SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

Academic Year: 2022-2023

End Term Examination

Class: Second Year (IT)

Max Marks: 50

Subject: Discrete Mathematics

Code: PCC-IT203

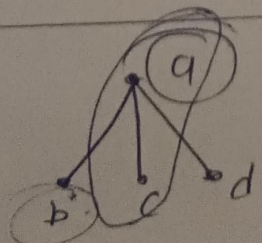
Date: 12/12/22

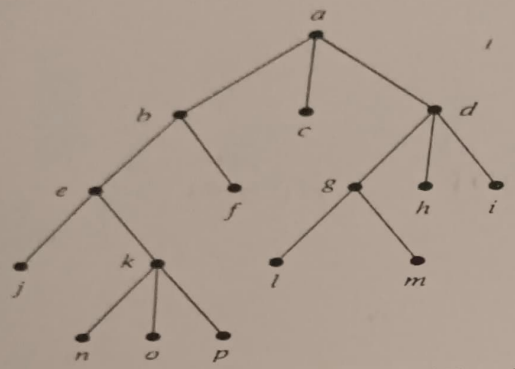
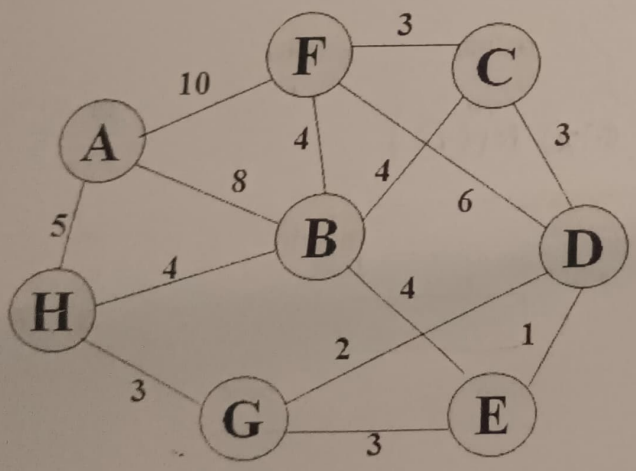
Time: 15:00-17:00

Notes:

1. Solve All Questions.
2. Figures to right indicate full mark.

Q.N.	Question	Marks	CO	BT
1.	What are the contra positive, the converse, and the inverse of the conditional statement "The home team wins whenever it is raining."?	[6]	IT207.1	BT5
2.	Show that the premises "A student in this class has not read the book," and "Everyone in this class passed the first exam" imply the conclusion "Someone who passed the first exam has not read the book."	[4]	IT207.2	BT3
3.	a) Explain in brief Principle of Inclusion-Exclusion. Illustrate the following problem with this principle i) How many bit strings of length eight either start with a 1 bit or end with the two bits 00 ?	[6]	IT207.2	BT2
	b) How many ways are there to pack six copies of the same book into four identical boxes, where a box can contain as many as six books?	[4]	IT207.2	BT3
4.	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 spilt the plane?	[6]	IT207.2	BT4
	b. Explain THE FOUR-COLOR THEOREM in detail	[4]	IT207.2	BT1



5	In Which order does an inorder traversal visit the vertices of the ordered rooted tree T in figure  The Ordered Rooted Tree T.	[10]	IT207.5	BT6
6	 Fig no.1 In Fig no.1 use Kruskal's algorithm to find a minimum spanning tree for the given weighted graph.	[10]	IT207.5	BT4

Course Outcomes (CO)

207.1 Understand Propositional Logic
207.2 To understand Set operations and Functions
07.3 To Understand fundamentals of algorithms
07.4 To learn Mathematical reasoning and Algebraic Structures
07.5 Understanding Graph theory and trees.

	SGGS Institute of Engineering and Technology, Nanded	
	Mid Term Examination 2022-23 (Semester-I)	
	S. Y. B. Tech. - Information Technology	
	Subject: Digital System Design	Code: PCC-IT204
Date: 13/12/2022	Time: 15.00 To 17.00 (Session 2)	Max. Marks: 50

Notes:

1. This paper contains **TWO** pages.
2. **Q. No. 1 is COMPULSORY.**
3. **SOLVE ANY FIVE questions from the remaining.**
4. Figures to right indicate full marks.
5. Assume suitable data if necessary and clearly mention it.
6. Use of calculator is not permitted.

