Exam. Code : 206701
Subject Code : 3665

M.Sc. Computer Science 1st Semester

ADVANCED COMPUTER ARCHITECTURE

Paper : MCS-102

Time Allowed—3 Hours] [Maximum Marks—100

Note :— Attempt any **five** questions, selecting at least **one** question from each section. All questions carry equal marks.

SECTION—A

1. (a) Discuss the functional structure of an SIMD Array Processor. How it is different from MIMD Multiprocessor system ?

   (b) Differentiate between Vector Processor and Systolic processor.

2. (a) Explain Kung's software taxonomy in detail.

   (b) How SPMD is related with MIMD ?

SECTION—B

3. Discuss different available parallel computing models in brief. Explain the working of PRAM in detail.

4. Explain system architecture of a Uniprocessor Computer with example.

SECTION—C

5. "A Pipeline Computer performs overlapped computations to exploit temporal parallelism". Discuss.

6. Differentiate between :

   (a) Parallelism versus Pipelining.

   (b) Serial Processing versus Parallel Processing.

SECTION—D

7. Explain with the help of suitable example :

   (a) Arithmetic Pipelining

   (b) Instruction Pipelining

   (c) Processor Pipelining.

8. How various Pipeline problems can be solved with the help of Reservation Table in Linear Pipeline ? Discuss.

Exam. Code : 206701

Subject Code : 3667

M.Sc. Computer Science Ist Semester

MCS-104 DISCRETE STRUCTURES

Time Allowed—3 Hours] [Maximum Marks—100

Note :—Attempt **five** questions in all, taking at least **one** from each Section. All questions carry equal marks.

SECTION—A

1. (a) Let $f : X \to Y$ is a function. What does it mean to say that f has an inverse function ? Give a necessary and sufficient condition for f to have an inverse function.

   (b) Let $A = \{a, b, c, d, e\}$, $g = \{e, f, g, h\}$ and $C = \{a, c, h, e\}$ be the three sets. Prove that

   $$|A \cup B \cup C| = |A| + |B| + |C| - |A \cap B| - |B \cap C| - |A \cap C| + |A \cap B \cap C|$$

   where $|A|$ represents cardinality of set A.

2. For two positive integers, we write $m < n$ if the sum of the (distinct) prime factors of the first is less than or equal to the product of the (distinct) prime factors of the second. For instance, $75 < 14$, because $3 + 5 \leq 2 \times 7$.

   (a) Is this relation reflexive ? Explain.

   (b) Is this relation anti-symmetric ? Explain.

   (c) Is this relation transitive ? Explain.

SECTION—B

3. (a) Define complete binary tree. What is the total number of nodes in a binary tree of height h ?

   (b) State the criteria to detect the planarity of a connected graph and give an example also.

4. (a) What are the steps involved in deriving a minimum spanning tree using Kruskal's algorithm.

   (b) "The cost of minimum spanning tree is unique, but the minimum spanning tree may not be unique". Justify the comment.

SECTION—C

5. Four playing cards Club A, Heart J, Spade Q and Diamond K are arranged in a row.

   (a) List all the possible permutations.

   (b) How many different permutations are there ?

6. Solve the recurrence relation :

   $a_n - 7a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$ for $n \geq 2$.

SECTION—D

7. (a) What is the characteristic of a ring ? What makes a ring commutative and/or a ring with unity ?

   (b) What are integral domains and fields ? Can you think of a ring that isn't an integral domain or an integral domain that isn't a field ?

8. What are logic circuit (LC) and switching functions (SF) in Boolean algebra ? Explain the application of Boolean algebra in LC and SF, by taking appropriate examples.