Subject Code No: BSC 273 Date: 10/10/2022

SHRI GURU GOBIND SINGHJI INSTITUTE OF ENGINEERING AND TECHNOLOGY, NANDED
(Government Aided Autonomous Institute)

Second Year B. Tech | Mathematics-III | Max mark: 30
Duration: 60 mins

All Questions are compulsory.

1. Attempt any two

(I) Let $u = \begin{bmatrix} 5 \\ 2 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 6 \\ 0 \\ 3 \end{bmatrix} \in Z_7 (or \quad F_7)$. Then Find followings [3 marks]

(i) $4u + 5v$
(ii) $3u + (u.v)$

(II) State whether the given statements are true or false. Justify your answer. [3 marks]

(i) In Z_5, if $ab = 0$ then either $a = 0$ or $b = 0$.
(ii) In Z_6, if $ab = 0$ then either $a = 0$ or $b = 0$.

(III) Solve the given system of equations using LU factorization. [3 marks]

$$x + 2y - 3z = 9$$
$$2x - y + z = 0$$
$$4x - y + z = 4$$

2. Attempt any three

(I) Prove that $\mathbb{R}^2 = span \left\{ \begin{bmatrix} 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \end{bmatrix}, \begin{bmatrix} 2 \\ 3 \end{bmatrix} \right\}$. [4 marks]

(II) Find projection of v onto u in each case: [4 marks]

(i) $u = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $v = \begin{bmatrix} 2022 \\ -4 \end{bmatrix}$

(ii) $u = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ and $v = \begin{bmatrix} 2 \\ -4 \\ 1 \end{bmatrix}$

(III) State and prove Pythagora's Theorem. [4 marks]

(IV) Prove that $proj_u(proj_u(v)) = proj_u(v)$ [4 marks]

3. Attempt any three

(I) Under what conditions are the following true for vectors u and v in $\mathbb{R}^2$ or $\mathbb{R}^3$? [4 marks]

(i) $||u+v|| = ||u|| + ||v||$

(ii) $||u+v|| = ||u|| - ||v||$

(II) Find the basis of column subspace of matrix A

for $A = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 4 & 0 \\ 3 & 6 & 0 \end{bmatrix}$. [4 marks]

(III) Show that : [4 marks]

(i) $c0 = 0,\ 0 \in \mathbb{R}^n,\ \forall\ c \in \mathbb{R}$.

(ii) $(-1)u = -u\ ,\ \forall\ u \in \mathbb{R}^n$.

(IV) Is subset $X = \left\{ \begin{bmatrix} 1 \\ 4 \\ 7 \end{bmatrix}, \begin{bmatrix} 2 \\ 5 \\ 8 \end{bmatrix}, \begin{bmatrix} 3 \\ 6 \\ 9 \end{bmatrix} \right\}$ of $\mathbb{R}^3$ linearly independent? write your answer with full justification. [4 marks]

Best wishes!

	SGGS Institute of Engineering and Technology, Nanded	
	Mid Term Examination 2022-23 (Semester-I)	
	SY B. Tech. - Information Technology	
	Subject: Digital System Design	Code: PCC-IT204
Date: 15/10/2022	Time: 11.30 To 12.30	Max. Marks: 30

Notes:

1. This paper contains ONE page.
2. Figures to right indicate full marks.
3. Assume suitable data if necessary and mention it.
4. No calculator is permitted.

Q. No.	Question	Marks	CO/BT
Q. 1- a	Express the following function in Canonical SOP and POS form: $f = \overline{A}\overline{B} + A\overline{C} + \overline{A}CD$	[03]	CO2/BT 2,3
Q. 1- b	Represent the decimal number 15 in: (i) Binary code (ii) BCD Code (iii) Excess-3 Code (vi) Gray Code (v) Octal Code (vi) Hexadecimal Code (vii) Hamming code	[04]	CO1/BT 1,2,3
Q. 2	For the logic expression: $Y = \overline{A}\overline{B} + AB$ a) Obtain the truth table and name the operation performed b) Realize this operation using AND, OR and NOT gates c) Realize this operation using only NOR gates. d) Realize this operation using minimum size Multiplexer.	[05]	CO2/BT 2,3
Q. 3	Design a 3 bit Binary to Gray code converter using decoder IC 74138. Write the truth table and explain the design procedure.	[06]	CO1,2/ BT2,3,4
Q. 4	Make a K-map for the following function, minimize it and implement using only NAND gates. $f = \overline{A}\overline{B} + A\overline{C} + \overline{B} + \overline{A}CD + \overline{B}C + \overline{A}BCD$	[06]	CO2/BT 3,4,5
Q. 5	Design 8:1 multiplexer having an active low enable input using only lower order multiplexers.	[06]	CO2/BT 3,4,5