Q. No.	Question	Marks	CO/BT
Q. 1- a	Obtain a minimized expression for the following function using Quine-McCluskey method and implement it using AOI gates. $f(A,B,C,D) = \sum m(0,1,2,4,5,6,8,10,14)$	[05]	CO2/BT 5,6
Q. 1- b	Write a VHDL Structural code for the circuit obtained in above question.	[05]	CO5/BT 2,3
Q. 2	Design a synchronous counter that counts the sequence: …,1,2,4,5,7…. Design the circuit using **T flip flops**. The counter should be self-starting.	[08]	CO3/BT 3,4,5,6
Q. 3-a	Draw the circuit of a negative edge triggered JK flip flop using NAND gates having Preset and Clear inputs. Explain its working with the help of its State Table.	[04]	CO3/BT 1,2
Q. 3-b	Obtain a SR flip flop using a D flip flop.	[04]	CO3/BT 1,2
Q. 4	Design an overlapping sequence detector circuit to detect the sequence: **1100**	[08]	CO3/BT 3,4,5,6
Q. 5-a	Explain the working of a parallel in serial out (PISO) shift register by drawing a neat circuit diagram.	[04]	CO3/BT 1,2
Q. 5-b	Explain the working of a serial adder circuit (multibit adder using FF and Shift register) by drawing a neat circuit diagram.	[04]	CO3/BT 1,2
Q. 6	A clocked synchronous sequential circuit designed using positive edge triggered D flip flops has an input X and an output Z. The excitation equations are: $D_1 = Q_1\overline{X} + \overline{Q}_1Q_0X + Q_1\overline{Q}_0X$; $D_0 = Q_0\overline{X} + \overline{Q}_0X$ and $Z = Q_1Q_0X$ (a) Draw its circuit diagram. (b) Draw its state diagram.	[08]	CO3/BT 3,4,5,6

Q. 7 For the state table given below, eliminate the redundant state(s) if any and then design the circuit using D flip flops. [08] CO2/BT 3,4,5,6

Present State	Next State		Output	
	$x = 0$	$x = 1$	$x = 0$	$x = 1$
A	B	C	0	0
B	D	E	0	0
C	F	G	0	0
D	A	A	0	1
E	D	D	1	0
F	A	A	0	1
G	F	F	1	0

//ALL THE BEST//

Course Outcomes (CO):

- **CO1** Apply the knowledge of number systems and codes in problem solving related to number system and code conversion.
- **CO2** Do the analysis, design and implementation of combinational logic circuits
- **CO3** Do the analysis, design and implementation of sequential logic circuits
- **CO4** Classify and decide the use of various semiconductor memories according to application
- **CO5** Implement and simulate combinational and sequential logic circuits using MultiSim and VHDL

Bloom's Taxonomy (BT):

BT1- Remember, BT2- Understand, BT3- Apply, BT4- Analyze, BT5- Evaluate BT6- Create

	S. G. G. S. Institute of Engineering and Technology, Vishnupuri, Nanded. End-Term Examination 2022 Class: B.Tech SY	
Date:07/12/2022 Time: 14:30 - 16:30	Subject: Mathematics-III (BSC 273) Paper Name: Applied Linear Algebra	Max. Marks: 50

10 Marks

Q 1.Solve any two

a) Define the following terms: (i) Field

(ii) Linear Combination

(iii) Subspace of R^n

b) Prove that the set of vectors $B = \left\{\begin{bmatrix}-2\\1\\1\end{bmatrix}, \begin{bmatrix}1\\0\\1\end{bmatrix}, \begin{bmatrix}0\\1\\0\end{bmatrix}\right\}$ forms a basis for R^3, with detailed explanation.

c) Define Basis and Dimension and find the Basis and dimension for a subspace of R^3 given by

$$S = \{\begin{bmatrix}x\\y\\z\end{bmatrix} : x+y+z=0 \quad x-y-z=0\}$$

Q 2. Solve any two. 10 Marks

a) Find Basis and Dimension for Column space, Row Space, and Null Space for the following Matrix $A = \begin{bmatrix}2 & 0 & 1 & -1 & 0\\1 & 2 & 0 & -3 & 1\\4 & -4 & 3 & -9 & -2\end{bmatrix}$

b) Define Linear Transformation, give the expression for Rotation Transformation in R^2 and rotate the vector $\begin{bmatrix}1\\-2\end{bmatrix}$ through an angle $2\pi/3$ clockwise.

c) (i) If S is a subset of R^n then prove that, Span(S) is a subspace of R^n.

(ii)If A be the mxn then prove that, Null(A) = $\{X \in R^n : AX = 0\}$ is a subspace of R^n.

