

Printed pages: 02

Sub Code: NCS 505

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 No.

B.TECH
(SEM V) THEORY EXAMINATION 2017-18
COMPUTER ARCHITECTURE

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If any missing data is required, then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- a. What is meant by synchronous and asynchronous communication?
- b. Describe magnetic disk?
- c. What is instruction cycle?
- d. Discuss floating point number representation.
- e. Explain concept of memory transfer.
- f. What are various types of registers?
- g. Define bus arbitration. What the different types are of bus arbitration do you know?
- h. What is auxiliary memory? Explain.
- i. What is vertical microprogramming?
- j. How many 128X8RAM chips are needed to provide memory capacity of 2048 bytes?

SECTION B

2. Attempt any three of the following: 10 x 3 = 30

- a. Explain General Register Organization with the help of suitable diagram.
- b. What is interrupt? What are the different types of interrupts?
- c. Describe the following organizations of cache memory:
 - (i). Associative mapping
 - (ii). Direct Mapping
 - (iii). Set associative mapping
- d. A digital computer has a memory unit of 64K X 16 and a cache memory of 1K words. The cache uses direct mapping with block size of four words.
 - (i). How many bits are there in tag, index, block and word fields of the address format?
 - (ii). How many bits are there in each word of cache, and how they are divided into functions? Include a valid bit.
 - (iii). How many blocks can the cache accommodate?
- e. Discuss stack organization. Explain the following in details.
 - (i) Register stack
 - (ii) Memory stack

3. Attempt any one part of the following: 10 x 1 = 10

- Discuss Booth's algorithm. Multiply (-7) and (3) using Booth's algorithm.
- Consider a two level memory hierarchy of the form (M_1 , M_2) where M_1 is connected directly to the CPU. Determine the average cost per bit C and average access time t_a for the data given below:

| Level(i) | Capacity(S_i) | Cost(C_i) | Access time (t_{ai}) | Hit Ratio(H) |
|---------------|-------------------|---------------|--------------------------|--------------|
| M_1 (Cache) | 1024 | 0.1000 | 10^{-8} | .9000 |
| M_2 (Main) | 2^{16} | 0.0100 | 10^{-6} | - |

4. Attempt any one part of the following: 10 x 1 = 10

- Discuss control word with suitable example.
- Describe I/O interface.

5. Attempt any one part of the following: 10 x 1 = 10

- What is DMA in computer architecture?
- Draw and explain 2D and 2-1/2D RAM chip

6. Attempt any one part of the following: 10 x 1 = 10

- What is Virtual Memory? Why is it necessary to implement virtual memory? What is use of page replacement algorithm?
- What is difference between I/O mapped input/output and memory mapped I/O? What are the advantages and disadvantages of each?

7. Attempt any one part of the following: 10 x 1 = 10

- Write a program to evaluate arithmetic expression

$$X = (A - B) * ((C - D) / F) / G$$
 Using a general register computer with three, two, one & zero address instructions.
- Describe the following control units
 - Hardwired control unit
 - Microprogrammed control unit