EUNOIA JUNIOR COLLEGE
JC2 Preliminary Examination 2025
General Certificate of Education Advanced Level
Higher 2

ECONOMICS

Paper 1

9570/01

28 August 2025

2 hours 30 minutes

Additional Materials: Answer Booklet

READ THESE INSTRUCTIONS FIRST

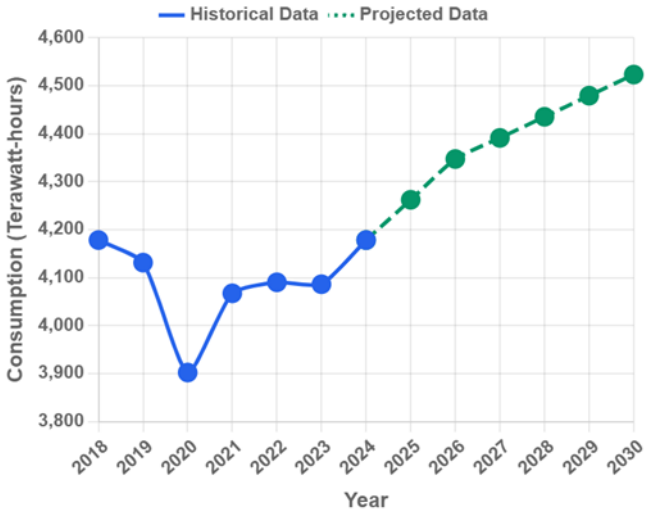
An answer booklet will be provided with this question paper. You should follow the instructions on the front cover of the answer booklet. If you need additional answer paper, ask the invigilator for a continuation booklet.

Answer **all** questions.

The number of marks is given in brackets [ ] at the end of each question or part question.

Question 1: Artificial intelligence (AI) and data centers

Figure 1: Total electricity consumption in the United States (US) from 2018 to 2030



Source: statista.com, accessed 1 July 2025

Extract 1: AI is pushing data center energy demands through the roof

The rapid rise of artificial intelligence (AI), catalyzed by OpenAI's ChatGPT launch in November 2022, has transformed the digital landscape, driving an unprecedented surge in electricity consumption by US data centers. The primary driver is the proliferation of AI workloads, particularly generative AI models, which rely on energy-intensive graphics processing units (GPUs) that consume up to 10 times more power than traditional servers.

The International Energy Agency (IEA) projects that US data center electricity demand could triple to 606 terawatt-hours (TWh) by 2030, equivalent to the annual power needs of 56 million households. This growth is fueled by the expansion of hyperscale data centers operated by tech giants like Google, Microsoft, and Amazon, which are investing heavily in AI infrastructure. As a result, electricity prices across the US rose by 4.5% in 2023. Supply constraints, such as limited grid capacity and long lead times for new power infrastructure, have also intensified electricity price increases. This increase in electricity prices does not only have cost implications for operators of data centers; it also impacts the households. Households across the country are now grappling with noticeably higher electricity bills. Some families are beginning to reduce their electricity usage, such as limiting the use of high-energy appliances by delaying laundry cycles or turning to LED lighting that is more energy efficient. Other families may need to adjust their overall consumption patterns, so that they can pay for the higher electricity bills yet keep to their budget.

Source: Adapted from Forbes, 31 May 2024

Extract 2: First time that AI has been blamed for layoffs

The advent of artificial intelligence (AI) has significantly disrupted the US labor market, with automation increasingly replacing human workers in various sectors. In May 2023, the US Labor

Department reported that approximately 3,900 workers lost their jobs explicitly due to AI-driven automation, marking the first instance where AI was officially cited as a cause of unemployment in government data. This figure represents a small but growing share of the 236,000 total layoffs recorded that month, underscoring the rapid integration of AI tools by major companies like Microsoft, Meta, and IBM. These firms have adopted generative AI technologies, such as ChatGPT, to automate tasks in customer service, data entry, content creation, and even software development. The International Monetary Fund (IMF) notes that 60% of jobs in advanced economies, including the US, are exposed to AI, with entry-level roles most vulnerable due to their routine nature.

But analysts note that as with previous technologies that have replaced human workers, generative AI technologies are already creating new jobs, and the emerging industry is just getting started. According to a report by the US Chamber of Commerce, demand for AI-related roles, such as machine learning engineers, AI ethicists, prompt engineers, and data annotators, has surged, particularly in the technology, healthcare, and finance sectors. Companies are also providing AI courses for existing employees, allowing them to take on higher-value roles that require human judgment, creativity, and oversight of automated systems.