Q 3. Solve any two 10 Marks

a) Define the following terms for a square matrix

i) Eigenvalue and Eigenvector

ii) Characteristic Polynomial

iii) Eigenspace

b) Find the Algebraic Multiplicity and Geometric Multiplicity for each eigenvalue of the matrix

$$A=\begin{bmatrix}-1 & 0 & 1\\ 3 & 0 & -3\\ 1 & 0 & -1\end{bmatrix}$$

c) Find A^5 by using eigenvalues and eigenvectors of A, where $A=\begin{bmatrix}0 & 0 & -2\\ 1 & 2 & 3\\ 1 & 0 & 3\end{bmatrix}$

Also find eigen values of A^5

Q 4 Solve any two. 10 Marks

a). Define the following terms (i)Diagonal matrix

(ii)Simillar Matrices

(iii)Diagonalizable Matrix

b) If A is an nxn matrix, then show that the following statements are equivalent

(i)A is diagonalizable.

(ii)A has n Linearly Independent Eigenvectors.

c) If possible, find matrix P such that it diagonalizes $A=\begin{bmatrix}0 & 4\\ -2 & 6\end{bmatrix}$ and also find the resulting diagonal matrix D

Q 5 Solve any two. 10 Marks

a). Check the diagonalizability for the following matrix

(i)$A=\begin{bmatrix}1 & 0 & 0\\ 0 & 2 & 1\\ 0 & 1 & 2\end{bmatrix}$ (ii)$B=\begin{bmatrix}1 & 3 & 0\\ 0 & 2 & 4\\ 0 & 0 & 1\end{bmatrix}$

b) Define the Fibonacci sequence, and find the nth term of the sequence by using the diagonalizability concept..

c) State and Prove Cauchy-Schwarz Inequality in R^n.

$-8+20-16+4$

$-1+5-8+4$

SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

End Term Examination (Semester-I) | AY → 2022-23
S. Y. B. Tech. | Information Technology Dept.
Object Oriented Programming | PCC - IT 202
Date: 09/12/2022 | Time: 15.00 - 17.00 | Max. Marks: 50

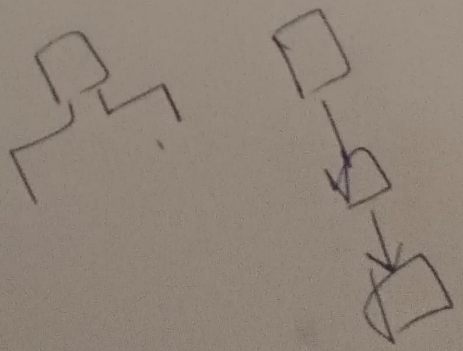
		Marks	CO	BT
Q.1	**Answer the followings**	14	CO1	BT1
a	What is exception handling? What are the keywords used in exception handling?			
b	Define polymorphism. How is compile time polymorphism achieved?			
c	Is there a need to call a constructor function explicitly? Justify			
d	List the situation where inline function does not work.			
e	What is pure virtual function?			
f	What is the difference between normal function and static function?			
g	Why should exceptions are used instead of if else logic?			

Solve any SIX of the followings.

Q.2	Define inheritance. Explain the visibility scope of private, public and protected access specifiers	06	CO2	BT2
Q.3	What is file mode? Explain any four file modes supported by C++	06	CO3	BT1
Q.4	What are the rules for defining virtual function?	06	CO4	BT2
Q.5	Design a base class person (name, address, phone-no). Derive a class employee (eno, ename) from person. Derive a class manager (designation, department, basic-salary) from employee. Accept all details of n managers and display manager having highest salary.	06	CO1	BT3
Q.6	Create a C++ class sumdata to perform the following functions: int sum(int,int)- returns addition of two integer arguments. float sum(float, float, float)- returns the addition of three float arguments. use templates	06	CO3	BT5
Q.7	Write a C++ program which will accept 'n' integers from user, write all even integers into "even.dat" file and write all odd integers into "odd.dat" file. Display the contents of both the files.	06	CO4	BT6
Q.8	Design a base class Customer (name, phoneNo). Derive a class Depositor (accNo, bal) from Customer. Again derive a class Borrower (loanNo, loan-amt) from Depositor. Write necessary member functions to read and display the details of n Customers.	06	CO3	BT4
Q.9	Define ternary operator. Compare it with if and if-else statement	06	CO1	BT5

Course Outcomes (CO)

BT1-Remember, BT2-Understand, BT3- Apply, BT4-Analyze, BT5-Evaluate, BT6-Create



SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

End Term Examination (Semester-I) 2022-23

S.Y. B. Tech. **Information Technology**

Data Structure **PCC-IT201**

Date: 10/12/22 **Time: 3:00 pm to 5:00 pm** **Max. Marks :50**

Note: i. Attempt all questions. Assume suitable data if necessary. Performance would be cancelled if code is replicated.
iii. This paper contains 1 page. Solve any 5 Question from Q1 to Q6. Solve any one question from Q7 to Q8.

