MALLA REDDY UNIVERSITY

School of Engineering (CSE-IOT)
II Year B. Tech - I Semester
Subject Name: Computer Organization and Architecture
Subject Code: MR20-1IT0147

Question Bank

Unit-I

1. Convert the following to decimal to octal
   (a) $(2A7)_{16}$ (b) $(1AB)_{16}$ (c) $(10110111)_2$ (d) $(11011010)_2$ (e) $(496)_{10}$ (f) $(777)_{16}$
2. (a) Explain the D-Flipflop with truth table and excitation table.
   (b) Implementation of half adder using 4 NAND gates.
3. (a) Design and explain about JK flipflop.
   (b) Obtain the complement of the following Boolean functions
   (i) $X^1Y^1 + XYZ + XZ^1$ (ii) $(A^1B^1+C^1)^1 + C + AB + DC$
   (iii) $W^1X\,(Z^1+ Y^1Z) + Y(W+ W^1YZ)$ (iv) $(A^1 + C)(A^1 + C^1)(A + B + C^1D)$
4. Explain the functionalities and applications of the following:
   (i)Decoders (ii) Encoders (iii) Multiplexers (iv) De-multiplexers

Unit-II

1. What is meant by Memory-Reference instructions? Explain.
2. Briefly explain the registers in basic computer with a neat diagram.
3. Describe Instruction cycle with a neat sketch.
4. Explain with diagram about Computer Description.
5. Describe the Design of Accumulator Logic

Unit-III

1. Explain data transfer and manipulation instructions?
2. What is direct memory transfer? Give an overview and the block diagram of a DMA controller.
3. Briefly explain the different instruction formats with suitable examples.
4. What are addressing modes? Explain the various addressing modes with examples.
5. Explain the general register organization of the processor.

Unit-IV

1. What is direct memory transfer? Give an overview and the block diagram of a DMA controller.
2. a) Write short notes on I/O devices.

b) Explain the strobe control method of asynchronous data transfer.

3. Discuss about priority interrupt.
4.. What is meant by handshaking? Explain with neat diagram.
5. Explain about Input output interface?
6. Discuss about the modes of transfer

Unit-V

1. Explain about the virtual memory?
2. Explain the cache memory?
3. What is the associate memory and what kind of operation it is more suitable?
4. Explain the need of the memory hierarchy.
5. Distinguish between Main memory and Auxiliary memory.

MALLA REDDY UNIVERSITY
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SCHOOL OF ENGINEERING
Subject Name: Data Base Management System (AIML/CSE/DS/CS)
Subject Code: MR20-1CS0101

Question Bank

UNIT–I: Introduction to DBMS& Data Models

1. Describe the Structure of Database Management system with a neat diagram (S) 10M
2. a) What is meant by Data Abstraction? Describe various levels of Data Abstraction (S) 5M
   b) Define Data Independence. Describe Physical Data Independence and Logical Data (S) 5M
3. What is Data Model? List out various Data Model and explain with suitable example (S) 10M
4. a) Describe the Structure of Database Management system with a neat diagram. (S) 7M
   b) List out various applications of Database Management Systems. (S) 3M
5. Explain the differences between files system data management and database systems. (S) 10M

UNIT–II: ER-Model & Relational Model

1. Describe the components of entity-relationship diagram with suitable examples. (S) 10M
2. Explain the following in ER-Model:
   a. Aggregation (M) 5M
   b. Class Hierarchies (M) 5M
3. Explain the process of converting ER Diagram into a Table, explain with example. (C)
4. Explain the different integrity constraints used in Relational Model. (M) 10M
5. a. Explain in detail about Basic Operations of Relation Algebra with Examples(M) 5M
   b. Define a view, how a view is created from single table and multiple tables? (M) 5M

UNIT–III: Structured Query Language (SQL)

1. Explain various Data Definition Commands (DDL) in detail with its syntax. (S) 10M
2. Explain Data Manipulation Commands (DML) with syntax and examples. (S) 10M
3. a) Explain how Order By , Group By , Having Clauses used in SQL (M) 6 M
   b) Briefly explain about TCL and DCL Commands in SQL. (S) 4 M
4. How would you use the operators IN, EXISTS, UNIQUE, ANY and ALL in Writing nested queries? Why are they useful? Explain with an example. (C) 10M
5. a) Explain various types of Joins available in SQL with examples. (M) 5M
   b) Consider following relations and write SQL queries for given statements. (M) 5M

