

## III B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010 COMPUTER ORGANIZATION (COMMON TO ECE, EIE, ETM)

#### **Time: 3hours**

Code.No: 07A5EC07

Max.Marks:80

# Answer any FIVE questions All questions carry equal marks

- 1.a) Explain clearly the terms Computer Organization, Computer Architecture and Computer System Design.
- b) Explain about the "sign magnitude" and "2's compliment" representations used for the fixed point numbers. Which among the above is most preferred and why? [8+8]
- 2.a) With the help of neat block diagrams explain the hardware that implements the following register transfer statement:  $yT_2: R2 \leftarrow R1, R1 \leftarrow R2$ .
  - b) What is a Register stack? Explain with relevant illustrations and examples. [8+8]
- 3.a) Write about the Control memory in detail.
  - b) Compare and contrast hardwired control and micro-programmed control. Is it possible to have a hardwired control associated with a control memory? [8+8]
- 4.a) Perform the arithmetic operations given below with binary and negative numbers in signed-2's complement representation. Use seven bits to accommodate each number together with its sign.

i) (-53) + (-80) ii) (-53) - (+80)

- b) Explain the decimal division algorithm flowchart with a suitable example. [8+8]
- 5.a) A digital computer has a memory unit of 64K x 16 and a cache memory of 1K words. The cache uses direct mapping with a block size of four words.
  - i) How many bits are there in the TAG, INDEX, BLOCK and WORD fields of the address format?
  - ii) How many bits are there in each word of cache, and how are they divided into functions? Include a valid bit.
  - b) Explain how the associative memory page table is used for effective storage utilization.

[8+8]

- 6.a) What is an Input-Output interface? Explain the isolated versus memory-mapped I/O.
  - b) Write about the character-oriented protocol for the purpose of serial communication.

[8+8]

- 7.a) Explain the instruction pipeline in detail with an example.
  - b) What is Vector processing? Explain how vector processing is related to supercomputer.

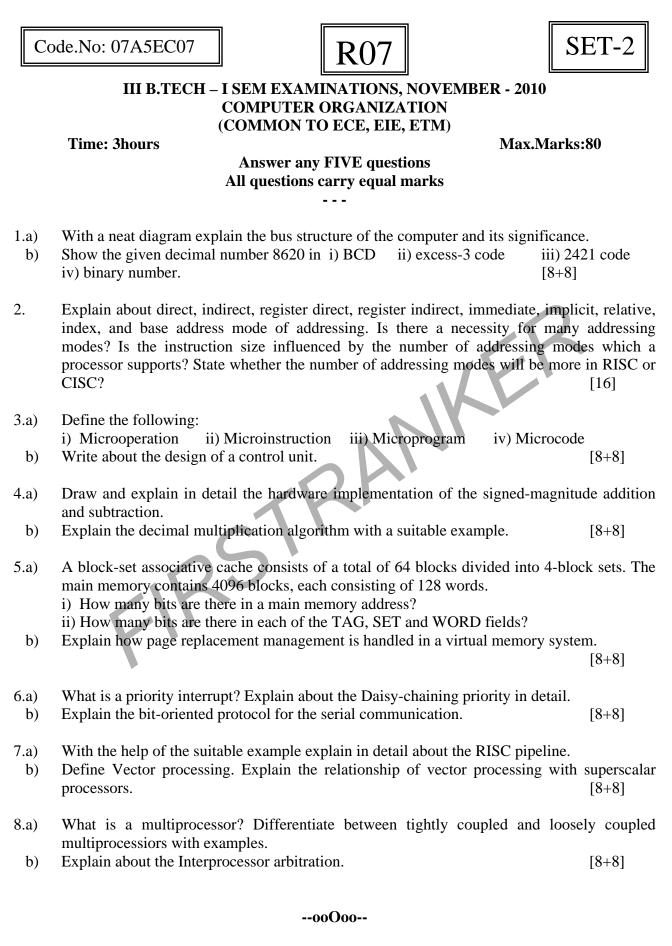
[8+8]

