Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India

Autonomous College Affiliated to University of Mumbai)

Mid Semester Evaluation (Synoptic)

Mar 2018

Max. Marks: 30 **Class:** S.E.

Course Code: CE44 / IT42 **Name of the Course:** Computer Organization and Architecture

Semester: IV **Branch:** Computer / IT

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1. Embedded System is a combination of computer hardware and software. Give in detail possible organization of Embedded System CO-1 [5M]

Synoptic:

1. Diagram of possible Organization of ES = 2
2. Explain any 3 components from – Auxillary System, Diagnostic Port, D/A Converter, A/D Converter, Sensor, Actuators, FPGA/ASIC, Memory, Processor = 3M

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2. With neat diagram, describe the Harvard Model CO-1 [5M]

Synoptic:

1. Diagram of Harvard Model = 2M
2. Storage for Data Memory and Program Memory = 2M
3. Give difference between Harvard and Von Numann Model = 1M

OR

2. Draw and explain in brief Von Numann Architecture CO-1 [5M]

Synoptic:

1. Diagram of IAS computer = 2M
2. Explain three components – Memory, ALU and I/O device = 3M

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3. Divide 145 by 13 in binary 2's complement notation, using 12 bits. CO-2 [5M]

Synoptic:

1. Binary 2's complement representation of 145 and 13 = 1M
2. Step by Step execution of Restoring / Non-restoring Division algorithm = 3M
3. Correct value for Quotient = and Remainder = 1M

OR

3. Explain Booth's Multiplication approach with example. CO-1 [5M]

Synoptic:

1. Booth's Hardware circuit = 2M
2. Booth's Flowchart = 1M
3. Solved Example = 2M

4. The following numbers use the IEEE 32-bit floating point format. What is the equivalent decimal value. **CO-2** **[5M]**

A. 1 10000011 11000000000000000000000
B. 0 01111110 10100000000000000000000

Synoptic: 2.5M each

A. 1 10000011
11000000000000000000000
$10000011=(131)_{10}$
Now subtract 127 from 131= 131-127=4
$-(1.11000000000000000000000)_2 \times 2^4$
$-(11100.00000000000000000000)_2 \times 2^4 \times 2^{-4}$
$= -(11100.00000000000000000000) = (-28.0)_{10}$

B. 0 01111110 10100000000000000000000
01111110=126
Now 126 – 127= -1
$=1.10100000000000000000000 \times 2^{-1}$
$= 0.11010000000000000000000 \times 2^{-1} \times 2^1$
$=0.11010000000000000000000 = 0.5+0.25+0.0625 = 0.8125$

5. Explain the basic Instruction Cycle **CO-3** **[5M]**

Synoptic:

1. Diagram = 1M
2. Explain 4 stages Fetch, Indirect, Execute and Interrupt = 4M

6. Discuss Register Organization in detail. **CO-3** **[5M]**

Synoptic:

1. Two roles – A) User-visible and Registers B) Control and Status Registers = 1M
2. User-visible registers – General purpose, Data, Address and Condition Code = 2M
3. Control and Status Register – PC, IR, MAR, MBR, Sign, Zero, Carry, Overflow = 2M