CureMD Reskilling Program
Mathematical Modeling

FINAL PROJECT

Instr: Imran Akhtar, PhD **Max Marks:** 100
Due Date: 7 Nov 2021 @ 9 pm

PROJECT STATEMENT

While working as an expert of Mathematical Modeling in the Core Research Team of a leading Financial Firm, you have been tasked to review and model the recent surge of US Dollar (USD) against the Pakistani Rupee (PKR). Using the data of past 15-20 years from internet sources, you plan to analyze and model the trend and predict USD to PKR exchange rate at the end of next fiscal year, i.e. 30 Jun 2022, using ordinary differential equations (ODE). You are required to suggest the best option after performing the following tasks:

1. Model the given problem using ODE based approach discussed in the paper (Li, M.R., Chiang-Lin, T.J. and Lee, Y.S., 2018. Applications of Parameterized Nonlinear Ordinary Differential Equations and Dynamic Systems: An Example of the Taiwan Stock Index. International Journal of Differential Equations, 2018.)

2. Identify the sharp increase in the exchange rate in the past 15 years and discuss the possible reasons. How does the mathematical model takes care of these sudden surges.

3. Discuss the parameters in the model.

After successfully performing your analysis, you plan to report your findings to the CEO of your Company. Write a preliminary research paper strictly following IEEE template (MS word or Latex) with the following sections:

1. Title, Author, Affiliation, and Abstract [5]

2. Introduction [10]

3. Literature Review [15]

4. Mathematical Model [25]

5. Numerical Results and Discussion [25]

6. Recommendations to the Company [15]

7. Acknowledgment (if any)

8. Bibliography (at least 5 references) [5]

IMPORTANT NOTES:

1. TITLE: Give appropriate title to your work. Include the names of authors actually doing the work. Do NOT include instructors, colleagues etc. unless someone is really involved in the work. Mention the affiliation of each author(s). Write an abstract not more than 100 words.

2. INTRODUCTION: It should include motivation of this work and objective of the report.

3. LITERATURE REVIEW: Study the referred paper carefully and use a similar approach to cover the past literature on the subject under discussion. You may include other papers on the subject.

4. MATHEMATICAL MODEL: Discuss in detail how did you develop the mathematical model from various options provided in the referred paper.

5. NUMERICAL RESULTS & DISCUSSION: Simulate the model and discuss the predictions of your model in detail.

6. RECOMMENDATIONS: Give recommendations to your CEO as to what why your model should be used for prediction of exchange rates.

7. ACKNOWLEDGEMENT: If you think someone was of help in your work, thank him/her.

8. BIBLIOGRAPHY: Cite good reference. Give priority to recent journal articles. Do NOT cite website references.

9. MISCELLENOUS: Page limit for the research paper is minimum 4 pages and maximum 8 pages excluding Bibliography.

10. JUDGING CRITERIA: The paper will be reviewed with following possible decisions:

    (a) Accepted (95% or above)

    (b) Accepted with Minor Revisions (80% or above)

    (c) Accepted with Major Revisions (50% or above)

    (d) Rejected (below 50%)

11. WARNING: Use of any unfair means, including copying or helping others in copying, will result in REJECTION of the paper and a FAIL grade. WRONG FORMAT of the paper will have the penalty of 50% points.