

Enrollment No: _____

Exam Seat No: _____

C. U. SHAH UNIVERSITY

Winter Examination - 2022

Subject Name : Mathematical Physics

Subject Code : 5SC01MTP1

Branch: M.Sc. (Physics)

Semester : 1

Date : 02/01/2023

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.
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SECTION – I

Q-1 Attempt the Following questions (07)

- | | | |
|--|--|----|
| | a. Define Group. | 01 |
| | b. Give any one property of a group. | 01 |
| | c. When a group is called an abelian? | 01 |
| | d. What do you mean by a subgroup? | 01 |
| | e. Define tensor. | 01 |
| | f. How a tensor is called a zero tensor? | 01 |
| | g. What is dyad ? | 01 |

Q-2 (14)
Give properties of Group. Also give the applications of it.

OR

Q-2 Attempt all questions (14)

	a. Explain the symmetry of an equilateral triangle using group theory.	08
	b. Write a detailed note on isomorphism.	06

Q-3 Attempt all questions (14)

	a. Write a note on rank of matrix and differentiate between all of them.	07
	b. Differentiate between symmetric and skew-symmetric tensors with examples.	07

OR

Q-3 Attempt all questions

	a. Explain Kronecker delta function in detail.	08
	b. Give the properties of the tensors.	06



SECTION – II

- Q-4 Attempt the Following questions (07)**
- a. Which number is called the complex number? **01**
 - b. $i^2 = \underline{\hspace{2cm}}$ **01**
 - c. Give the necessary equation for a function to be analytic. **01**
 - d. State the Cauchy integral theorem. **01**
 - e. What do you mean by a differential equation? **01**
 - f. Give the expression for a 1st order differential equation. **01**
 - g. Bessel differential function is given by? **01**
- Q-5 Attempt all questions (14)**
- a State and prove Laurent theorem. **07**
 - b Explain Taylor series and prove the Taylor theorem. **07**
- OR**
- Q-5 Attempt all questions**
- a Prove the Cauchy's integral formula for a nth derivative. **07**
 - b Prove the Cauchy integral theorem. **07**
- Q-6 Attempt all questions (14)**
- a Write a note on Legendre equation and solve the series in descending power of n upto k= n. **08**
 - b Solve the equation $x^2y' - 2xy = x^{-1}$ **06**
- OR**
- Q-6 Attempt all Questions**
- a Write a note on Bessel equation and solve the series in descending power of n upto k= n. **08**
 - b Derive the general equation for the nth order of differential equation. **06**

