MGM UNIVERSITY

MGM University
Aurangabad-431003
First Term Exam A.Y. 2021-22

Program : Computer Science and Engineering — Sem –III
Course : Design and Analysis of Algorithm — Marks : 60
Course Code : 20UCS403D

Instructions to the students
1. Each question carries 10 marks.
2 All questions are compulsory
3. Illustrate your answers with neat sketches , diagram etc wherever necessary
4. If some part or parameter is noticed to be missing ,you may appropriately assume it and should mention it clearly

Marks

Q1. Solve any two
a) What is mean by Time Complexity of an algorithm. Explain different asymptotic notations. (5)
b) Trace the heap sort algorithm for the following data {12,25,62,50,85,15,20} (5)
c) How do you analyse a non recursive algorithm? Explain with example (5)

Q2. Solve any two
a) Explain about divide and Conquer paradigm for algorithm design with suitable example (5)
b) Write the quick sort algorithm using randomized approach and explain its time complexity (5)
c) What is Min Max problem? What is the purpose of Min Max? Where is Min Max Normalization Used? (5)

Q3. Solve any two
a) Explain Huffman algorithm with following example

Character	Frequency
A	5
B	9
C	12
D	13
E	16
F	45

(5)

b) Differentiate between Prim's and Kruskal's algorithm for MST (5)

MGM University
Aurangabad-431003
Semester IV Exam A.Y. 2021-22

Program : B.Tech (Computer Science & Engineering) Semester –IV
Course : Formal Language & Automata Theory Marks : 60
Course Code : 20UCS404D

Instructions to the students
1. Each question carries 10 marks.
2 All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Marks

Q1. Solve any two

a) Define NFA. Convert following NFA into an equivalent DFA (5)

state	0	1	2
--> q0	q0	q4	{q2,q3}
q1		q4	
q2			{q2,q3}
q3(final State)		q4	
q4			

b) Construct a DFA to accept a string containing even number of zeros and any number of ones (5)
c) Illustrate the basic difference between Moore Machine and Mealy Machine. (5)

Q2. Solve any two

a) What is a regular expression? State Arden's Theorem to check the equivalence of two regular expressions. (5)
b) What is: (i) (0+1)* (ii)(01)* (iii)(0+1) (iv)(0+1)+ (v) 0* 1 0* (5)
c) Write a regular expression to denote a language L which accepts all the strings which begin or end with either 00 or 11. (5)

Q3. Solve any two

a) What do you mean by ambiguity? Show that the grammar S ->aS/S, S ->aa is ambiguous (5)
b) Find the language generated by : S->0S1 | 0A | 0 |1B | 1 (5)
c) Convert the following Context Free Grammar to Chomsky Normal Form. (5)
{S ->AaB | aaB ,A->Є , B->bbA | Є }

Q4. Solve any two

a) Define PDA and give examples of languages handled by PDA. (5)
b) Construct PDA For the language {x | x = wcw^r and w in {0,1}*, but Σ = {0,1,c}, length |x| is odd (5)
c) Create a pushdown automaton that accepts the language {0^n1^n | n > 0}. (5)
Show that your PDA accepts 0011 and that it rejects 0001

Q5. Solve any two

a) Give formal definition of Turing Machine with example (5)
b) Design a Turing machine to accept a even palindrome (5)
c) Give examples of recursive languages? (5)

Q6. Solve any two

a) How CFG is used in Syntax Analysis? (5)
b) Discuss any two applications of PDA. (5)
c) Write short note on Lexical Analyzer (5)

**** End****

MGM University

Jawaharlal Nehru Engineering College, Aurangabad

Department of Computer Science and Engineering

Semester II

Course Code: 20UCS405D **Name of course: Object Oriented Programming**

Max Marks: 60 **Time: 3Hrs**

Instructions:

