Enrollment No: _____   Exam Seat No:_____

C.U.SHAH UNIVERSITY
Summer Examination-2022

Subject Name :Mathematical Physics
Subject Code : 5SC01MTP1   **Branch: M.Sc. (Physics)**
Semester: 1   **Date: 21/04/2022**   **Time: 11:00 To 02:00**   **Marks: 70**
Instructions:
   (1) Use of Programmable calculator and any other electronic instrument is prohibited.
   (2) Instructions written on main answer book are strictly to be obeyed.
   (3) Draw neat diagrams and figures (if necessary) at right places.
   (4) Assume suitable data if needed.

SECTION – I

Q-1	**Attempt the Following questions**	**07**
a.	Distinguish Scalars, Vectors and Tensors.	(01)
b.	What is Rank or Order of Tensors?	(01)
c.	Define "Subscript" and "Superscript" giving one example of each.	(01)
d.	Define Dummy indices giving one example.	(01)
e.	Name different types of groups.	(01)
f.	What are the possible elements of symmetry operations in a square? Draw figures.	(01)
g.	What is N-dimensional space?	(01)
Q-2	**Attempt all questions**	**14**
(A)	Discuss properties of Tensors.	(07)
(B)	Explain and derive Bessel Differential Equation.	(07)
	OR	
Q-2	**Attempt all questions**	**14**
(A)	Explain applications of tensors in science and technology.	(07)
(B)	Describe coordinate transformation in tensors.	(07)
Q-3	**Attempt all questions**	**14**
(A)	What is a "Group" in mathematics? Explain with different definitions.	(07)
(B)	Explain The symmetry operations of an equilateral triangle forming a finite group of six elements.	(07)
	OR	
Q-3	**Attempt all questions**	**14**
(A)	Explain a Sub-group. Describe 1-step and 2-step sub group tests.	(07)
(B)	What are the applications of Group theory?	(07)

SECTION – II

Q-4 **Attempt the Following questions.**   **07**
   a. Define: Differential Equations. Name different types of differential equations.   (01)
   b. What are 'degree' and 'order' of a differential equation?   (01)
   c. What is difference between ordinary and partial differential equations?   (01)
   d. Define linear Differential Equations.   (01)
   e. Define:Analytic function   (01)
   f. Define:Continuous function   (01)
   g. Define complex numbers and identify each of its parts.   (01)

Q-5 Discuss the Cauchy-Riemann theorem by the 'Necessary and Sufficient C.R.   **14**
        conditions for a function to be analytic.

<p align="center">OR</p>

Q-5 **Attempt all Questions.**   **(14)**
   (A) Stateand prove: Taylor's theorem equation   (07)
   (B) State and prove: Laurent's theorem equation.   (07)

Q-6 Derive the solution of Legendre's differential equation by the ascending and   **14**
        descending power of variables.

<p align="center">OR</p>

Q-6 **(A)** Discuss Kronecker delta.   **(07)**
   (B) Write a note on "Rules and Properties of Groups".   **(07)**