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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 x10 = 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

SECTION C

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

- (a) Discuss Booth's algorithm. Multiply (-7) and (3) using Booth's algorithm.
- (b) Consider a two level memory hierarchy of the form (M₁, M₂) where M₁ 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

- (a) Discuss control word with suitable example.
- (b) Describe I/O interface.

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

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

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

- (a) What is Virtual Memory? Why is it necessary to implement virtual memory? What is use of page replacement algorithm?
- (b) 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

- (a) 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.
- (b) Describe the following control units
 - (i). Hardwired control unit
 - (ii). Microprogrammed control unit