//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

SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

MID Term Examination (Semester-I) — **AY → 2022-23**

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

Object Oriented Programming — **PCC - IT 202**

Date: 12/10/2022 — **Time: 11.30 - 12.30** — **Max. Marks: 30**

Q.N	Question	Marks	CO	BT
Q.1	**Answer the followings**	06	CO1	BT1

a What will be the output?

```
#include<iostream>
using namespace std;
int main()
{
        int a = 5;
        auto check = [=]()
        {  a = 10;     };
        check();
        cout<<"Value of a: "<<a<<endl;
        return 0;
}
```

a) Segmentation fault
b) Value of a: 5
c) Value of a: 10
d) Error

b How structures and classes in C++ differ?
a) Structures by default hide every member
b) In Structures, members are public by default whereas, in Classes, they are private by default
c) Structures cannot have private members
d) In Structures, members are private by default whereas, in Classes, they are public by default

c Constructors are used to ____
A. initialize the objects
B. construct the data members
C. both initialize the objects & construct the data members
D. delete the objects

d What will be the output?

```
#include <iostream>
#include <string>
using namespace std;
int main ()
{
  std::string str ("SGGSIET.");
  str.back() = '!';
  std::cout << str << endl;
  return 0;
}
```

a) SGGSIET!
b) SGGSIET!.
c) SGGSIET.
d) SGGSIET.!

e What is an abstract class in C++?
a) Any Class in C++ is an abstract class
b) Class from which any class is derived
c) Class specifically used as a base class with atleast one virtual functions
d) Class specifically used as a base class with atleast one pure virtual functions

f Which operator has more precedance in below list?
(A) +
(B) -
(C) ++
(D) *

Solve any four of the followings.

Q.2	Write down a C++ program to implement function overloading.	06	CO2	BT3
Q.3	What are the different ways to define member functions of a class. What is the role of scope resolution operator in the definition of member function?	06	CO3	BT5
Q.4	How is the working of member function different from friend function and a non member function?	06	CO4	BT4
Q.5	Compare procedural programming with object oriented programming. For what type of application is the procedural programming is suitable and for what type object oriented programming is suitable?Justify your answer.	06	CO1	BT2
Q.6	Explain static member functions and static data members in a class using suitable examples	06	CO3	BT5
Q.7	Write a C++ program to find out minimum and average of two integer numbers of two different classes using friend function.	06	CO4	BT6

Course Outcomes (CO)

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: Mid Term

Class: S. Y. (EXTC/ELE/IT/PROD/INSTRU) | Date: 11/10/2022

Course: MAC277 INDIAN CONSTITUTION

Time: 11.30 To 12.30 Hours | Total Marks : 30

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

2. Solve any three questions.

1. A. Write a detailed note on Making of Indian Constitution from 1947 to 1950? 5
   B. Explain the Basic features of the Government of India Act 1935 in the history of Indian Constitution? 5

2. A. Is Preamble the part of Indian Constitution? Explain with case laws? 5
   B. Explain the term "State" according to Art. 12 of Indian Constitution? 5

3. A. What do you mean by "Directive Principles of State policies"? Explain the aim, objectives and nature of DPSP? 5
   B. Explain in detail "Salient Features and Characteristics of Indian Constitution"? (Any 10) 5

4. A. Why Fundamental rights are called fundamental? Explain this concept with Right to equality according to Art. 14 - 18? 5
   B. Explain the concept of "Right to work, to education and to public assistance" under Art. 41 of Indian Constitution? 5