Q.N.	Question	Marks	CO	BT
Q1	Write a C++ program using recursion to print sum of all the odd numbers divisible by both 3 and 2 in an array from index 10 to 20 only. Print sum in main program and return count in main program. Take Function name as ***Print_Odd,*** pass array name as ***input*** and print ***odd-number*** count inside main program. What is the time complexity (number of times of loop execution)	8	IT201.1, IT201.2 IT201.5	BT1, BT2 BT3, BT6
Q2	Write an algorithm to search for an element in array using recursion. Take array name as ***input*** and function name as ***FIND***. Discuss the time complexity also.	8	IT201.1, IT201.3,	BT1 BT6
Q3	You are given the postfix expression. Write a program for postfix expression evaluation for following input only. ***4 5 * 6 - $***	8	IT201.1, IT201.4	BT1 BT4 BT5
Q4	Given the following numbers. Sort the number using selection sort & Insertion sort. ***90,60,80,70,50***	8	IT201.3,	BT2 BT3
Q5	You are given the following graph. Discuss the different graph traversal methods and print the necessary traversal. Diagram is given after last question.	8	IT201.4 IT201.5	BT1 BT3 BT6
Q6	Discuss Stack data structure with necessary algorithm and example. Search 100 by pushing all elements one by one, popping it one by one and display sum of all the number after the pop operations. Elements are ***12,20,30,40, 50,60,70,80,90,100.*** Item to be searched is ***100.***	8	IT201.1, IT201.2	BT2 BT3 BT4
Q7	Create Binary search tree for the following numbers. Print all its traversal. ***60,40,50,30,80,70,90.*** Binary search tree is a tree where the left element is less than parent node and right element is greater than the child and it's true for all the nodes. ***OR***	10	IT201.4 IT201.5	BT1 BT6
Q8	Given this expression. Print the result using all necessary stack simulation for the following expression for expression evaluation. Show all stack simulation in detail. 1) Infix to postfix 2) Expression evaluation ***2*3+ 4*5$***	10	IT201.1, IT201.5	BT4 BT5 BT6

Course Outcomes (CO)

IT 201.1 Understand and remember algorithms and its analysis procedure.
IT 201.2 Introduce the concept of data structures through ADT including List, Stack, Queues.
IT 201.3 Introduce various techniques for representation of the data in the real world.
IT 201.4 Develop application using data structure algorithms.
IT 201.5 Study and analyze the complexity of various algorithms

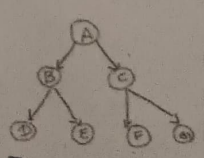


Diagram for Q5

Bloom's Taxonomy (BT)

BT1- Remember, BT2- Understand, BT3- Apply, BT4- Analyze, BT5- Evaluate, BT6- Create

SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

Academic Year: 2022-23

Semester: I | Examination: End Term

Class: S. Y. (EXTC/ELE/IT/PROD/INSTRU) | Date: 08/12/2022

Course: MAC277 INDIAN CONSTITUTION

Time: 15.00 To 17.00 Hours | Total Marks : 50

NOTE: **1. All Questions carry equal Marks**

2. Solve any five questions.

1. Explain the Powers and Functions of "President of India" given under Indian Constitution? 10

2. Write a detail note on Basis of Reasonable Classification under Art.14 of Indian Constitution? 10

3. What is Rule of law? Explain the concept under Art.14 with its exceptions? 10

4. Explain the concept of "Freedom of Speech and Expression" under Art.19(1)(a) of Indian Constitution with cases? 10

5. What is Right to life and Personal Liberty?
   Explain this concept of
   a. Right against custodial violence with case laws
   b. Right to Privacy with case laws under Art. 21of Indian Constitution? 10

6. Write a detailed note on Emergency provisions under Indian Constitution? 10

7. Write Short notes on: (Any two) 10
   A. Amendments under Art.368
   B. Mercy Killing under Art. 21
   C. Commercial Advertisement Under Art.19

All the Best!

The word Impossible itself speaks, I Am Possible. Do your Best.