   Assume suitable constrains:

   Instructor (ID, Name, Dept_name , Salary)

   Teaches (ID, Course_id, Sec_id, Semester (even/odd),Year)

i) Find the average salary of the instructors in computer department.

ii) Find the number of instructors in each department who teach a course in even semester of 2016.

iii) Find the names of instructor with salary amounts between 30000 and 50000.

iv) Find the minimum and maximum Salary in each department.

v) Find the Instructor names that start with letter “A”

UNIT–IV: Schema Refinement &Normalization

1. What are the problems caused by Redundancy? Explain about Normalization and need fornormalization. (M) 10M
2. Define Axioms of Functional Dependencies. (S) 4M
   Consider a relation R (A, B, C, D, E, F, G) with the functional dependencies-
   $A \rightarrow BC$
   $BC \rightarrow DE$
   $D \rightarrow F$
   $CF \rightarrow G$
   Find all candidate keys in relation R. (M) 6M
3. Explain about Third NF and BCNF with relevant table structure. (M) 10M
4. Explain the following: Multi-valued dependencies and fourth normal forms. 10M
5. a. Write a short notes Decomposition and its types. (M) 5M
   b. Given a relation R(P, Q, R, S, T, U, V, W, X) and Functional Dependency set FD = {$PQ \rightarrow R$, $QS \rightarrow TU$, $PS \rightarrow VW$, and $P \rightarrow X$}, determine the given R is in which normal form? (C) 5M

UNIT–V: Transaction Management and Concurrency Control

1. What is transaction? Explain the ACID Properties. (M) 10M
2. Define Concurrency control. Explain different concurrency control. (C) 10M
3. a. What are the different types locking? (C) 5M
   b. Explain Lock-based Concurrency control with diagram. (C) 5M
4. Explain about concurrency control based on time-stamp ordering. (C) 10M
5. What is Serializability? Explain different types of Serializability with examples.(C) 10M

* (S) – Simple
* (M) - Medium
* (C) - Complex

Discrete Mathematics Question Bank

Unit I – Sets and Relations

Ques. 1 In a survey of 120 people, it was found that:

65 read *Newsweek* magazine, 20 read both *Newsweek* and *Time*,
45 read *Time*, 25 read both *Newsweek* and *Fortune*,
42 read *Fortune*, 15 read both *Time* and *Fortune*,
8 read all three magazines.

(i) Find the number of people who read at least one of the three magazines.
(ii) Draw its Venn diagram.
(iii) Find the number of people who read exactly one magazine.

Ques. 2 (a) If A = {1,1,2,2,2,3,3,3,3}and B = {1,1,1,0,0,2,2} then find

$(i)(A\cup B)$ $(ii)(A\cap B)$ $(iii)(A+B)$ $(iv)(A-B)$

(b) If A = {1, 2, 3, 4} and B = {x, y, z}. Let R be the following relation from A to B:

R = {(1, y), (1, z), (3, y), (4, x), (4, z)}

(i) Determine the matrix of the relation.
(ii) Draw the arrow diagram of R.

Ques. 3 (a) If A, B and C are given sets, prove that

$$(A\cap B)=B-(B-A) \text{ and } \overline{A\cup(B\cap C)}=(\overline{C}\cup\overline{B})\cap\overline{A}.$$

(b) Explain the concept of congruence modulo 'm'. Let I = {0, 1, 2} be a given set and the functions f and g are defined from I to I as follows: For all x in I, $f(x)=(x^2+x+1)\bmod 3$ and $g(x)=(x+2)^2 \bmod 3$. State whether $f=g$.

Ques. 4 (a) Prove that for any positive integer m, the relation congruence modulo m is an equivalence relation on the integers.

(b) If X = {1, 2, 3, 4, 5, 6, 7} and R is a relation defined as $(x,y)\in R$ iff $x-y$ is divisible by 3. Find the elements of R and show that R is an equivalence relation.

