Please start the answer to each question on a separate page.

There are 5 questions in this paper.

Candidates must answer two questions: one from Part A and one from Part B.
All questions attract the same number of total marks.
For multipart questions, the weight assigned to each part is indicated in square brackets.

Candidates may use their own calculators.

Do not turn over until told that you may do so.
PART A

1. (Macroeconomics) Suppose that output, \( Y_t \), is produced according to the following production function:

\[
Y_t = A_t(K_t)^a (L_t)^{(1-a)}
\]

where \( A_t \) is the level of technology, \( K_t \) is the aggregate stock of capital and \( \alpha \) represents the share of income that goes to capital. The total workforce, \( L_t \), is assumed to be employed. Let \( s \) represent the national saving rate, and allow capital to depreciate at a rate \( d \). Assume that there is no persistent growth in labour force or technology.

(a) Write an equation for capital accumulation and explain whether this model exhibits long-run growth. [10%]

(b) Suppose that labour supply falls abruptly from \( L_0 \) to \( L_1 < L_0 \). What happens to output per worker and overall GDP? [15%]

(c) Many experts, economists included, warn that climate change will have profound implications for economic growth. For this part of the question, consider two potential effects of climate change: (1) a policy decision to ban the use of certain types of currently-used machinery (for example old vehicles), and (2) increased depreciation of capital due to the increased severity and frequency of extreme weather events. How would the levels and growth rates of output per worker and overall output develop over time if these changes were both simultaneously implemented? [20%]

(d) In addition to the effects described above, what other effects might climate change have on the drivers of economic growth as laid out by the model? [15%]

(e) Now suppose that there is no climate change effect and no change in labour supply. Start at steady state, and imagine that productivity in the model (measured by the level of technology parameter, \( A_t \)) will increase temporarily to a new higher level for 3 periods (before returning to its original level). What will the impacts be on output and consumption per worker over time? [25%]

(f) Does investment increase when productivity increases in the Solow Model? Does that correlation match what you would expect in the real world? How does this response compare to the behaviour of investment in other models? [15%]
2. (Macroeconomics) Starting with New Zealand in 1989, many central banks around the world have adopted an inflation targeting framework.

(a) Explain briefly why the adoption of an inflation targeting framework can help a central bank to build credibility. [10%]

(b) Suppose inflation was on target at \( t - 1 \). Using the short-run model (with an IS curve and a Phillips Curve) derive the value of the output gap, real interest rate, and nominal interest rate consistent with inflation being exactly on target also at \( t \). [20%]

(c) Using your answer from part (b) explain intuitively how the central bank can ensure that inflation is exactly on target at time \( t \). What are the consequences for the output gap? [10%]

(d) Consider a central bank that sets the real interest rate in response to deviations of inflation from target according to

\[
R_t = \bar{r} + \bar{m}(\pi_t - \bar{\pi}),
\]

where \( \bar{m} > 0 \), \( R_t \) is the real interest rate at \( t \), \( \pi_t \) is inflation at \( t \) and \( \bar{\pi} \) is target inflation. Maintaining the assumption that \( \pi_{t-1} = \bar{\pi} \), derive the values of the output gap and inflation in this case. [25%]

(e) Compare the results you obtained in parts (b) and (d). What can you conclude about the volatility of the output gap in the two cases? [20%]

(f) Assuming it is feasible, in which circumstances would you recommend a central bank to adopt a monetary policy strategy that delivers inflation on target in every period? [15%]
3. *Macroeconomics* After 2008 the Turkish economy experienced a persistent economic boom, especially in the construction sector.

(a) Using the IS-MP model, discuss the consequences of the boom on the output gap and inflation for given monetary policy. [15%]

(b) What would the appropriate monetary policy response be for the central bank of Turkey if its mandate were to stabilise short-run inflation? Explain and illustrate your answer graphically. How would your answer change if, in addition to inflation, the central bank were to target the output gap too? [10%]

(c) One narrative of the Turkish experience is that political interference prevented the central bank from raising interest rates in a timely fashion. What piece of empirical evidence would support this view in light of the IS-MP model? [25%]

(d) Turkey had a large trade deficit. Explain briefly if and how a large trade deficit with the rest of the world is consistent with the overall macroeconomic environment for Turkey discussed so far. In the IS-MP model, how would you model a shock that contemporaneously led to a domestic boom and a large trade deficit? [15%]

(e) Assume the trade balance depends on long-run output but also on the gap between the real interest rate and the world real interest rate as in the open economy version of the short-run model. What would have happened to the trade balance if the central bank of Turkey had increased interest rates to cool down the economy? Explain the intuition. [15%]

(f) In several international financial crisis episodes, foreign investors flee countries that are experiencing macroeconomic turmoil. What is the likely effect of such a confidence crisis on the trade balance? What should the central bank do to stabilise output gap and inflation in these circumstances? [20%]
PART B

4. (Macroeconomics) Explain the rationale for Quantitative Easing (QE). Do you agree with the view that QE should be part of the central bank’s toolkit also in normal times? Explain your answer.

5. (Macroeconomics) Milton Friedman, in an interview in The Guardian in 1974, said “Inflation is the one form of taxation that can be imposed without legislation. It is also a form of taxation that is particularly seductive. In its early stages, people find it rather attractive, because the first effects of inflation are expansionary and pleasant. It’s like the first drink you take. It’s only the next morning that you have a hangover.” Discuss the basis for this quote together with how this idea has influenced the design of central banks in the last 40 years.