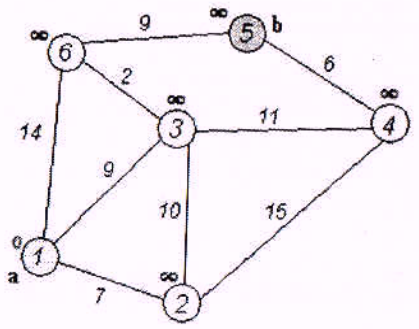
1. Each question carries equal marks.
2 All questions are compulsory
3. Illustrate your answers with neat sketches, diagram etc. wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Q1		**Attempt any 2 from following.**	
	A	What are the properties of the Object Oriented Programming? Why java is platform independent?	5
	B	Write short note on final and static keywords in Java?	5
	C	How the concept of data encapsulation is implemented in java?	5
Q2		**Attempt any 2 from following.**	
	A	Explain any one system package in detail?	5
	B	How multiple inheritance is implemented in Java?	5
	C	Write a short note on interface in java.	5
Q3		**Attempt any 2 from following.**	
	A	Define thread and multithreading? Explain concept of Synchronization with example.	5
	B	Write a multithreaded java program to find out all prime numbers from 1 to 200000.	5
	C	Explain how user defined exception are created in Java?	5

Q4		**Attempt any 2 from following.**	
	A	Write a short note on Collection framework in Java?	5
	B	Explain in detail Linked List class with example.	5
	C	Write a Java program to display the system properties?	5
Q5		**Attempt any 2 from following.**	
	A	Write a Java program to perform read and write operation on a file?	5
	B	Write a short note on Socket Programming in Java?	5
	C	Explain important methods of networking package with example?	5
Q6		**Attempt any 2 from following.**	
	A	What is Applet? Explain the life cycle of Applet with diagram.	5
	B	What is AWT? What are the AWT components used for designing GUI?	5
	C	Write a program to design a simple registration form ?	5

----------**All d Best**----------

c) Find the shortest path from 1 to 5 using Dijkstra's Algorithm



(5)

Q4. Solve any two

a) What are characteristics of Dynamic Programming? Give real time examples where Dynamic programming can be applied. What is difference between Divide and Conquer and Dynamic Programming (5)

b) You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack? (5)

c) What is the process of Multistage graph problem? What kind of problems can be multistage graph used for (5)

Q5. Solve any two

a) Compare Backtracking and Branch and bound with suitable example (5)

b) Step wise explain the sum of subset problem for following input

Input: arr[] = {3, 34, 4, 12, 3, 2}, sum = 7 **Input:** arr[] = {2, 2, 2, 3, 2, 2}, sum = 10 (5)

c) What is N Queen's Problem? Which techniques are used to solve the problem? What is the Time Complexity. (5)

Q6. Solve any two

a) Discuss the terms P, NP, NP Complete Problems (5)

b)What is approximation Algorithm ? What are different types of approximation Algorithms? Why do we need approximation? (5)

c) Explain Travelling Sales person Problem using Approximation Algorithm. (5)

End of paper

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Aurangabad-431003
First Term Exam A.Y. 2021-22

Program: Computer Science and Engineering — Sem: III
Course: Data Structure — Marks: 60
Course Code: 20UCS305D

Instructions to the students:
1. Each question carries 10 marks.
2 All questions are compulsory.
3. Illustrate your answers with neat sketches, diagrams, etc. wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and it should be mentioned clearly.

Marks

Q1. Solve any two:

a) Sketch a C program for performing following operations on Array: Deletion, Display. (5)
b) List out and explain the areas in which data structures are applied extensively. (5)
c) Explain the dynamic memory management with necessary methods. (5)

Q2. Solve any two:

a) What are the types of Collision Resolution Techniques and the methods used in each of the type? (5)
b) Given the input { 4371, 1323, 6173, 4199, 4344, 9679, 1989 } and a hash function of h(X) = X (mod 10). Show the result using linear probing. (5)
c) Differentiate between linear and non linear data structures. (5)

Q3. Solve any two:

a) Create a Singly Linked List using data fields 10,20,30,40,50. And sketch stepwise procedures from start to end. (5)
b) Write a program in C to insert a node at the end in a doubly linked list. (5)
c) What is the complexity of an algorithm? Explain the time space trade off? (5)

Q4. Solve any two:

a) Write a short note on Priority Queue. (5)

b) A circular queue has a size of 5 and has 3 elements 10, 20 and 40 where F=2 and R=4. (5)
i) After inserting 50 and 60, what is the value of F and R.?
ii) Trying to insert 30 at this stage what happens?
iii) Delete 2 elements from the queue and insert 70, 80 & 90.
Show the sequence of steps with necessary diagrams with the value of F & R.

c) Consider the following stack of characters, where STACK is allocated N = 8 memory cells (5)
STACK: A, C, D, F, K, _, _, _. (_ means empty allocated cell)
Describe the stack as the following operations takes place with suitable diagram at each step:
(a) POP (STACK, ITEM)
(b) POP (STACK, ITEM)