Ques. 5 (a) Prove that $f(x)=5x^3-1$ is a one-one function from $R\to R$ where R is set of real numbers. Also, prove that $f^{-1}\circ g^{-1}=(g\circ f)^{-1}$ for $f,g:Q\to Q$ such that $f(x)=2x$ and $g(x)=x+2$.

(b) Define function and inverse functions. Show that the functions $f:R\to(1,\infty)$ *and* $g:(1,\infty)\to R$ defined by $f(x)=3^{2x}+1$, $g(x)=\frac{1}{2}\log_3(x-1)$ are inverses.

Unit II – Mathematical Logic and Induction

Ques. 1 (a) Define logical equivalence and show that $\sim(p \vee q)$ and $(\sim p \wedge \sim q)$ are logically equivalent.

(b) What are the contrapositive, the converse, and the inverse of the conditional statement "The home team wins whenever it is raining."?

Ques. 2 (a) Show that

(i) $(p \veebar q) \vee (p \leftrightarrow q)$ is a tautology,

(ii) $(p \veebar q) \wedge (p \leftrightarrow q)$ is a contradiction,

(iii) $(p \veebar q) \wedge (p \rightarrow q)$ is a contingency.

(b) Prove the formula $\frac{n(n+1)}{2}$ for the sum of the first *n* positive integers using mathematical Induction.

Ques. 3 (a) Consider these statements, of which the first three are premises and the fourth is a valid conclusion.

"All hummingbirds are richly coloured."
"No large birds live on honey."
"Birds that do not live on honey are dull in colour."
"Hummingbirds are small."

Assuming that the domain consists of all birds, express the statements in the argument using quantifiers.

(b) Show that the premises

"If you send me an e-mail message, then I will finish writing the program",
"If you do not send me an e-mail message, then I will go to sleep early",
"If I go to sleep early, then I will wake up feeling refreshed"

lead to the conclusion "If I do not finish writing the program, then I will wake up feeling refreshed."

Ques. 4 (a) Define quantifiers and symbolize the following argument and check for its validity:

All Men are fallible.
All Kings are Men.
Therefore, all Kings are fallible.

(b) Explain universal and existential quantifiers. Symbolize the following argument and check for its validity:

Lions are dangerous animals.
There are Lions.
Therefore, there are dangerous animals.

Ques. 5 (a) Conjecture a formula for the sum of the first *n* positive odd integers. Then prove your conjecture using mathematical induction.

(b) Using strong mathematical induction prove that the function $b(n) = 2(3)^n - 5$ is the unique function defined by

(1) $b(0) = -3,\ b(1) = 1$, and

(2) $b(n) = 4b(n-1) - 3b(n-2)$ for $n \geq 2$.

UNIT III – Elementary Combinatorics

Ques. 1 (a) Suppose that a saleswoman has to visit eight different cities. She must begin her trip in a specified city, but she can visit the other seven cities in any order she wishes. How many possible orders can the saleswoman use when visiting these cities?

(b) The license plates of a certain state require 3 English letters followed by 4 digits, how many different plates can be manufactured (i) if repetition of letters and digits are allowed? (ii) if only the letters can be repeated? (iii) if only the digits can be repeated? (iv) if no repetitions are allowed at all?

Ques. 2 (a) In how many ways can we draw a heart or a spade from an ordinary deck of playing cards? A heart or an ace? An ace or a king? A card numbered 2 through 10? A numbered card or a king?

(b) In how many ways can 7 women and 3 men be arranged in a row if the 3 men must always stand next to each other?

Ques. 3 (a) Suppose that there are 9 faculty members in the mathematics department and 11 in the computer science department. How many ways are there to select a committee to develop a discrete mathematics course at a university if the committee is to consist of three faculty members from the mathematics department and four from the computer science department?

(b) Enumerate the number of ways of placing 20 indistinguishable balls into 5 boxes where each box is nonempty.

Ques. 4 (a) In how many ways can 23 different books be given to 5 students so that 2 of the students will have 4 books each and the other 3 will have 5 books each?