Source: Adapted from CBS News, 3 June 2023

Extract 3: Benefits and costs of AI

In 2019, Singapore was one of the first countries in the world to introduce a national AI strategy to power Singapore's future. It represents the next phase of the country's economic transformation and growth. More than $500 million has been invested in research and development through the national research programme AI Singapore since 2019. Now known as National AI Strategy 2.0 (NAIS 2.0), the new plan is needed to gear the nation to deepen AI adoption across many sectors while mitigating its risks. Since then, Singapore has witnessed significant breakthroughs in AI, resulting in the development of enhanced capabilities, new products and transformative interactions. The influx of AI tools in industry transformation, healthcare, education, security and other sectors is "not by chance" but comes on the back of years of planning and investment.

One of the risks is the rapid expansion of data centers. It poses a severe threat to global climate goals due to their heavy reliance on fossil fuels. In 2023, US data centers consumed approximately 147 terawatt-hours (TWh) of electricity. Of this, 56% were powered by fossil fuels, with 40% from natural gas and 16% from coal, according to the International Energy Agency (IEA). This fossil fuel dependency resulted in carbon dioxide emissions equivalent to Brazil's annual output, estimated at 435 million metric tons, contributing to significant environmental degradation given the increasing local air pollution and greenhouse gas emissions. This perpetuation of fossil fuel reliance exacerbates climate-related damage, such as rising sea levels and heatwaves.

The most ambitious legislative effort to combat environmental damage through clean energy initiatives by the US include the Investment Tax Credit (ITC) and Production Tax Credit (PTC), which offer a 30% cost deduction for eligible solar and wind projects for clean energy production. These tax credits have catalyzed significant private sector investment, with companies like Google and Microsoft committing over US$15 billion in 2023 to new solar and wind projects to power their AI-driven data centers. While this is a good start, these sources of energy are intermittent, and data centers will still require energy to continue processing when the wind is not blowing and the sun is not shining.

Similarly, Singapore's Green Plan 2030, launched in 2021, represents a comprehensive strategy to incentivise clean energy. A cornerstone of the Green Plan is the carbon tax. It targets large emitters, including Singapore's 70 over data centers, which are critical to the city-state's role as a global tech hub hosting AI operation for companies like Google and Amazon. To enable a smooth transition to a low-carbon future, Singapore plans to raise the carbon tax levels progressively to send the right price signal and minimize possible disruptions to businesses and individuals as they reduce their carbon footprints.

Sources: Adapted from The Straits Times, 4 Dec 2023
TIME, 3 March 2024
National Climate Change Secretariat, 12 April 2024

Questions

(a) Describe the trend in the actual total electricity consumption in the US from 2018 to 2023 **and** in the projected consumption from 2024 to 2030 in Figure 1. [2]

(b) With reference to Extract 1:

(i) Explain the likely value of the price elasticity of supply (PES) of electricity in the US market. [2]

(ii) Using the PES concept **and** a diagram, explain why increasing electricity prices have intensified in the US market. [4]

(c) Discuss the factors that the Singapore government has considered when deepening AI adoption 'to power Singapore's future' through initiatives such as NAIS 2.0. [8]

(d) **(i)** Explain why the operations of fossil fuel-powered data centers are not socially optimal. [4]

(ii) Discuss the view that carbon taxes by Singapore is a better approach than the tax credits by the US to improve social welfare in the operations of fossil fuel-powered data centers. [10]

[Total: 30]

Question 2: Government Spendings and Debts

Table 1: Selected indicators for Singapore and Malaysia

	Singapore			Malaysia		
	2021	2022	2023	2021	2022	2023
Real GDP growth rate (%)	9.8	4.1	1.8	3.3	8.7	3.7
Government debt (as a % of GDP)	149.3	154.1	175.6	62.0	60.2	64.3
Real GDP per capita (US$)	80,056	90,299	85,412	10,903	11,748	11,379

Source: World Bank, accessed 1 July 2025

Extract 4: Singapore economic forecast 2023

The Singapore economy is expected to grow by around 1% in 2023, narrowing from a previous forecast range of 0.5% to 1.5%. According to a survey by Singapore Business Federation (SBF), more than three quarters of the businesses expressed economic pessimism, citing higher costs and uncertain economic climate. The increase in Goods and Services Tax (GST) from 7% to 8% adds to the cost concerns, which also contributes to the poor expectations of economic growth and price stability.

