



SGGS Institute of Engineering and Technology, Vishnupuri, Nanded
Academic Year: 2022-2023
End Term Examination
Class: Second Year (IT)

Max Marks: 50

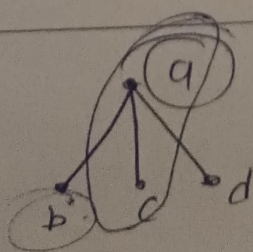
Date: 12/12/22
Time: 15:00-17:00

Subject: Discrete Mathematics
Code: PCC-IT203

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."? $\frac{P}{\text{home team wins}} \rightarrow \frac{Q}{\text{it is raining}}$ Handwritten: $\neg Q \rightarrow \neg P$ (contra positive), $Q \rightarrow P$ (converse), $\neg P \rightarrow \neg Q$ (inverse)	[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." Handwritten: $x = \text{all student in class}$ $P(x) = \text{read book}$ $Q(x) = \text{passed exam}$ $\exists x (Q(x) \wedge \neg P(x))$	[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? \rightarrow condition $n(A)$ Handwritten: \uparrow condition $n(B)$ 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?	[6] [4]	IT207.2 IT207.2	BT2 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? b. Explain THE FOUR-COLOR THEOREM in detail	[6] [4]	IT207.2 IT207.2	BT4 BT1



A

B

C

D

In order

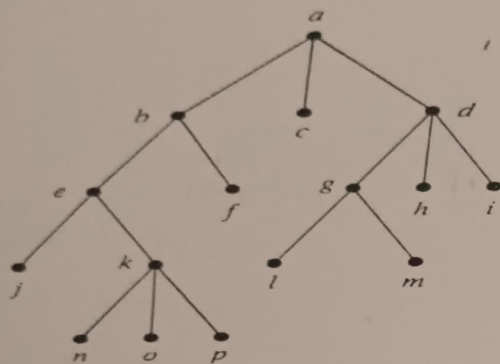
128

$2^4 = 16$

→ 2
 → 2
 → 2
 → 2
 → 2
 → 2

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

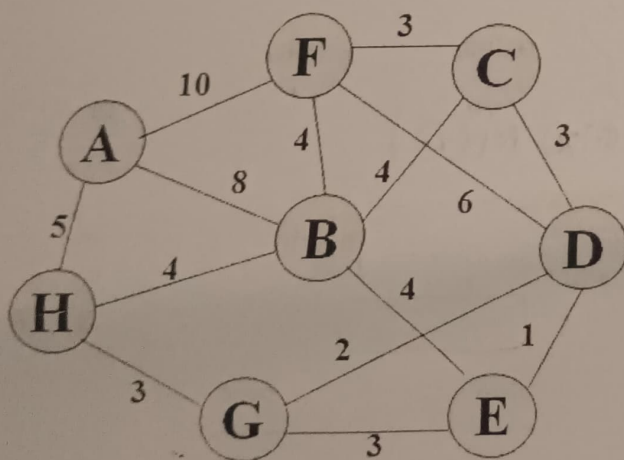


Fig no.1

In Fig no.1 use Kruskal's algorithm to find a minimum spanning tree for the given weighted graph.

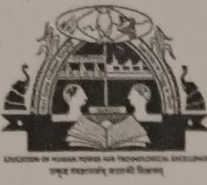
[10]

IT207.5

BT4

Course Outcomes (CO)

- 207.1 Understand Propositional Logic
- 207.2 To understand Set operations and Functions
- 207.3 To Understand fundamentals of algorithms
- 207.4 To learn Mathematical reasoning and Algebraic Structures
- 207.5 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: $D_1 = Q_1 \bar{X} + \bar{Q}_1 Q_0 X + Q_1 \bar{Q}_0 X; \quad D_0 = Q_0 \bar{X} + \bar{Q}_0 X \quad \text{and} \quad Z = Q_1 Q_0 X$ (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

$$S = \left\{ \begin{bmatrix} x \\ y \\ z \end{bmatrix} : \begin{aligned} x + y + z &= 0 \\ x - y - z &= 0 \end{aligned} \right\}$$

Q 2. Solve any two.

10 Marks

a) Find Basis and Dimension for Column space, Row Space, and Null Space for the following

$$\text{Matrix } A = \begin{bmatrix} 2 & 0 & 1 & -1 & 0 \\ 1 & 2 & 0 & -3 & 1 \\ 4 & -4 & 3 & -9 & -2 \end{bmatrix}$$

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

$$\begin{aligned} \cos \theta & \quad -\sin \theta \\ \sin \theta & \quad \cos \theta \end{aligned}$$

$$\begin{aligned} -3 + 1/2 \\ \cdot 5/2 \end{aligned}$$

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) Similar Matrices

(iii) Diagonalizable Matrix

b) If A is an $n \times n$ 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

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

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

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

$$\begin{aligned} & -8 + 20 - 16 + 4 \\ & -1 + 5 - 8 + 4 \end{aligned}$$



SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

End Term Examination (Semester-I)

S. Y. B. Tech.

Object Oriented Programming

AY → 2022-23

Information Technology Dept.

PCC - IT 202

Max. Marks: 50

Date: 09/12/2022

Time: 15.00 - 17.00

Q.1 Answer the followings

- 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
- g Why should exceptions be used instead of if else logic?

- d List the situation where inline function does not work.
- e What is pure virtual function?
virtual function = 0;
- f What is the difference between normal function and static function?

loop, switch, goto, recursion

Marks CO BT
14 CO1 BT1

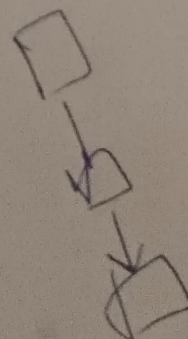
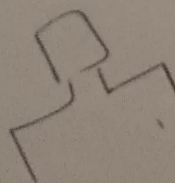
Solve any SIX of the followings.

- 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, loanamt) 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
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*MULTIPLE-
MULTIPLY-
HYBRID-
HYBRID.*





SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

End Term Examination (Semester-I) 2022-23

S.Y. B. Tech.
Data Structure

Information Technology
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) <i>(10/11)</i>	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. <i>(10/11)</i>	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

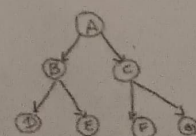


Diagram for Q5

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. 21 of 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.