(b) Prove the following identities: (i) $C(n+1, r) = C(n, r-1) + C(n, r)$,

(ii) $C(m+n, 2) - C(m, 2) - C(n, 2) = mn$.

Ques. 5 (a) How many solutions will be possible for $x_1 + x_2 + x_3 + x_4 + x_5 = 25$ such that $x_1 > 1,\ x_2 > 2,\ x_3 > 3,\ x_4 > 4,\ x_5 > 5$?

(b) Find the coefficient of $x_1^2 x_3 x_4^3 x_5^4$ in $(x_1 + x_2 + x_3 + x_4 + x_5)^{10}$.

(ii) $C(m+n, 2) - C(m, 2) - C(n, 2) = mn$.

Unit IV – Advanced Counting Techniques

Ques. 1 (a) Find the solution of the recurrence relation $a_n = a_{n-1} + n(n-1)$, $a_0 = 1$, $n \geq 1$.

(b) Solve $a_n - a_{n-1} - 2a_{n-2} = 2^n$, $n \geq 2$.

Ques. 2 (a) Solve the Tower of Hanoi recurrence relation $a_n = 2a_{n-1} + 1$ with $a_1 = 1$, $n \geq 2$.

(b) Write the recurrence relation for the Fibonacci numbers and find its solution.

Ques. 3 (a) Using generating function, solve the recurrence relation $a_n - 9a_{n-1} + 20a_{n-2} = 0$ for $n \geq 2$ with $a_0 = -3$, $a_1 = -10$.

(b) Solve the recurrence relation $a_k = 3a_{k-1}$ for $k = 1, 2, 3, \ldots$ and initial condition $a_0 = 2$ using generating functions.

Ques. 4 (a) Solve the Divide and Conquer recurrence relation $a_n = ca_{\frac{n}{d}} + e$ for $a_1 = e, c \neq 0$ & $n = d^k$ where c, d & e are constants.

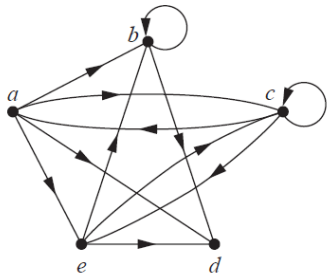
(b) Solve the recurrence relation $a_n - 5a_{n-1} + 6a_{n-2} = n^2.4^n$, $n \geq 2$.

Ques. 5 (a) Compute how many integers between 1 and 1000 are divisible by none of the 5, 6 and 8.

(b) Find the number of integral solutions of the equation $x_1 + x_2 + x_3 = 20$ such that $2 \leq x_1 \leq 5, 4 \leq x_2 \leq 7, -2 \leq x_3 \leq 9$.

Unit V – Graphs

Ques. 1 (a) Write the adjacency list for the following directed graph



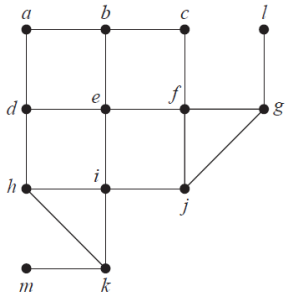
(b) How many vertices and edges must a graph have if its degree sequence can be written as 4; 4; 3; 3; 3; 2; 1?

Ques. 2 (a) Suppose that a connected planar simple graph has 20 vertices, each of degree 3. Into how many regions does a representation of this planar graph split the plane?

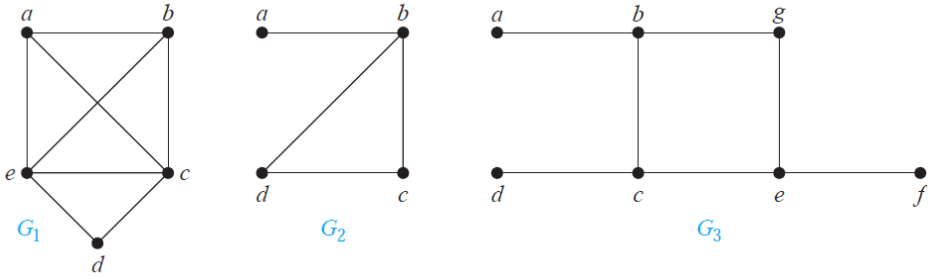
(b) How to represent a graph with the help of adjacency matrix? Explain with the help of an example.