5. Write Short notes on: **(Any two)** 10
   A. Six Golden Freedoms under Art. 19
   B. Fundamental Duties under Art. 51-A
   C. Independent Judiciary

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

SGGS Institute of Engineering and Technology, Vishnupuri, Nanded

Mid Term Examination (Semester-I) 2022-23

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

Data Structure **PCC-IT201**

Date: 13/10/22 **Time: 11:30 am to 12:30 pm** **Max. Marks :30**

Note: i. Attempt all questions
ii. Assume suitable data if necessary. Performance would be cancelled if code is replicated.
iii. Use of non-programmable calculator is permitted.
iv. This paper contains 1 page. Solve any 1 question from Q3 to Q3. If a student solves 2 questions, the first question marks would be considered.

Q.N.		Question	Marks	CO	BT
Q.1		Given this expression. Print the result using stack. Show all stack simulation in detail. 1) Infix to postfix 2) Expression evaluation	10	IT201.1, IT201.2	BT1 BT2 BT3 BT5
	A	2+3^4			
	B	2^3+4			
Q.2	A	Write a C++ program using recursion to print sum of all the odd numbers divisible by 2, sum of all the odd numbers divisible by 3 and sum of all the odd numbers divisible by both 3 and 2 in a given array, Print all three individual sum in main program and return count of all odd number. 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) **OR**	15	IT201.1, IT201.2 IT201.3, IT201.4 IT201.5	BT1 BT2 BT3 BT6
Q.2	A	Define Stack of Students information consist of ***roll_number, name, 3 subject marks.*** When we ***push*** elements, calculate Sum and average and save it. Print the Sum and average of last but one student directly in stack's ***pop*** operation.	15	IT201.3 IT201.4	BT1
Q3	A	Define in 2 lines only. ***Stack definition***. Define one function and show the logic to merge 2 sorted array. Assume ***INPUT1*** and ***INPUT2*** are sorted number of m and n sizes. Create third Sorted array. **OR**	1 4	IT201.1	BT1 BT2 BT6
Q3	A	Write a C++ program of Linear search using recursion only. Take integer array name as ***input,*** search item name as ***item*** *and* function name as ***Show.***	5	IT201.4	BT3 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

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: 2022-2023 Mid Term Examination Class: Second Year (IT)	
Date: 14/10/22 Time: 11:30-12:30	Subject: Discrete Mathematics Code: PCC IT 203	Max Marks: 30

Notes:

1. **All Questions are compulsory**
2. **Figures to right indicate full mark.**

Q.N.	Question	Marks	CO	BT
1.	Construct a truth table for each of these compound propositions a) $(p \rightarrow q) \wedge (\neg p \rightarrow r)$ b) $(p \leftrightarrow q) \vee (\neg q \leftrightarrow r)$ c) $(\neg p \leftrightarrow q) \leftrightarrow (q \leftrightarrow r)$	[6]	IT203.1	BT5
2.	Translate each of these statements into logical expressions using predicates, quantifiers, and logical connectives a) No one is perfect b) Not everyone is perfect c) All your friends are perfect d) One of your friends is perfect e) Everyone is your friend and is perfect f) Not everybody is your friend, or someone is not perfect.	[6]	IT203.2	BT2
3	Prove that $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$ for all sets A, B, and C.	[6]	IT203.2	BT4
4.	Determine whether each of these functions is a bijection from R to R. a) $f(x) = 2x + 1$ b) $f(x) = x^2 + 1$ c) $f(x) = (x^3 + 1)/(x^2 + 2)$	[6]	IT203.3	BT6
5.	List all the steps used to search for 9 in the sequence 1, 3, 4, 5, 6, 8, 9, 11 using a) a linear search. b) a binary search.	[6]	IT203.3	BT3

Course Outcomes (CO)

IT203.1 Understand Propositional Logic
IT203.2 To understand Set operations and Functions
IT203.3 To Understand fundamentals of algorithms
IT203.4 To learn Mathematical reasoning
IT203.5 Understanding Graph theory.

Bloom's Taxonomy (BT)

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

ALL THE BEST