(c) PUSH (STACK, R)
(e) PUSH (STACK, S)
(g) POP (STACK, ITEM)

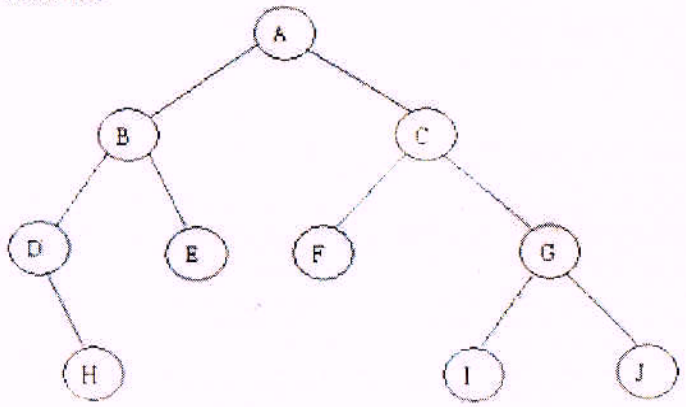
Q5. Solve any two

a) What is traversing? Write a recursive procedure for in order traversal in a binary tree. (5)

b) Discuss threaded binary trees. (5)

c) Traverse the given tree using Inorder, Preorder and Postorder traversals. (5)

Given tree



Q6. Solve any two

a) Explain the BFS algorithm with an example. (5)

b) Discuss how to represent graph storage using Adjacency matrix and list. (5)

c) Explain the various applications of Graphs. (5)

End of paper

MGM University

Aurangabad-431003

First Term Exam A.Y. 2021-22

Program: Computer Science & Engineering | **Semester:** III

Course: Programming Logic Design | **Marks**: 60

Course Code: 20UCS304D | **Duration**: 3 Hrs.

Instructions to the students:

1. Each question carries 10 marks.
2. All questions are compulsory
3. Illustrate your answers with neat sketches, diagram, flowcharts etc wherever necessary
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Marks

Q.1. Solve any two

a) Explain the concept of coupling. If two modules refer to a global variable, they would be coupled in what way? **[05]**

b) A sweater is on sale for 25% off the original price. The original price is Rs 500. Write an algorithm and draw flowchart to calculate and print the sale price. **[05]**

c) Design a flowchart and pseudocode for a program that accepts two numbers a and b, from the user and displays "Yes" if b is divisible by a, display" No" otherwise. **[05]**

Q.2. Solve any two

a) Differentiate between local and global variables. **[05]**

b) What is modular programming? Discuss advantages of modular programming. **[05]**

c) Following is an algorithm developed using positive logic. Convert it to negative logic to give same results. **[05]**

```
IF sales <= 2000
   Then
      c=0.02
Else
      If sales < = 4000
      Then
         c= 0.04
      Else
         If sales < = 6000
         Then
               c= 0.08
         Else
               c = 0.1
```

Q.3. Solve any two

a) Develop an algorithm and write pseudocode for a program that accepts a number and prints its table as output. Use while loop. **[05]**

b) Explain life and scope of variables. What is a static variable? **[05]**

c) Using straight through logic, write the algorithm and then draw the flowchart to declare grade of a student. Set of conditions of marks for a student is given below:
F = if marks are below 60; D = marks between 60–69; C = marks between 70-79
B = marks between 80-89 and A = marks between 90-100 **[05]**

Q.4. Solve any two

a) Differentiate between forward chaining and backward chaining. **[05]**

b) Explain logical programming language model **[05]**

c) Explain following terms in logical programming:

- Fact
- Query

Build a knowledge base of collection of facts as given below.
Mira, Sita, and Priya are women. Nimish, Ayan and Ajay are boys. Nimish and Ajay are Python programmers. Ayan, Priya and Sita are Web developers. Sita and Mira are foodie.
Then write query to:

i. List the Python programmers
ii. List the boys.
iii. List of foodies.