Singapore is frequently misunderstood in terms of its national debt. The city-state has no net debt. Yet, media portrayals, authoritative sources included, typically focus on Singapore's gross debt figures, painting a picture of significant indebtedness. While Singapore's gross debt-to-GDP ratio may appear large on its own, it does not consider Singapore's sizeable asset position. Singapore's financial assets are well more than its debt. This explains why Singapore receives the top credit rating of AAA from the three leading international credit-rating agencies.

Sources: Adapted from Singapore Business Federation, National Business Survey 2023/2024
Factually.gov.sg, 16 January 2024

Extract 5: Malaysia's plan to revive Kuala Lumpur-Singapore high-speed rail (HSR)

Malaysia's plan to revive the Kuala Lumpur-Singapore high-speed rail (HSR) by relying wholly on private sector financing is unlikely to get off the ground. Prime Minister Anwar Ibrahim's administration has said it is open to reviving the HSR, but it will not pay for the 350km-long line, which is estimated to cost over 100 billion Malaysian ringgit (US$23 billion).

Analysts believe that private financing alone cannot revive the project. For the HSR to be commercially viable, private rail companies would need state support for land acquisition, subsidies for train tickets, and maintenance of the infrastructure. This would allow more passengers to afford the tickets and commute between Singapore and Kuala Lumpur, since 1-way ticket is projected to costs less than 200 Malaysian ringgit (US$47). Affordability is a key factor for ridership, given that Malaysia's average income is only about 13% of Singapore's.

As of August 2023, total federal government debt stood at 1.147 trillion Malaysian ringgit (US$271 billion), or 62% of GDP, higher than its target. As much as spending on the HSR could have boosted economic activity, created jobs and improved connectivity for travel, it might also affect the government's future budgets, as allocations for priority sectors such as health and education could be trimmed.

'It would be fiscally irresponsible for the Malaysian government to fund it (HSR).' said economist Muhammed Abdul Khalid, a research fellow at the Institute of Malaysian and International Studies.

Source: The Straits Times, 19 February 2024

Extract 6: Addressing crisis through infrastructure stimulus

Fiscal policy plays a major role in counteracting recession. Infrastructure stimulus generally creates larger economic benefits, because it not only puts people to work, but also creates durable assets that can help boost long-term growth.

Macroeconomic conditions determine a stimulus package's effectiveness. Infrastructure stimulus is more likely to succeed in a more closed economy, with a fixed exchange rate regime. It requires loose monetary policy, so that fiscal expansion is not offset by a reduction in net exports, exchange rate appreciation or higher interest rates.

Initial fiscal conditions matter. Countries can respond to the recession more aggressively if enough fiscal space exists before the upheaval. When initial conditions are healthy, fiscal expansion is less likely to endanger debt sustainability and hamper growth in the long term. When taxes are distortionary, debt-financed spending will be more effective in boosting employment and output than spending that is paid with higher current tax.

Table 2: Conditions affecting effectiveness of infrastructure stimulus

Macro-economic conditions	**More effective**	**Less effective**
Exchange rate regime	Fixed exchange rate	Floating exchange rate
Monetary policy (interest rate)	Loose	Tight
Openness to trade	Less open economy	More open economy
Financing mechanism	Debt-financed investment	Tax-financed investment
Public indebtedness	Low levels of public debt	High levels of public debt

Infrastructure projects could form an important part of fiscal stimulus, particularly when macroeconomic conditions are supportive. But not all initiatives will be equally effective. Governments need to be smart about identifying high-quality projects that can meet policy goals.

Source: Adapted from World Bank, 20 August 2020

Questions

(a) With reference to Table 1, explain which country performed better from 2021 to 2023, in terms of real economic growth **and** fiscal debt. [4]

(c) Explain why the statement in Extract 4 that 'The city-state has no net debt' is a positive one. [2]

(d) With reference to Extract 5:

(i) Explain the likely value for the price elasticity of demand (PED) for high-speed rail travel for an average consumer in Malaysia. [2]

(ii) Using the PED concept **and** a supply and demand diagram, explain the pricing strategy that you would recommend to the private rail companies in Malaysia. [4]

(e) Discuss the possible effects of the high-speed railway (HSR) on the living standards of Malaysians. [8]

(f) With reference to Table 2, discuss the extent of the effectiveness of infrastructure stimulus in Singapore given that it is open to trade and relies on debt-financing mechanism. [10]

[Total: 30]

[End of Paper]

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