30-MINUTE TEST

Subject: Time Series

Duration: 30 minutes

PART I: THEORY (5 points)

1. (2 points) Define a time series. Provide an example of a real-life time series you know.
2. (3 points) Explain the significance of the Trend, Seasonality, and Noise components in time series analysis.

PART II: EXERCISES (5 points)

1. (2 points) A company recorded its revenue (in million VND) over the first 6 months of the year as follows:

Month	1	2	3	4	5	6
Revenue	50	55	60	58	65	70

a) Plot the time series graph of the revenue.
b) Comment on the trend of the revenue changes over the months.

2. (3 points) A time series is given as follows:

$y_t = 100 + 5t + 10\sin(\pi t/6) + \varepsilon_t$

Where:
- t: time (in months), t = 1, 2, ..., 12.
- ε_t: random noise with an expected value of 0.

a) Identify the Trend, Seasonality, and Noise components in the given time series.
b) Calculate the forecasted value of y_t at t = 7, assuming $\varepsilon_t = 0$.

INSTRUCTIONS:
- Write your answers clearly on the paper.
- Use calculation tools or software if necessary, but explain your steps.

GOOD LUCK!