What will be the output of the goal "web_dev(X)"? if web_dev is a predicate of web developers? **[05]**

Q.5. Solve any two

a) Explain characteristics of functional programming **[05]**

b) Compare functional programming with Object Oriented Programming. **[05]**

c) What are the features of Imperative programming? **[05]**

Q.6. Solve any two

a) Explain the difference between dynamic and static method binding. Also explain the connection between dynamic method binding and polymorphism. **[05]**

b) Define a class to represent a bank account. Include the following data members:

- Name of depositor
- Account Number
- Type of account (Savings/ Current)
- Balance amount in the account

Member functions are:

- read_data();
- display ();

Write main program to invoke these functions. **[05]**

c) What is the purpose of the: operator in C++? Explain with suitable example. **[05]**

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First Term Exam A.Y. 2021-22

Program: Computer Science and Engineering — Sem –III
Course Discrete Mathematics — Marks: 60
Course Code:20UCS303D

Instructions to the students

1. Each question carries 10 marks.
2 All questions are compulsory
3. If any part or parameter is noticed to be missing, you may assume suitable/appropriate data and mention it clearly in respective question.

Marks

Q1. Solve any two

a) Applying the principle of inclusion-exclusion find how many integer between 1 and 60 that are not divisible by 2 nor by 3 and nor by 5. Also determine the number of integers divisible by 5, not by 2, not by 3. (5)

b) Two applicants appear for an interview for two vacancies against the same post. The probability of Ist applicant's selection is 1/6 and the probability of IInd applicant's selection is 2/5.What is the probability that
   i) Both of them will be selected
   ii) Only one of them will be selected. (5)

c) Prove by using mathematical induction that for $n \geq 1$

$$1 + 2 + 3 + \ldots\ldots + n = \frac{n(n-1)}{2}$$ (5)

Q2. Solve any two

a) Consider A = {0,1,2,3,4} and a relation R on A as follows
R= {(0,0), (0,4), (1,1), (1,3), (2,2), (3,1), (3,3), (4,0), (4,4)}
Find the distinct equivalence classes of R. (5)

b) Using Warshall algorithm, find all the transitive closure of the relation
R= { (1,2),(2,3),(3,3)} on the set A={1,2,3}. (5)

c) Assume that R & S are reflexive relations on a set A. Prove or disprove each of the following statements are - (5)
i) Reflexive: R U S , R ∩ S (ii) Irreflexive : R ⊖ S , R−S

Q3. Solve any two

a) Calculate *gcd*(a,b) where a=37 and b=249. Also find integers *m* and *n* such that d=ma + nb. (5)

b) Solve the following equation using Chinese reminder theorem
$4X \equiv 5(mod\ 9)$
$2X \equiv 6(mod\ 20)$ (5)

c) Solve the congruence equation $1092x \equiv 213(mod\ 2295)$ (5)

MGM University
Aurangabad-431003
Second Term Exam A.Y. 2021-22

Program : Computer Science and Engineering — Sem –III
Course : Microprocessor and Microcontroller — Marks : 60
Course Code : 20UCS406D — Time : 03 Hrs

Instructions to the students
1. Each question carries 10 marks.
2 All questions are compulsory
3. Illustrate your answers with neat sketches , diagram etc wherever necessary
4. If some part or parameter is noticed to be missing ,you may appropriately assume it and should mention it clearly

	Marks
Q1. Solve any two	
a) Draw and Explain the programming model of 8086	(5)
b) Enlist the addressing modes of 8086 and explain any two with example	(5)
c) The contents of the registers are: CS = 2222H, DS = 3333 H, SS = 4444 H, IP = 1232 H, SP = 1100 H, DI = 0020 H, Calculate the corresponding physical addresses for the address bytes in CS, DS and SS.	(5)
Q2. Solve any two	
a) Explain the XCHG, DAA instruction with example	(5)
b) Write assembly language program using macro	(5)
c) What is the use of ALE, M/IO, HOLD pins of 8086	(5)
Q3. Solve any two	
a) Design 8086 based system for interfacing of Two 2K SRAM, indentify the no. of address line required and starting-ending address of each RAM and prepare address map.	(5)
	(5)
b) Design 8086 based system for interfacing of 32K SRAM, indentify the no. of address line required and starting-ending address of each RAM and prepare address map.	(5)
c) Explain the block address decoding technique with example	
Q4. Solve any two	
a) Enlist the features of 80386 microprocessor	(5)
b) Draw and explain paging operation of 80386	(5)
c) Draw and explain flag register of 80386	(5)

Q5. Solve any two

a) Differentiate between microprocessor and microcontroller (5)

b) Explain Internal Block diagram of 8051 (5)

c) Enlist and explain different types of microcontroller (5)

Q6. Solve any two

a) Enlist Special function register of 8051 and explain any 2 (5)

b) Explain counter and Timer of 8051 (5)

c) Draw and explain interfacing of stepper motor with 8051 (5)