20 (2.5 Marks)</li> <li>2. Frame size = 4 : Miss ratio = 9 / 20 , Hit Ratio = 11 / 20 (2.5 Marks)</li> </ol>	10	CO4
Q.4 ( b )	<p>Explain the High order interleaving and Low order interleaving memory techniques.</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Diagram and explanation of High order Interleaved memory (4 Marks)</li> <li>2. Diagram and explanation of Low order Interleaved memory (3 marks)</li> </ol>	10	CO4
Q.5 ( a )	<p>Give the Working of ARM architecture.</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Diagram of ARM (3 Marks)</li> <li>2. Register Organization (3 Marks)</li> <li>3. Explanation of Diagram and register modes (4 Marks)</li> </ol>	10	CO1
Q.5 ( b )	<p>What is Instruction pipelining and it's advantages? What are the types of pipeline hazards and Discribe any one in detail.</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Instruction Pipelining (4 Marks)</li> <li>2. Enlist Pipeline hazards (1 Marks)</li> <li>3. Explanation of any one (5 Marks)</li> </ol> <p style="text-align: center;"><b>OR</b></p> <p>Why Flynn's Classification is required? Give the working of each and write the advantages and disadvantages of it.</p> <p><b>Synoptic:</b></p> <ol style="list-style-type: none"> <li>1. Flynn's Classification - Instruction Stream and Data Stream (2 Marks)</li> <li>2. Explanation of SISD, SIMD, MISD, MIMD (8 Marks)</li> </ol>	10	CO6