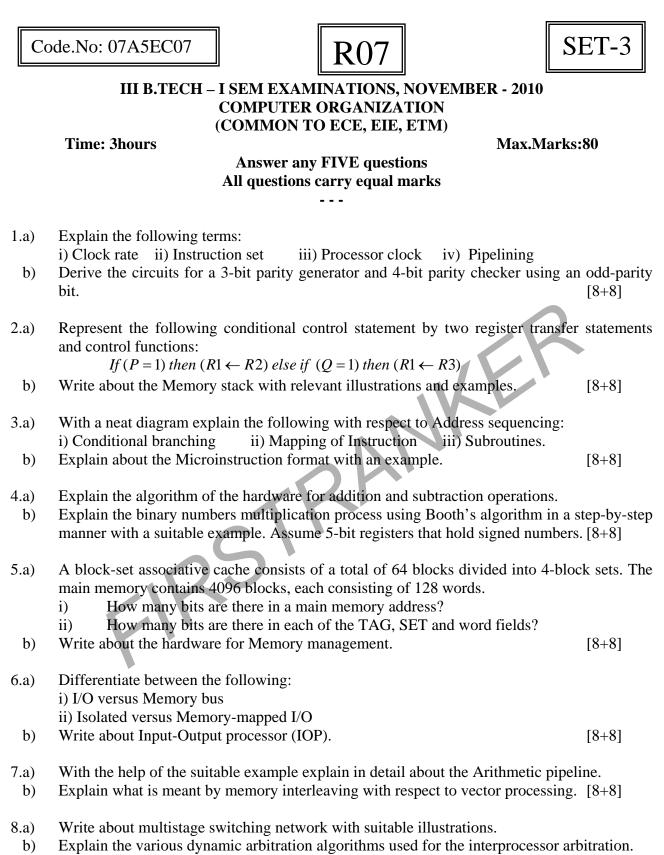
- 8.a) Define a multiprocessor. Explain clearly the characteristics of multiprocessors.
- b) Write about cache coherence.

[8+8]

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[8+8]

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[8+8]

[6+5+5]

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- 1.a) With a neat diagram and example of an operation, explain clearly how the basic operations are performed in a computer in terms of the processor and memory.
- b) Derive the circuits for a 3-bit parity generator and 4-bit parity checker using an even-parity bit. [8+8]
- 2.a) Define a micro operation. Explain clearly at least four logic micro operations with examples.
- b) With an example clearly explain the following address modes: i) Direct ii) Indirect iii) Relative iv) Indexed. [8+8]
- 3.a) Explain about the address sequencing with neat illustration.
  - b) Explain the difference between a microprocessor and a microprogram? Is it possible to design a microprocessor without a microprogram? Are all microprogrammed computers also microprocessors?
    [8+8]
- 4.a) Explain the Booth's algorithm for the binary numbers multiplication process using a suitable example. Assume 5-bit registers that hold signed numbers.
  - b) Explain the decimal division algorithm with a suitable example. [8+8]
- 5.a) A digital computer has a memory unit of 64K x 16 and a cache memory of 1K words. The cache uses direct mapping with a block size of four words.
  - i) How many bits are there in the TAG, INDEX, BLOCK and WORD fields of the address format?
  - ii) How many bits are there in each word of cache, and how are they divided into functions? Include a valid bit.
  - b) Write about the Virtual memory.

# 6. Explain the following:

- a) Direct Memory Access.
- b) Isolated versus memory-mapped I/O
- c) CPU –IOP communication.
- 7.a) What is parallel processing? Explain the significance of parallel processing. List the Flynn's classification of computers.
  - b) Define Array processors. Explain how are attached array processors different from SIMD array processors? [8+8]
- 8.a) What are Interconnection structures? Explain the scheme Crossbar switch in detail.
- b) Write about the Interprocessor arbitration. [8+8]

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