Ques. 3 (a) Form a binary search tree for the words *mathematics, physics, geography, zoology, meteorology, geology, psychology*, and *chemistry* (using alphabetical order).

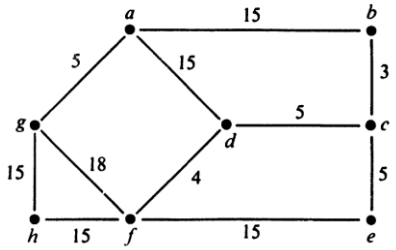
(b) Use breadth-first search to find a spanning tree for the following graph:



Ques. 4 (a) Which of the following graphs have a Hamilton circuit or, if not, a Hamilton path? State your reason.

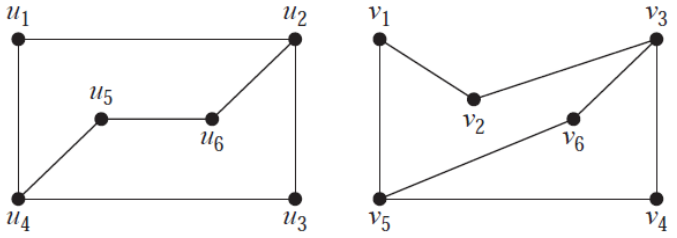


(b) State Kruskal's algorithm and using this determine spanning tree for the following graph:



Ques. 5 (a) State and prove Euler's formula.

(b) Show that the following graphs are isomorphic:



For all the UNITS
BASIC – Ques. 1 and 2
MODERATE– Ques. 3 and 4
DIFFICULT – Ques. 5

MALLA REDDY UNIVERSITY
School of Engineering
Question Bank
Department of AIML

Subject: Data Structures Using Python **Subject Code: MR20-1CS0102**

UNIT-1

1) What is OOPS? Explain the OOPs concepts with examples?
2) What is inheritance? Explain various types of inheritance with examples?
3) What is data structure? Explain the classification of data structures?
4) Explain comprehensions and its types with examples?
5) Define array and list? Differentiate between array and list?
6) What is Constructor? Explain with example?

UNIT-2

1) Explain single linked list and its operations with examples and Program?
2) Explain double linked list and its operations with Examples and Program?
3) Define stack and explain its operations with examples and Program?
4) What is a Queue explain various types of operations on queue with examples and Program?
5) Write a short note on i) Circular linked list ii) Dequeue

UNIT-3

1) Explain linear search technique with program and example?
2) Explain Binary search technique with program and example?
3) Explain Bubble sort implementation with example and program?
4) Explain Selection sort implementation with example and program?
5) Explain Insertion sort implementation with example and program?
6) Explain Quick sort implementation with example and program?
7) Explain Merge sort implementation with example and program?

UNIT-4

1) Define tree? Discuss about representation of a Binary Tree?
2) Discuss binary tree traversal techniques with example and program?
3) Construct the binary search tree for the following numbers?
   50, 15, 62, 5, 20, 58, 91, 3, 8, 37, 60, 24
4) What is height balanced tree Construct a Height Balanced Tree (AVL tree) for the following elements. 51, 26, 11, 6, 8, 4, 31, 21, 9, 16
5) Explain binary search tree and its operations with example and program?
6) Discuss concept of AVL Tree and its rotations with an example

UNIT-5

1) Define graph? Discuss representation of graph with examples.
2) Explain about Breadth First Search Technique with an Example and program?
3) Explain about Depth First Search Technique with an Example and program?
4) Explain about Directed Acyclic graph with example?
5) Explain the steps for shortest path in Directed Acyclic graph?

MALLA REDDY UNIVERSITY

School of Engineering-Dept. of IoT

Subject Name: MPMC

Subject Code: MR20-1CS0502

QUESTION BANK

UNIT-I

1. Explain with neat sketch architecture of 8086 microprocessor?
2. Explain the memory segmentation of 8086 with all segment registers?
3. Give the contents of the flag register after execution of following addition

   0110 0101 1101 0001

   0010 0011 0101 1001

   and also write conditions of different flags?
4. Sketch the pin diagram of 8086 microprocessor and Explain the functions of different pins?
5. Describe the minimum mode configuration of 8086 and its timing diagram?

UNIT-II

6. Discuss the addressing modes of 8086 microprocessor with examples?
7. Define the following in instruction set of 8086?

   a. Data transfer group b. Arithmetic group

   c. BCD&ASCII Arithmetic group d. Logic group
8. Discuss various assembler directives of 8086?
9. Explain various functions of assembly language programming tools?
10. Write an assembly language program to find sum of 'N' numbers given in an array?

    01h,02h,03h,04h,05h,06h,07h

UNIT-III

11. Explain in detail the concept of stack structure of 8086?

12. Explain in detail interrupt cycle of 8086?

13. What are the sources of interrupts in 8086 and draw its interrupt vector table?

14. a) Explain different types of interrupts in detail?

    b) Write an assembly language program to count number of ones and zeros in a number?

15. Explain the following

    1. Maskable interrupts

    2. Non Maskable interrupts

UNIT-IV

16. a) Differentiate between Microprocessor Vs. Microcontroller

    b) Discuss briefly different types of micro controllers in detail?

17. Explain in detail architecture of 8051 micro controller and mention its applications?

18. Discuss the addressing modes of 8086 microprocessor with examples?

19. Define the following in instruction set of 8051?

    1. Logical Instructions

    2. Boolean or Bit Manipulation Instructions

    3. Program Branching Instructions

20. Explain the following in 8051 micro controller?

    1. Program memory organization

    2. Data memory organization

UNIT-V

21. a) Classify different types of PIC micro controllers?

    b) Explain PIC microcontroller architectural block diagram in detail and list out parts of CPU?

22. Explain PIC microcontroller memory module in detail?

23. Explain ARM processor architecture and organization in detail?

24. Explain the following concepts in detail in ARM Processor ?

    a) Thumb programming model,

    b) Thumb instruction set.

25. Explain the following terms?

    a). Interrupts

    b). I/O Ports

    c).CCP Module

MALLA REDDY UNIVERSITY

School of Engineering (CSE-IOT) II Year B. Tech - I Semester
Subject Name: Fundamentals of IOT

Subject Code: MR20-1CS0506

Question Bank

UNIT-I

1) Explain in detail about OSI and TCP/IP Networking Models?
2) Discuss Internet layer IOT Network Technologies in detail?
3) Write about IOT Networking considerations and challenges in detail?
4) Discuss Physical layer IOT Network Technologies in detail?
5) Explain the IoT World Forum (IoTWF) Standardized Architecture briefly?

UNIT-II

1) Explain Network Layer ZigBee IP Protocol in detail?
2) Discuss briefly IEEE 802.15.4 wireless Technology in IOT?
3) Explain Network Layer ZigBee Protocol in detail?
4) Explain briefly LoRa WAN Technology in IOT?
5) Define in detail about IOT Constraints Networks and Constraints Nodes?

UNIT-III

1) Explain in detail about IOT Design Methodology?
2) Discuss the importance of microcontrollers Embedded Computing with IoT Devices?
3) Describe in detail about Building Blocks of IoT?
4) Draw IOT platform Arduino Board and explain its components in detail?
5) Define Cloud computing and how cloud platform is used in IoT system?

UNIT-IV

1) Explain in detail about Cloud Computing Features and its Advantages for IOT?
2) Explain A few conventional methods for data collection and storage in Cloud Platform IOT?
3) Discuss in detail about Cloud service models for IOT?
4) Write a short notes on
   a) Public Cloud
   b) Private Cloud
   c) Community cloud
   d) Hybrid cloud
5) Describe Cloud Based IoT Network Virtualization in detail?

UNIT-V

1) What is Case Study explain its characteristics advantages and disadvantages?
2) Discuss in detail about IoT application requirements and capabilities?
3) What are the multiple benefits of Industry 4.0 offers explain in detail?
4) Construct the Design of Smart home with Raspberry Pi (or) Arduino and other hardware Devices with neat sketch.
5) What is Smart City? What are the characteristics of smart city explain briefly about Challenges of smart city?